

**INVESTOR BEHAVIOUR, INVESTOR DEMOGRAPHIC
CHARACTERISTICS, INVESTMENT STYLE AND
INDIVIDUAL INVESTOR PORTFOLIO PERFORMANCE
AT THE NAIROBI SECURITIES EXCHANGE**

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DOCTOR OF PHILOSOPHY

(Business Administration)

**JOMO KENYATTA UNIVERSITY OF
AGRICULTURE AND TECHNOLOGY**

2016

**Investor Behaviour, Investor Demographic Characteristics,
Investment Style and Individual Investor Portfolio Performance at the
Nairobi Securities Exchange**

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**A thesis submitted in partial fulfillment of the Degree of Doctor of
Philosophy in Business Administration in the Jomo Kenyatta University
of Agriculture and Technology**

2016

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Sign..... Date.....

Winnie Iminza Nyamute

This thesis has been submitted for examination with our approval as the university supervisors.

Sign..... Date.....

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Sign..... Date.....

Dr. Margaret Oloko,
JKUAT, Kenya

DEDICATION

I dedicate this thesis to my parents for giving me the foundation in education that has allowed me to reach where I am today. To my children, thank you for your love and understanding during the entire period of my research.

ACKNOWLEDGEMENT

My appreciation goes to many whose without contribution this thesis would not have been possible. The invaluable support, guidance and critical comments from my supervisors Dr. Josephat Lishanga and Dr. Margaret Oloko made the walk through every stage of this thesis possible. I am grateful to them for their encouragement, invaluable comments and technical advice that helped me to remain focused throughout the dissertation process.

I appreciate the support provided by the investors in filling the questionnaires and providing the necessary data for this research thesis. I wish to thank the stock brokerage community for the support provided during the difficult stage of data collection. I am thankful to my research assistant, Philip Kitheka for the support provided during my research work.

I thank my colleagues at the University of Nairobi for the support and encouragement given to me during the entire period of my research. I am grateful to my employer for providing a conducive environment for reading and research which allowed me to successively complete my PhD studies as I worked.

I thank my family for the understanding during the busy and stressful period of my research. I am particularly grateful to my daughter Linda for always challenging me to attain my PhD and providing the necessary support when required.

To the Almighty God, thank you for giving me serenity of mind, wisdom and knowledge to conceptualize the research ideas and deliver a concrete research thesis.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
CAPM	Capital Asset Pricing Model
CDSC	Central Depository & Settlement Corporation
CML	Capital Market Line
IPOs	Initial Public Offers
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KASIB	Kenya Association of Stock Brokers and Investment Bankers
MPT	Modern Portfolio Theory
NASI	NSE All Share Index
NSE	Nairobi Securities Exchange
NYSE	New York Stock Exchange
RFR	Risk Free Rate
UoN	University of Nairobi

ABSTRACT

This study sought to determine the relationships among investor behaviour, investor demographic characteristics, investment style and individual investor portfolio performance at the Nairobi Securities Exchange in Kenya. The study aimed at addressing the research gaps identified in the literature which included: conflicting empirical findings on the effect of investor behavior on portfolio performance; limited studies on the joint effect of investor behavior, investor demographic characteristics and investment style on investor portfolio performance; lack of inclusion of intervening and moderating effects on the relationship between investor behavior and portfolio performance; differences in contextual setups and finally, the use of traditional financial measures that assume that portfolio performance is only affected by the market risk. To address the above gaps, six hypotheses were formulated and tested. The study tested the direct relationship between investor behaviour and portfolio performance; the moderating and intervening effect of demographic characteristics and investment style respectively on the relationship between investor behaviour and portfolio performance as well as the joint effect of investor behaviour, demographic characteristics and investment style on individual investor portfolio performance. The population consisted of individual investors estimated at 2.4 million based on the CDSC investor data base as on December 31, 2014. A mix of random and convenience sampling methods were used and data was collected from 348 respondents out of the target sample size of 385. The data was analyzed using descriptive statistics, correlation analysis and inferential statistics. Hierarchical multiple regression analysis was used to test the hypotheses. The findings show that investor behaviour influences individual portfolio performance and the investment style adopted by the investor. Further, the results indicate that demographic characteristics moderate the relationship between investor behavior and portfolio performance while investment style has no mediating role in the relationship between investor behaviour and portfolio performance. Jointly, investor behavior, demographic characteristics, and investment style explain 8% of the variations in individual investor

portfolio performance and the relationship is statistically significant. This study concludes that investors do not often review their biases and the effect they have on performance hence they keep on suffering from the consequences of the similar mistakes. It also concludes that even the financially literate investors suffer from behavioral effects and that other demographic characteristics also impact portfolio performance. The study recommends that the Capital Markets Authority, the Nairobi Securities Exchange and other capital market players clearly appreciate the role played by investor behavior, investment style and demographic characteristics in influencing share price movements and use the information as a basis of investor education for purposes of minimizing the amount of noise trading and price distortion in the Kenyan capital market. The study contributes to existing knowledge by introducing the moderating and intervening variables in the relationship between investor behaviour and individual portfolio performance at the NSE. It also serves as a reference point for investors to understand how their behaviour affects their portfolio performance and thus learn to avoid those behaviors that negatively impact the value of their investment and also incorporate fundamental information in their buying and selling decisions.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Traditional finance presupposes that people view all decisions through the transparent and objective lens of risk and return. It assumes that people are guided by reason and logic and independent judgment. It argues that markets are efficient, implying that the price of each security is an unbiased estimate of its intrinsic value. Behavioral finance, on the other hand, recognizes that emotions and herd instincts play an important role in influencing decisions. It postulates that perceptions of risk and return are significantly influenced by the way decision problems are framed. It contends that heuristic-driven biases and errors, frame dependence, and effects of emotions and social influence often lead to discrepancy between market price and fundamental value (Sewell, 2008).

Behavioural finance combines psychology and economics to explain why and how people make seemingly irrational or illogical decisions when they spend, invest, save, and borrow money. It shows what happens when emotional reactions are engaged in investment decisions that shape the securities market and impact the prices of securities, as well as the allocation of financial resources in both spending and saving habits. This implies that in order to have a complete view of the market and its performance, one cannot ignore the investors' behavioural patterns (Gilovich, 1999).

Modern portfolio theory provides practitioners with a set of quantitative tools for prescribing how investors should combine financial assets to maximize return for a given risk. Prospect theory is significant in Behavioural finance as it describes how people make choices in situations where they have to decide between alternatives that involve risk. However, in financial transactions, mental accounting is used to describe how individuals think about and evaluate their financial transactions. The role of stereotypes in investment decisions is explained by heuristic theory also

referred to as representativeness. Effects of beliefs or assumptions of investment processes is explained by cognitive dissonance as the mental conflict that people experience when presented with evidence that their beliefs or assumptions are wrong.

1.1.1 Investor Behaviour

Research studies suggest that human beings are rational agents and modern economics are built on the notion that investors attempt to maximize wealth while minimizing risks (Barber & Odean, 2011). Thus, investors carefully assess the risk and return of all possible investment options to arrive at an investment portfolio that suits their level of risk aversion. Barber and Odean (2011) however opine that real individual investors behave differently from investors in modern economics models. Most individual investors hold undiversified portfolios. Many apparently uninformed investors suffer from overconfidence by trading actively, speculatively, and to their detriment. And, as a group, individual investors suffer from herding by making systematic, not random, buying and selling decisions.

Investors behave differently in different market situation before investing and would always consider the return, flexibility and the risk among other factors but determining the pulse of an investor is a question that remains unanswered by the markets. It would add value if the demographics and psychographics of the investor were studied for the market to know the preferences of an investor and how to act upon them. Investor behaviour analysis deals with analyzing the behavior of an investor based on his demographic and psychographic factors like age, gender, social class, and income groups. This will be helpful to the stock brokers and portfolio managers so that they can offer better portfolios to their investors. Behavioural finance models that incorporate overconfidence provide an even stronger prediction that active investment strategies will underperform passive investment strategies (Odean, 1998). Historically, active management has underperformed passive management, suggesting that too many resources have been devoted to security research, resulting in sub-optimal returns to investors.

Rattner (2009) argues that large investors act as antagonists to other investors by following opposite trading behavior when the disclosure of new information has been made. Although the underlying dynamics of this systematic behavior remains largely unexplained, Ekholm (2006) argues that investment decisions may be affected by psychological biases, such as overconfidence. He argues that differences in trading behavior when new information is disclosed are driven by differences in overconfidence, and that investor size is a good measure of overconfidence. This explains the fact that investor overconfidence affects portfolio performance. People tend to be overconfident and hence overestimate the accuracy of their forecasts. Overconfidence stems partly from the illusion of knowledge and the illusion of control. Investors tend to believe that they have influence over future outcomes in an uncertain environment due to an illusion of control. Overconfidence manifests itself in excessive trading in financial markets and is more common in emerging markets. Overconfidence also explains the dominance of active portfolio management.

Becket (2012) posits that there is evidence that when faced with uncertainty, human beings arrive at decisions and choices in an irrational, inconsistent and incompetent manner. Rattner (2009) posits that investor behaviour therefore looks at how behaviour impacts investment decisions. The behavior of herding has been seen to affect security prices by either driving them away or closer to their intrinsic values. Herding behaviour, both rational and irrational has been used to explain many financial markets phenomena including stock price volatility, market crashes and market bubbles (Lakonisok *et al.*, 1992). Theoretically, fund investors receive high quality information than individual investors and hence tend to trade with similar stocks causing herd behaviour (Lakonisok *et al.*, 1992). Researching on how herding behaviour affects individual investor portfolio performance is a key contribution to empirical as well as theoretical literature.

Loewenstein (2000) argues that the emotions and feelings experienced at the time of making a decision often propel behaviour in directions that are different from that dictated by a weighing of the long-term costs and benefits of disparate actions.

Emerging markets are characterized by few investment experts who suffer from overconfidence due to an illusion of knowledge and control. The investors tend to herd together and also suffer from disposition effect. The natural desire on the part of human beings to be part of a group makes people to herd together and this induces one to decide on the "feel" of the herd rather than on rigorous independent analysis. This tendency is accentuated in the case of decisions involving high uncertainty hence individuals ignore their private information but take cues from the actions of others hence financial markets which are constantly bombarded by new information lead investors to overreact to both good and bad news.

Investor behaviour is important in influencing investor portfolio performance. The investors tend to herd together to be part of a group hence avoiding independent analysis. Emerging markets, Kenya being one of them, are characterized by few investment experts who suffer from overconfidence due to an illusion of knowledge and control. The investors tend to herd together and also suffer from disposition effect as they make investment decisions. This study focused on the three forms of investor behaviour namely; overconfidence, herding and disposition effect as they have been found to be prevalent from the literature (Loewenstein, 2000; Rattner, 2009; Lakonisok *et al.*, 1992).

1.1.2 Investor Demographic Characteristics

Demographic characteristics are considered to affect risk tolerance and tolerance affects the decision to invest and hence the value of a portfolio. Investor risk tolerance refers to the maximum amount of investment risk someone is comfortable taking (Schaefer, 1978). Risk tolerance induces an order relation on risk evaluation. According to Schaefer (1978), two persons can agree on the riskiness of a set of gambles, but may nevertheless prefer different gambles, rank-ordering them differently according to their personal risk tolerance. He argues that someone with a high level of risk tolerance would be expected to accept a higher exposure to risk in the sense of taking sole responsibility, acting with less information, and requiring less control than would someone with a low level of risk tolerance. Individuals with low levels of risk tolerance generally require lower chances of a loss, choose not to

operate in unfamiliar situations, tolerate less uncertainty, and require more information about the performance of an investment (MacCrimmon & Wehrung, 1986). Gender is considered an important investor risk-tolerance classification factor where men and women tend to fit the personality trait called “thrill seeker” or “sensation seeker” respectively. There is also a prevalent belief that men take greater risks than women, which has generated a consensus among investment managers that gender is an effective differentiating and classifying factor in individual portfolio performance.

Investment managers use age as a measure of the time remaining until a client’s financial assets are needed to meet goals and objectives. In addition to being used as a proxy for time, investment managers also use age as a measure of someone’s ability to recoup financial losses. It is widely assumed that older individuals have less time to recover losses than do younger individuals, and as such, older individuals will have lower risk tolerances implying that investors suffer from disposition effect (Razek, 2011).

Studies by investment managers have found that higher ranking occupational status can be used as a classification factor related to higher levels of investor risk tolerance (Razek, 2011). According to MacCrimmon and Wehrung (1986), upper income persons usually the financially literate, tend to take greater risks than individuals with lower incomes as increased income levels are associated with access to more immediate resources (O’Neill, 1996), leading some to conclude that increased levels of income lead to increased levels of risk tolerance. Sung and Hanna (1996) argue that high levels financial literacy allow someone to assess risk and benefits more carefully than someone with less education in finance. Higher levels of financial literacy have been found to encourage risk taking (MacCrimmon & Wehrung, 1986) and this implies that investors with higher levels of financial literacy tend to be overconfident as they under estimate risk.

1.1.3 Investment Style

Investment style refers to the strategies adopted by investors in making investment decisions. The choice of the style adopted by the investor is intended to serve different circumstances depending on the needs of the investor. An investor is said to employ an active investment strategy when they buy and sell their investments with the aim of taking advantage of profitable opportunities and therefore trade very often than an average investor. A passive investor on the other hand purchases an investment, holds it for a long time awaiting its appreciation and generally has limited turnover (Goldman Sachs, 2010). French (2008) concludes that active investors tend to spend value chasing higher returns therefore underperform passive investors. Emerging markets have thinly traded therefore making trading costs a matter of great importance and that give a better return to passive investors (Mamudi, 2009).

An investor may adopt the strategy of purchasing value or growth stocks. Value stocks have a low P/E ratio and a high dividend yield implying that the stocks are under-priced. A growth stock has a high P/E ratio and a low dividend yield and is a representative of a company with a high earnings growth rate (Lakonishok *et al.*, 1994). Investing in value stocks was found to be more profitable than investing in growth stocks in Japanese market (Chan *et al.*, 2002). Lakonishok *et al.*(1994) suggested that the higher returns achieved by value styles are due to the fact that these are contrarian strategies of noise traders that make investors pay too much attention to recent earnings growth and hence overreact to both good or bad news leading to overpricing of the growth stocks and under-pricing of the value strategies. Noise trading is a sign of market inefficiency that is a characteristic of emerging markets of which Kenya is one.

1.1.4 Portfolio Performance

Successful stock investing is not only choosing a particular stock but also involves how one goes about doing it. Successful investors will therefore go beyond picking good stocks and watching the financial news but proceed on to implement techniques

and strategies that help them either minimize losses or maximize gains (Paul, 2009). Rational stock investors practice sensible stock investing where common sense, best practice, sensible risk management and a reasonable degree of attention and care are upheld (Knapp, 2006).

A portfolio manager should have the ability to derive above-average returns for a given risk class and the ability to diversify the portfolio completely to eliminate all unsystematic risk, relative to the portfolio's benchmark. Treynor (1965) developed the first composite measure of portfolio performance that included risk. He postulated two components of risk, that is, the risk produced by general market fluctuations and the risk resulting from unique fluctuations in the portfolio securities. Treynor was interested in a measure of performance that would apply to all investors regardless of their risk preferences. He introduced a risk-free asset that could be combined with different portfolios to form a straight portfolio possibility line between the rates of return for a portfolio over time and the rates of return for an appropriate market portfolio. The Treynor index however requires that security returns are normally distributed.

The Jensen (1968) measure notes the expected return and the risk-free return vary for different periods. Consequently it is concerned with the time series of expected rates of return for a security or a portfolio. The Jensen measure of performance requires using a different Risk Free Rate (*RFR*) for each time interval during the sample period and does not directly consider the portfolio manager's ability to diversify because it calculates risk premiums in terms of systematic risk.

The Sharpe (1994) measure of portfolio performance followed closely his earlier work on the Capital Asset Pricing Model (CAPM), dealing specifically with the Capital Market Line (CML). This composite measure of portfolio performance is similar to the Treynor measure but it however seeks to measure the total risk of the portfolio by including the standard deviation of returns rather than considering only the systematic risk as summarized by beta. Since the Sharpe ratio does not make any assumption about the distribution of the returns and considers the total portfolio risk, it is the most suitable measure of performance for individual investors.

Individual investor portfolios are either concentrated or diversified. According to Ivkovic, Sialm and Weisbenner (2008), despite longstanding and widespread financial advice to hold well diversified portfolios, several studies find that many individual investors tend to concentrate their portfolios in a small number of stocks due to fixed trading costs, behavioral biases such as familiarity or overconfidence and because they are able to identify stocks with high expected returns.

1.1.5 Nairobi Securities Exchange

The NSE began in the early 1954 as a mutual association of stock brokers and became a listed company in September 2014. There are sixty five companies listed on the Nairobi Securities Exchange as on December 31st 2014 and twenty two active licensed stock brokers. Currently the NSE is trading more than a 100 million shares each day, and plays a large role in the economic growth of Kenya. The volume of stocks traded at the Exchange was 5.46 billion in 2012 compared with a record 7.55 billion in 2010 and 5.72 billion in 2011. The NSE had an average of 2.4 million retail investors with an average turnover of slightly more than one billion Kenya shillings per day in the year 2014.

The NSE is one of the major avenues that the Kenya Government is using to achieve its growth objectives as it falls in the economic pillar of the Vision 2030. Volatility in trading volumes and prices has been observed in the Kenyan capital market. Market sentiments have been observed to sway wildly from positive to negative and back frequently within short periods of time leading to fluctuations in traded volumes and market capitalization. The swigs attributed to irrational investor behaviour and how investors interpret new information and act on it to make decisions under conditions of uncertainty.

Initial public offers (IPOs) have attracted interest in directions opposite to those expected from market fundamentals leading to under subscription or excessive over subscription like what happened with the NSE's IPO which had over 700% over subscription and outperformed the market in its first month of trading. The market has tended to overreact to new information as evidenced by the drop in the market

capitalization from approximately Kenya shillings 1.4 billion daily to Kenya shillings 400 million daily as a result of the introduction of the capital gains tax which was later suspended.

Trades by the investors have to go through the stock brokers who may also act as advisors to the investors. There are only 22 stock brokers who have to serve a total of over 2.4 million retail investors in addition to other institutional investors. This workload makes it almost impossible for the stock brokers to provide adequate advice and education to their clients. The NSE, CMA and KASIB usually carry out investor education programs to provide investors with financial information regarding the capital markets operations as well as the products available plus the associated risks and possible returns.

1.2 Statement of the Problem

The central assumption of the traditional finance model is that investors are rational and they make decisions using the transparent lens of risk and return. However, psychologists challenged this assumption arguing that people often suffer from cognitive and emotional biases and act in a seemingly irrational manner. Investors tend to adopt the behaviour of herding, disposition effect and overconfidence among others in making investment decisions which can lead them to commit errors as they ignore fundamental information. Barber and Odean (2011) opine that individual investors behave differently from investors in modern economics models as they hold undiversified portfolios and many uninformed investors trade actively and speculatively ending up with poor portfolio performance. Demographic characteristics such as age, gender, marital status and financial literacy are considered to affect risk tolerance and tolerance affects the decision to invest and hence the value of a portfolio. Investment styles that are used by investors include passive, active, value and growth oriented strategies each of which affect portfolio performance differently. Investors prefer to have high returns for a given risk and therefore knowledge of how the above factors affect portfolio performance is critical to the investors as they make investment decisions.

The Nairobi Securities Exchange is an emerging capital market with few investment advisors. Investors must trust the market to put their money in it to help achieve the growth objectives for Kenya. Although investor education programs have been carried out by the NSE, CMA and KASIB, the market has and continues to experience unexplained volatility with both volumes traded and market capitalization moving in directions opposite to those expected from market fundamentals. Initial public offers (IPOs) have been under or oversubscribed like the NSE's IPO which had over 700% over subscription and outperformed the market in its first month of trading. The investors have a tendency to overreact to new information as evidenced by the drastic drop in the market capitalization from approximately Kenya shillings 1.4 billion daily to Kenya shillings 400 million daily early in the year 2015 as a result of the introduction of the capital gains tax which was later suspended. These happenings indicate that investor behaviour influences capital market performance in Kenya.

Empirical analysis of the relationship between investor behaviour and portfolio performance has not yet provided a clear link between these two variables since the studies have provided conflicting evidence. Barber and Odean (2000; 2001), Gavriilidis (2013) and Odean (1999) posits that individual investors trade excessively, expose themselves to a high level of risk, and make poor ex post investing decisions. Barber and Odean (2001) posits that men are more overconfident than women; they trade more and perform worse than women. Agrawal (2012) noted that announcement returns were lower for overconfident bidders as compared to rational bidders. On the contrary, Chen et al. (2007) found that overconfidence produced superior returns among the Chinese investors. Barber and Odean (2011) find that investors in markets in America suffered from disposition effect among other investor behaviors and that they tended to underperform diversified portfolios. Basu (1977) found that the style of investing in value stocks provides returns that surpass that of investing in growth stocks. Lakonishok *et al.* (1994) suggested that contrarian strategies of noise traders make investors pay too much attention to recent earnings growth and hence overreact to both good and bad news leading to overpricing of the growth stocks and underpricing of the value strategies.

Goodfellow *et al.* (2009) found that individual investors were very prone to herding and that herding significantly affected portfolio performance. Hsu and Shiu (2010) find that investor's financial literacy in the Chinese market does not necessarily mitigate behavioural biases, nor improve trading performance while Sung and Hanna (1996) concluded that financial literacy was significant in determining investors' willingness to assume greater risk.

The conflicting results may be explained by the fact that the relationship between investor behaviour and portfolio performance is affected by other factors such as demographic characteristics and investment style which were not captured in these studies. Some of the studies (Barber & Odean, 2011) used secondary data while other studies (Chen *et al.*, 2007) used primary data and this could bring differences in the results and conclusions based on methodological differences. These studies were also conducted in developed economies making it difficult to generalize the findings in an emerging market like the NSE which is the context of the current study.

Although a number of studies have been done in Kenya on investor behavior, the area still remains under explored. Waweru, Munyoki, and Uliana (2008) investigated the role of behavioural finance in investment decision making at the Nairobi Securities Exchange (NSE) and concluded that behavioural factors affected the decisions of the institutional investors. The study focused on institutional and not individual investors which is the focus of the current study. Lishenga (2010) tests the pervasiveness of profitability of momentum strategies and finds that past winners outperform past losers for most of the periods. The study did not consider other investment styles other than the momentum strategies and it also did not focus on performance of individual investors. The current study looks at investment styles and how they affect the performance of individual investors. Kimani (2011) surveyed the influence of behavioural factors on individual investors' choices of securities at the NSE and found that investors suffered from behavioural biases. The study did not evaluate how the decisions of investors affect their portfolio performance. The current study addresses the effect of investor behavior on portfolio performance. The above studies did not consider the relationship between investor behavior and

investor portfolio performance and how the relationship is moderated by demographic characteristics or intervened by investment style. The conflicting empirical findings, the different methodological approaches, the narrow approach to the study variables and the different economies studied provided research gaps that the current study sought to fill. The study sought to answer the question: what are the relationships among investor behaviour, demographic characteristics, investment style and portfolio performance?

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of the study was to establish the relationships among investor behavior, investor demographic characteristics, investment style and portfolio performance at the Nairobi Securities Exchange.

1.3.2 Specific Objectives

Based on the general objective above, the specific objectives of the study are:

- i. To determine the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange;
- ii. To examine the relationship between investor behavior and investment style at the Nairobi Securities Exchange;
- iii. To establish the relationship between investment style and portfolio performance at the Nairobi Securities Exchange;
- iv. To determine the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange;
- v. To establish the intervening effect of investment style on the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange; and

- vi. To determine the joint effect of investor behavior, investor demographic characteristics and investment style on portfolio performance at the Nairobi Securities Exchange.

1.4 Justification of the Study

The findings of this study add value to the theory as well as the practice of finance in the area of investor behavior, demographic characteristics, investment style and individual investor portfolio performance.

Companies going public can use the findings of this study to understand how investor behaviour influence the price of securities and hence be able to set realistic IPO prices that appear neither undervalued nor overvalued from the point of view of investors. The investors would also understand how their behaviour affects their portfolio performance and thus they can learn to avoid those behaviors that have a negative impact on the value of their investment.

Stockbrokers and mutual fund companies promise to maximize the wealth of investors who are their clients. They seek to satisfy the preferences of investors hence the findings would help them understand investor behavior and advise them appropriately.

The study findings would be informative to policy making and regulation of capital markets especially with regard to the role played by individual demographic characteristics and investor behaviour on capital market developments.

The findings of this study would provide insight to current and potential investors since they would make viable investment decisions without relying on incorrect information and without having to hold on to unprofitable ventures when the markets present a variety of good stocks in upcoming firms.

The findings of this study provide a review of theory and empirical evidence on behavioral finance to the learning institutions and researchers that would open up further areas of study. The findings provide evidence on the relationships among investor behavior, demographic characteristics, investment style and portfolio

performance on the NSE which enriches the existing literature theoretically and practice.

The public and potential investors in stock markets, it would be an eye-opener and provide guidelines on effect of behavioral bias on trading activities and to understand the market dynamics and look more closely at factors other than price that influence the performance of the securities in the market and how to deal with newly traded securities.

1.5 Scope of the Study

This was a study of retail investors in stocks of the Nairobi Securities Exchange for the period starting January 1st 2010 to December 31st 2014. The study covered individual investors estimated at 2.4 million based on Central Depository & Settlement Corporation limited (CDSC) investor data base as on December 31st 2014.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the theoretical and empirical literature on relationships among investor behaviour, investor demographic characteristics, investment style and portfolio performance. It also identifies the conceptual model and the gaps intended to be filled by this study.

2.2 Theoretical Review

2.2.1 Efficient Markets Hypothesis (EMH)

The traditional capital markets theory springs from the notion that securities markets are efficient, people like returns although they do not like risks implying that for them to take any additional risk, they must be compensated with higher returns. The Efficient Markets Hypothesis was developed by Eugene Fama (1970) and according to it, security prices reflect all available information and the prices change randomly reacting to new information that arrives randomly, is widely available to market all participants at the same time and is quickly and fully incorporated in stock prices. Since all the new information is already incorporated in the prices according to the EMH, there is no point of investors trying to seek profits higher than those of the market itself. The implication of the EMH is that there are no naive market participants and investors peg their bids to the market portfolio to optimize the returns. The EMH however fails to explain why stock markets crash (1997; 2008-2009) making markets untrustworthy and inefficient.

The EMH assumes that there are a large number of rational, profit-maximizing investors who actively participate in the market by analyzing, valuing, and trading securities. According to the EMH, markets must be competitive meaning no one investor can significantly affect the price of the security through their own buying or selling since the competition among investors who seek arbitrage profits drives prices to their intrinsic value. The EMH assume that investors are rational and they

aim to maximize their expected utility by making unbiased forecasts of the future (Ritter, 2003). Grossman and Stiglitz (1980) however posits that information has a cost associated with it as there is usually an incentive for investors to spend resources to obtain it implying that prices do not reflect all available information. Grossman and Stiglitz (1980) argue that investors are prone to trading using what they perceive to be relevant information which may actually turn out to be irrelevant, thus moving the actual prices away from their intrinsic values. Stocks with low PE ratios have been found to give higher returns compared to those with high PE ratios disputing the notion that security prices are efficiently determined (De Bondt, 2008).

The many findings challenging the assumptions of the EMH led to the emergence of behavioral finance which posits that investors make decisions based on psychological, emotional and social influences (Thaler, 1993). Since psychological factors differ from person to person, investors are unlikely to randomly trade with each other thus disputing the rationality assumption of the EMH. Behavioral finance assumes that in some instances, markets are inefficient due to limits to arbitrage and presence of noise traders. According to Barberis and Thaler (2003) behavioral finance combines the disciplines of finance, psychology and Sociology to explain how decisions are made in securities markets. Psychologically, people exhibit certain biases systematically while formulating their beliefs and preferences thus affecting their decisions. Sociologically, people's social interactions influence the decisions they make especially under conditions of uncertainty. This contradicts the EMH's assumption that investors make decisions using the transparent lens of risk and return.

2.2.2 Prospect Theory

Prospect theory was developed by Psychologist Daniel Kahneman and Amos Tversky in 1979 as a psychologically realistic alternative to expected utility theory. The theory allows one to describe how people make choices in situations where they have to decide between alternatives that involve risk. It describes how people frame and value a decision involving uncertainty and therefore they look at choices in terms

of potential gains or losses in relation to a specific reference point, which is often the purchase price (Kahneman, 2003). According to prospect theory, people feel more strongly about the pain from loss than the pleasure from an equal amount of gain. People tend to under-weigh probable outcomes compared with certain ones and people respond differently to the similar situations depending on the context of losses or gains in which they are presented (Kahneman & Perttunen, 2004). Prospect theory may lead to mental accounting where individuals separate their money into various mental accounts and treat a dollar in one account differently from a dollar in another because each account has a different significance to them. In financial markets, mental accounting is manifested through the tendency of investors to ride the losers as they are reluctant to realize losses since mentally, they treat unrealized paper loss and realized loss differently although from a rational economic point of view they are the same.

Generally, the prospect theory is concerned with how and why individuals make decisions under uncertainty in a real day to day life while the traditional classical utility theory emphasizes how decisions should be made in a rational environment. Prospect theory may be used to explain the irrationality that is constantly seen in financial markets that goes contrarily to the assumptions of the EMH that prices reflect the intrinsic value of securities. Investors often have an irrational preference for stocks paying high dividends as they do not mind spending the dividend income, but are not inclined to sell a few shares even when the fundamentals demand they sell since they consider shares to be their hard earned investment.

Since people are loss-averse, the prospect theory may lead to narrow framing which leads to myopic risk aversion creating a disposition effect. When investors sell shares, they typically sell stocks that have appreciated rather than those that have depreciated. This means that investors are afraid to close their losing positions at least until they see a little shed of hope that prices would turn around, while in winning situations they are prone to grab the first opportunity to sell their assets (Kahneman & Tversky, 1979).

Prospect theory describes the states of mind affecting an individual's decision-making processes including regret aversion and loss aversion (Waweru *et al*, 2003). Regret is an emotion that occurs after people make mistakes. Investors avoid regret by refusing to sell shares whose prices have gone down and willing to sell those that have appreciated. Moreover, investors tend to be more regretful about holding losing stocks too long than selling winning ones too soon (Forgel & Berry, 2006). According to Kahneman (1979), an important implication of prospect theory is that the way economic agents subjectively frame an outcome or transaction in their mind affects the utility they expect or receive. This theory has been criticized for failing to explain why people are attracted to both insurance and gambling. The theory does not also explain how behavior affects the total returns of individual investors.

2.2.3 Heuristic Theory

The traditional finance theory assumes that people process data appropriately and correctly but the heuristics theory recognizes that people employ imperfect rules of thumb to process data, come to judgments and solve complex problems in situations of uncertainty and incomplete information. Heuristics may produce good results in a number of situations but may also induce biases in people's beliefs and predispose them to commit errors. According to Ritter (2003), heuristics make decision making easier, especially in complex and uncertain environments by reducing the complexity of assessing probabilities and predicting values to simpler judgments that are based on trial and error and stereotypes. The reality is that the investors' decision making process is not strictly rational but is often influenced by mental and emotional factors even when the investors have collected the relevant information and objectively evaluated it. Investors may become overly optimistic about past winners and overly pessimistic about past losers and they generally may assume that good companies are good stocks, although the opposite holds true most of the time.

Heuristics may make investors overconfident as they overlook risks causing security prices to move away from fundamentals. People tend to be overconfident and hence overestimate the accuracy of their forecasts due to an

illusion of knowledge and illusion control. The human mind is perhaps designed to extract as much information as possible from what is available, but may not be aware that the available information is not adequate to develop an accurate forecast in uncertain situations. When people have special information or experience-no matter how insignificant, they may be persuaded to think that they have an investment edge. People also tend to believe that they have influence over future outcomes in an uncertain environment especially when they have been actively involved in decisions that have yielded positive earlier outcomes. Studies in human behavior in financial markets find overconfidence among trading participants to be a major contributor factor to overtrading. Barber and Odean (1999) attribute the high volume of trading to the overconfidence of investors which makes the investors believe their own judgment as definitely superior and ignore the assessment of others. Grinblatt and Keloharju (2006) find that overconfident investors tend to trade more frequently in stock markets as they overestimate the precision of their own information signal instead of the received publicly information signals. The heuristics theory is based rules of the thumb that lead to irrational behaviour that could be costly to the investor. Rational behaviour requires a combination of sound intellect with emotional discipline (Parikh, 2011).

2.2.4 Herding Theory

There is a natural desire on the part of human beings to be part of a group so people tend to herd together. Moving with the herd, however, magnifies the psychological biases. It induces one to decide on the 'feel' of the herd rather than on rigorous independent analysis especially in the case of decisions involving high levels of uncertainty. Investors often spend very little time to analyze individual stocks in the market but focus on buying the stocks that are currently at the center of attention by other market players. Herding can be irrational when investors in stock markets sell their stocks to avoid losses when there is a large stock market decline because other investors are doing so hence they ignore all rational analysis and react in panic leading to market distortions. According to Odean *et al.* (2007) herding behavior is adopted by people who think that they do not have adequate information and believe

that the knowledge of other people can help them make investment decisions much faster and easily. Investors imitate the actions of others believing that other people have better information than they do. Shefrin and Statman (1985) argue that herding can lead to disposition effect where individual investors sell stocks which have appreciated in value while they tend to hold on to stocks that have lost value due to loss aversion.

Herding can be rational when investors with information are bombarded with information from observing the actions of other investors and deliberately choose to act against their private information by following the crowd although they do not discard their information (Bikhchandani & Sharma, 2001). Herding behavior may occur due to the production of information asymmetry in the market as different groups of investors get diverse information with varied quality and the rate of their accessibility to information makes each group have its special investment behavior.

Herding in financial markets may stem from reputational fear where investment managers follow the actions of others so that they cannot be accused of inability to make sound judgments if their decisions turn out to be bad. They tend to seek comfort in the crowd as it is easy to push the blame to poor investment environment although this can have major implications for the stock market. Rational herding may also stem from investment managers' compensation that is based on their performance relative to those of other managers. Investment managers tend to herd towards the bench mark if their compensation is determined using the bench mark as a base (Bikhchandani & Sharma, 2001). Herding behavior is found to be undertaken in order to favorably affect investors' assessment of the analyst's forecasting ability.

Economists are interested in what might affect their risk and return characteristics while practitioners are concerned with what might create arbitrage profit opportunities. Investor herding has a behavioral effect on stock prices and the power to drive prices away from their fundamental values (Chiang & Zheng, 2010). Whether herding is rational or irrational, it deviates from the traditional theory of finance assumptions since investor decisions are not only influenced by fundamentals but also by following the crowd.

2.2.5 Modern Portfolio Theory

Modern Portfolio Theory (MPT) proposes an investment strategy that is philosophically opposite to traditional stock picking (Shefrin, 2000). It emerges from economists who try to understand the market as a whole, rather than business analysts who look for what makes each investment opportunity unique. Investments are described statistically in terms of their expected long-term return rate and their expected short-term volatility. The volatility is equated with risk, measuring how much worse than average an investment's bad years are likely to be. The goal is to identify the acceptable level of risk tolerance and then to find a portfolio with the maximum expected return for that level of risk. The key tenet of MPT therefore is that if one wishes to increase the performance and reduce the risk in an overall investment portfolio, he or she should combine investments that are non-correlated with one another (Thaler & Shefrin, 1981).

Markowitz (1952) provided researchers with a set of quantitative tools for prescribing how investors should combine their financial assets to maximize return for a given risk as measured by the standard deviation thus emphasizing on the nature and mix of assets to be held. A central aspect of MPT is that every investor should hold an optimal portfolio that is fully diversified. Diversification requires that investors randomly select the assets they invest in. The theory has been criticized on the ground that investors evaluate an investment opportunity based on the value they are likely to get and not how it affects their overall wealth. Many investors do not know their total portfolio risk or the interrelationships among the assets and consider many factors other than risk diversification in building up their portfolio.

The development of MPT and the Capital Asset Pricing Model (CAPM) provided a theoretical framework that could be applied to meet the challenges of performance measurement. Treynor (1965), Sharpe (1966), and Jensen (1968) were the first to realize the potential applications of MPT and CAPM for investment performance. The Treynor index is calculated using excess returns on the fund where the excess return on the fund is scaled by the beta of the fund and not the funds' standard deviation of returns. The Jensen's Alpha is a reward to risk measure which borrows

from the capital asset pricing model (CAPM) and it assumes that every investor holds a diversified portfolio therefore only the non-diversifiable market-related risk affects portfolio performance. Jensen's Alpha uses only systematic risk for scaling a portfolio's return. The Sharpe ratio is a risk-adjusted measure developed by the Nobel Laureate William Sharpe. The Sharpe ratio is determined using standard deviation and excess returns to come up with the reward per unit of risk. In theory, any portfolio with a Sharpe index greater than one is performing better than the market benchmark. Unlike the other measures of performance above, the Sharpe ratio does not make any assumptions about the nature of the distribution of the portfolio returns and therefore it can be used even when the portfolio returns do not follow a normal distribution. The current study does not make any assumptions regarding the distribution of individual investors' returns therefore the Sharpe ratio was the most appropriate measure of performance.

2.3. Empirical Literature Review

This section reviews studies on the relationships among investor behaviour, demographic characteristics, investment style and portfolio performance.

2.3.1 Investor Behaviour and Portfolio Performance

Investors may be inclined toward various types of behavioral biases, which lead them to make cognitive errors. Bloomfield, *et al.* (2010) categorizes the different types of cognitive errors that investors can make. People may make predictable, non-optimal, choices when faced with difficult and uncertain decisions because of heuristic simplification. Heuristic simplification exists because constraints on cognitive resources force the brain to shortcut complex analyses.

One outcome of heuristic simplification, self-deception, occurs because people tend to think that they are better than they really are (Gavriilidis, 2013). Both the psychology and the recent finance literature characterize people with this type of behavior as being overconfident. Barber and Odean (2000, 2001) posits that individual investors trade excessively, expose themselves to a high level of risk, and make poor ex post investing decisions. Odean (1999) finds that stocks that

individuals sell outperform stocks that they buy. This study does not however consider other factors that could have contributed excessive trading other than overconfidence as the market could present many arbitrage profit opportunities that could lead to over trading. Hirshleifer (2001) posits that mental accounting may explain the disposition effect where people have a tendency of wanting the results of their good decisions to be recognized immediately in their mental accounts while they keep postponing the acknowledgement the results from the poor decisions they made.

Investors may sell stocks that have performed well so that they can feel good about themselves, or so they can boast to others about their ability to pick good stocks. Investors may on the other hand hold on to stocks that are performing very poorly as they are not ready to acknowledge that they made mistakes (Shefrin & Statman, 1985). Odean (1998) posits that individual investors are more willing to recognize paper gains than paper losses. The buying of past winners has also been identified by funds flowing into equity mutual funds (Belsky & Gilovich, 1999). Bloomfield *et al.* (2010) posits that investors often confuse a good company with a good investment. Kumar (2005) analyzed the price trends of stocks bought by more than 62,000 households at a discount brokerage during a five-year period and found that stock prices increased by 0.6% during the week before the purchase. The increase was 1.2%, 2.2%, and 7.3% for the two weeks, one month, and three months before the purchase, respectively. The study does not clearly explain why prices increased and the nature of households studied which could significantly differ from that of individual investors covered in the current study.

People in an emerging market are not as familiar with stock price dynamics and trading as people in more developed markets. Studies in emerging markets find investors to be less familiar with how equity markets operate. Brahmana (2012) posits that the familiarity bias as a situation where investors who are familiar with an asset will view it more optimistically in terms of expected risk and return. According to Li (2004), Chinese investors have been found to suffer from a familiarity bias in their purchasing of local companies because they are less familiar with stock

investing and view stocks as being very risky thus the investors tend to generate poor returns as they are afraid to invest.

Merton (1987) finds that individual investors tend to hold only a few different common stocks in their portfolios. He argues that gathering information on stocks requires resources and suggests that investors conserve these resources by actively following only a few stocks. When investors behave in this manner, they choose stocks that they actively follow and will buy or sell only those stocks that they actively follow and will not impulsively buy attention-grabbing stocks. Investors who behave in this way tend to have consistent returns on their portfolios as they are not distracted by stocks on impulse.

Razek (2011) defines overconfidence as an overestimation of the probabilities for a set of events. The author argues that the concept is operationally reflected by comparing whether the specific probability assigned is greater than the portion that is correct for all assessments assigned to that given probability. Agrawal (2012) notes that overconfidence causes people to overestimate their knowledge, undervalue risks and overestimate their ability to control events. The author claimed that overconfidence originates in people's biased evaluation of evidence. Many researchers find evidence for the presence of the overconfidence bias in different financial decisions. Studies have shown that announcement returns are lower for overconfident bidders as compared to rational bidders. Overconfidence is believed to improve persistence and determination, mental facility, and risk tolerance and helps to promote professional performance. Overconfidence can enhance other's perception of one's abilities, which may help to achieve faster promotion and greater investment duration (Loung & Ha, 2011).

According to Agrawal (2012), overconfidence affects not only the behaviour of secondary market traders but also investors in the primary market. People tend to be overconfident and hence overestimate the accuracy of their forecasts. Overconfidence stems partly from the illusion of knowledge. The human mind is perhaps designed to extract as much information as possible from what is available, but may not be aware that the available information is not adequate to develop an

accurate forecast in uncertain situations. Overconfidence is particularly seductive when people have special information or experience no matter how insignificant-that persuades them to think that they have an investment edge. In reality, however, most of the so-called sophisticated and knowledgeable investors do not outperform the market consistently. Overconfidence could also result from illusion of control where people tend to believe that they have influence over future outcomes in an uncertain environment. Such an illusion may be fostered by factors like active involvement and positive early outcomes. Active involvement in a task gives investors a sense of control while positive early outcomes, although they may be purely fortuitous, create an illusion of control. People remain overconfident despite failures because they remember their successes and forget their failures and also they tend to focus on future plans rather than on past experience. Overconfidence manifests itself in excessive trading in financial markets. It also explains the dominance of active portfolio management, despite the disappointing performance of many actively managed funds (Loung & Ha, 2011).

Hsu and Shiu (2010) examined the investment returns of investors in discriminatory auctions taking place in the Taiwan stock market and find that frequent bidders under-perform infrequent bidders. Overconfidence led to aggressive bidding and higher payment for securing the auctioned shares. Frequent bidders also prove to be inferior in terms of stock selection performance. This implies their overestimation of the future cash flow of the Initial Public Offer (IPO) firms, or underestimation of the risk of investment in these firms, or both. According to Subrahmanyam (2007), overconfidence about private signals causes overreaction and hence phenomena like the book/market effect and long-run reversals, whereas self-attribution maintains overconfidence and allows prices to continue to overreact, creating momentum and poor performance. This study did not consider how overconfidence affects individual investor portfolio performance which is the focus of the current study.

Sewel (2005) caution that overconfidence is particularly seductive when people have special information or experience-no matter how insignificant-that persuades them to think that they have an investment edge. In reality, however, most of the so-called

sophisticated and knowledgeable investors do not outperform the market consistently. Fama (1997) carried out a study in which questionnaires were sent out to 2,000 wealthy individual investors and 1,000 institutional investors. He concluded that the high volume of trade on the day of the stock market crash, as well as the occurrence, duration, and reversal of the crash was in part determined by overconfidence. This study was biased towards wealthy individual and institutional investors' performance during a market crash but did not evaluate how the same investors will behave in markets with less extreme conditions.

Pompian (2012) explained self-attribution bias as the tendency of individuals to ascribe their successes to innate aspects such as talent or foresight, while more often blaming failures on outside influences such as bad luck. Therefore, self-attribution investors can, after a period of successful investing, believe that their success is due to their acumen as investors rather than to factors out of their control. Investors who are overconfident believe they can obtain large returns, thus they trade often and they underestimate the associated risks and end up with inferior returns (Odean, 1998). Economou, Kostakis and Philippas (2010) studied the behaviour of herding under extreme market conditions in the Greek, Italian, Portuguese and Spanish stock markets using daily stock prices for the period 1998- 2008 and found that herding is prevalent during periods of rising stock prices. During the global financial crisis of 2008, the authors find evidence of herding in the Portuguese stock market and anti-herding behaviour in the Spanish and the Italian stock markets while the Greek stock market exhibits rational investor behaviour. The rational is that investors act rational in tranquil times, but lose their confidence and follow the trends in volatile periods. These findings indicate that herding behaviour affects trading volume, market returns and return volatility therefore portfolio performance. These studies were however based in developed markets unlike the current study that is carried in an emerging market. The studies were also conducted in periods of extreme conditions while the current study does not make any assumption regarding the market conditions.

Waweru, Munyoki and Uliana (2008) in investigating the role of behavioral finance and investor psychology in investment decision making find that institutional

investors operating on the Nairobi Stock Exchange suffer from a number of behavioral biases that include overconfidence, representativeness, anchoring, gamblers' fallacy, availability, loss aversion, mental accounting and regret aversion. The study did not consider how the above biases affect investor returns and more so how individual investors behave.

Li, Rhee and Wang (2009) studied the differences in herding behaviour between institutional and individual investors in the Chinese market. Their findings indicate that institutional investors who are the better informed exhibited intense herding compared to the less informed individual investors although individual investors were more likely to influence market sentiments and demand as they tended to rely heavily on public information. The study does not however explain why institutional investors herd more and the effect of their actions on portfolio performance.

Sharyari (2007) carried out a survey in the Tehran Exchange to establish whether market participants exhibited mass behavior in their trading. He used stock yield variances from the whole market for the period 2001 to 2005 and found no herding behavior in periods in which price index changes and cash yield are positive although there was some evidence of herding using the daily yield data. The results could be attributed to informational herding as the participants are exposed to the same information and may use similar methods of determining the factors that will influence trades. Kumar and Lee (2006) carried out a study on retail investor sentiments and find that the trading retail investors buy or sell one group of stocks and they tend to buy or sell other groups exhibiting herding behaviour.

Studies on the investor behavior have concentrated on institutional investors due to their relative importance and dominance in the markets making it possible for them to influence stock prices and stock price volatility through their trading patterns (Walter & Weber, 2011). Other authors like Liou, Haung and Wu (2011), Kallinterakis and Ferreira (2011) and Li, Rhee and Wang (2009) argue that that institutional investors are assumed to be more sophisticated, well informed with superior capabilities and resources to better interpret the information as compared to other investors in the market and may therefore not have incentive to intentionally

herd. These results show that the findings on institutional investors cannot be inferred to individual investors. The current study looks at the behaviour of individual investors in the Kenyan capital market that is an emerging market that has recently seen a surge of individual investors trading in stocks.

2.3.2 Investment Style and Portfolio Performance

An investor is said to be active when they buy and sell their investments with the aim of taking advantage of profitable opportunities. A passive investor on the other hand purchases an investment, holds it for a long time awaiting its appreciation and generally has limited turnover. The choice of the style adopted by the investor is intended to serve different circumstances depending on the needs of the investor. An investor can be active in one investment and passive in the other and although most evidence suggests that passive management outperforms active management, there are studies that have found that active and skilled managers can and do generate returns above the average market (Goldman, 2010).

Active portfolio managers incur high fees, expenses and trading costs which end up lowering their returns hence passive managers tend to perform better. Comparing the fees and the trading costs associated with active and passive management averaging over 26 years, French (2008) found the average of the annual estimates for active management fees over these years to be 38.6 basis points was eight times the average for passive which was 4.8 basis points. French (2008) concluded that active investors spend .67% of the aggregate value of the market each year chasing higher returns.

Emerging markets have fewer analysts and researchers and hence active managers can provide an edge in the areas where there is less information such as small cap companies, international stocks and less liquid markets therefore there is more potential for adding value for an active manager (Mamudi, 2009). Emerging markets however, have stocks that are thinly traded therefore making trading costs a matter of great importance and that give a better return to passive investors. The current study is based in an emerging market with few analysts therefore the findings are important

in confirming whether or not active investors underperform their passive counterparts.

Investment portfolios may be defined as value or growth stocks. A fund is referred to as a value stock when it has a low P/E ratio and a high dividend yield implying that the stock is trading below its true value. A growth stock has a high P/E ratio and a low dividend yield and is a representative of a company with a high earnings growth rate (Lakonishok *et al.*, 1994). Investing in a growth stock is an investment style which is based on a company's fundamentals such as earnings, dividends, cash flows and book value of company and it is be considered as a rational style on behalf of investors.

Research findings suggest that the style of investing in value stocks provides returns that surpass that of investing in growth stocks. Basu (1977) used monthly data from over 1400 NYSE firms for the period 1956-1971 and examined whether a stock with low P/E ratio had higher returns than that with a high P/E ratio. He constructed portfolios of high and low P/E stocks and his findings indicated a significant higher return for the low P/E portfolios. Chan *et al.* (2002), used firm size, book to market ratio (B/M), cash flow yield (C/P) and earnings yield (E/P) as the fundamental variables in the Japanese market and concluded that investing in value stocks was more profitable than investing in growth stocks. Fama and French (1992) on the other hand argue that the superior performance of value stocks is due to the higher underlying risk of these stocks. Lakonishok *et al.* (1994) suggested that the higher returns achieved by value styles are due to the fact that these are contrarian to the strategies of noise traders that make investors pay too much attention to recent earnings growth and hence overreact to both good or bad news leading to overpricing of the growth stocks and under-pricing of the value strategies. Investors who follow value strategies and invest in undervalued stocks eventually achieve higher returns than those invested in growth companies.

Supporting evidence to the findings of Lakonishok *et al.* (1994) was provided in the research by Porta *et al.* (1997). The authors used data from NYSE for the period 1971-1993 and concluded that value stocks outperformed growth stocks. After

rejecting the risk based explanation for the high performance of value stocks, the authors concluded that investors often make errors in their expectations about the future earnings of growth stocks hence when the earnings are actually announced, value stocks, whose expectations were lower, outperform glamour stocks. The findings of the above studies cannot be generalized to emerging capital markets since the studies were based in the developed capital markets that could have different investor characteristics hence the need for the current study which is carried out in an emerging market.

2.3.3 Investor Behavior, Investor Demographic Characteristics and Portfolio Performance

Some studies on investor behavior have found that behavioral biases such as overconfidence may be exacerbated with financial literacy. A stock market environment with a very low level of predictability usually lead the financially literate investors to be overconfident than the less financially literate since they have theories and models with which they may tend to overweigh their expected returns (Griffin & Tversky, 1992). This implies that the financially literate investor will end up with poor returns hence poor performance due to underestimation of risk. The study did not however look at other factors that could contribute to poor performance other than overconfidence

Empirical evidence supports the theories and models that predict that more financially literate investors have a stronger tendency towards cognitive biases than less financially literate investors. Barber and Odean (2001) argue that investing is traditionally a masculine task in the U.S. and therefore, as a group, men can be considered to be more in tune to investing than women. Their results suggest that men do exhibit more overconfident characteristics, such as excessive trading and higher risk taking. Barber and Odean (2002) examined the performance of very successful investors who switched from a telephone-based brokerage system to an online system and find that the investors were more overconfident and this was attributed to the investor's success before switching is likely to have caused them to be overconfident about their ability. Given that the online environment made it easier

for them to act on their overconfidence, their trading activity subsequently increased, but their investment performance decreased. Individual investors are assumed to be less financially literate compared to institutional investors thus studies attribute irrational behavior and market anomalies to their trading. According to Lee, Shleifer, and Thaler (1991), uninformed individual investors trading on sentiment is a common theme in the herding literature.

Lee and Hanna (1991) posit that fad and fashion, rather than fundamentals, are likely to impact the investment decisions of individual investors. There is some compelling empirical support that sophisticated investors are more rational. Grinblatt, *et al.*(1993) used data from Finland and find that sophisticated investors who were believed to be the foreigners were more likely to follow momentum trading strategies and less likely to be inclined toward a home bias. The implication is that sophistication leads to poor as momentum traders become overconfident. Shefrin and Thaler (1988) examine brokerage accounts in Israel and find that, on average, individuals hold on to poorly performing stocks eight days longer than do professional institutional investors. Loomes and Sugden (1982) describe how traders can learn to become rational by recognizing and learning from their past mistakes. Le (1982) provides some experimental evidence in support of the theory that traders can learn to become rational. He concludes that with experience, traders were less affected by an endowment effect thus they did not overvalue a collectible simply because they were in possession of it.

Hsu and Shiu (2010) investigated how investor characteristics influence investing behavior and trading performance. They assumed that Chinese investors were less experienced investors compared to investors from more capitalistic-oriented countries since most Chinese investors were new to investing in stock markets. They found strong evidence that more experienced Chinese investors are more inclined toward making trading mistakes and exhibiting the disposition effect. They however found mixed evidence that experience mitigates overconfidence. They conclude that investor sophistication does not necessarily mitigate behavioural biases, nor improve trading performance.

There is still a persistent belief among investment managers and researchers that men are more risk tolerant than women, older individuals are less risk tolerant than younger people, single individuals are more risk tolerant than married, certain occupations are associated with increased and decreased levels of risk tolerance, individuals with greater income have greater risk tolerances than lower income earners and greater financial educational attainment is associated with increased risk tolerance. Hsu and Shiu (2003) study the impact of investor experience on the disposition effect in China. Hsu and Shiu (2010) study the impact of demographics such as income and the type of employment on the disposition effect. These studies were narrowly focused on one cognitive error that is the disposition effect over time the broader range of behavioural biases and performance in a cross-sectional analysis.

Bajtelsmit and Bernasek (1996) found that women invest their pensions more conservatively than men, and that, in general, women are less risk tolerant than men. Lytton and Grable (1997) analyzed gender differences in financial attitudes from a random sample of 592 tax payers from a mid-Atlantic state and found that males expressed more confidence in their financial decisions and higher risk-taking propensities in relation to financial management strategies than women. However, McInish (1982), who conducted a random sample survey of 3,000 investors, arrived at a dissimilar conclusion. McInish measured specific personality characteristics and locus of control in relation to portfolio risk as measured by beta. Using a form of multiple regressions, he found that gender was not a significant factor in explaining risk tolerances. These studies did not address how risk tolerance in turn affects individual portfolio performance.

Botwinick (1966) investigated cautiousness in relation to age, gender, and financial literacy in the context of 24 life situations using Wallach and Kogan's (1961) experimental choice-dilemma test as a basis of investigation. Based on experiments with 90 volunteer older adults and 111 young adults enrolled in psychology courses at Duke University, he found that older subjects were more cautious in their decisions than younger adult subjects. Wallach and Kogan's choice dilemma test has

been the subject of numerous other investigations. Vroom and Pahl (1971) also using Wallach and Kogan (1971) model administered a choice dilemmas test to 1,484 managers from over 200 companies, and concluded that older managers exhibited a significant negative relationship to risk taking and the value placed upon risk. However, Gehrels (1991), using German micro-census data, found no relationship between age and risk tolerance in his analysis of the life-cycle hypothesis. Lee and Hanna (1991), in attempting to investigate the rate of stock ownership among U.S. households, concluded that age was not a significant variable in determining ownership of risky assets. These studies were however heavily focused on risk tolerance and not portfolio performance in relation to demographic characteristics.

Haliassos and Bertaut (1995) posit that financial literacy was an important factor in overcoming the barriers to stockholding especially the risk that is usually associated with investing in equities. They also find that the less literate were less likely to invest in stocks compared to their financially literate counterparts. Lee and Hanna (1995) conclude that the proportion of individuals willing to take risks increased significantly with literacy while Sung and Hanna (1996) posits that literacy was statistically significant in determining someone's willingness to assume greater risk.

2.4 Summary of the Previous Studies and Research Gaps

The summary of the literature review indicates that investor behaviour is both rational and irrational. The review indicates that investors' behaviour does influence security prices and consequently portfolio performance. The findings are conflicting with some indicating that investor behaviour positively influence security prices and others find the influence to be negative while others find no influence at all. The conflicting results provide a research gap that the current study sought to fill.

The studies reviewed mainly considered two of the variables at a time among the variables in the current study. This provides a research gap that is filled by the current research. The current study considers the interrelationships among investor behaviour, investment style, demographic characteristics and individual portfolio performance at the same time.

Empirical studies reviewed did not control for the effects of moderation or intervention. The current study tests the moderating effect of demographic characteristics and the intervening effect of investment style on the relationship between investor behaviour and portfolio performance.

Another research gap arises from a contextual approach. The topic of investor behaviour and portfolio performance has largely been understudied in Kenya with many studies focusing only surveys. Many studies reviewed on investor behaviour have been based heavily in developed capital markets and therefore it is upon this basis that the current research is being done to determine the situation among investors on the Nairobi Securities Exchange which is an emerging capital market.

Methodological differences in the studies reviewed provide another research gap. Many studies have used the traditional finance measures of risks and returns which may not capture other factors that are not based on market fundamentals but which nevertheless affect the individual investor portfolio performance. The current study has used primary data to measure investor behaviour and investment style while performance is measured using secondary data.

The summary of the empirical research reviewed on the study variables and the research gaps identified and how the current study addresses the gaps are captured in Table 2.1.

Table 2. 1: Summary of Research Gaps from Literature Review

Author	Focus of the Study	Findings of the Study	Identified Research Gaps	Addressing Study gaps in the current study
Barber and Odean (2011)	Review of documented patterns in investment behaviour in the American market.	The paper notes that individual investors underperform standard benchmarks, sell winning investments while holding losing investments, are heavily influenced by limited attention and past return performance in their purchase decisions, engage in naive reinforcement learning by repeating past behaviors that coincided with pleasure while avoiding past behaviors that generated pain, and tend to hold undiversified stock portfolios.	It does not explain why investors in theory hold diversified portfolios and trade infrequently to minimize taxes and investment costs while in practice, investors behave differently. The study is also carried out in a developed economy that makes it difficult to generalize to all markets.	The current study models the behavior of investors regarding investment decisions as a function of individual demographic characteristics. This study is based in an emerging market. The current study also measures investor behaviour using primary data and not secondary data as is the case in this study.
Waweru, Munyoki and Uliana (2008)	A survey of investor psychology in investment decision making among institutional investors.	The authors find institutional investors operating on the Nairobi Stock (now Securities) Exchange to suffer from a number of behavioral biases that include overconfidence, representativeness, anchoring, gamblers' fallacy, availability, loss aversion, mental accounting and regret aversion.	The study did not consider how the above biases affect investor returns and more so how individual investors behave.	The current study looks at individual investor behaviour and how the behaviour affects individual investors' portfolio returns.

Kimani (2011)	A survey of the influence of behavioural factors on individual investors' choices of securities at the Nairobi Securities Exchange.	The findings indicate that investors suffered from behavioural biases in their decision making.	The study did not evaluate how the decisions of investors affect their portfolio performance and whether there were other factors that mitigated the biases adopted by investors.	The current study addresses the effect of investor behavior on portfolio performance and also how the relationship is mediated/moderated by investment style and demographic characteristics respectively.
Hsu and Shiu (2010)	The effect of investor's financial literacy on behavioural in the Chinese market.	They find that an investor's financial literacy in the Chinese market does not necessarily mitigate behavioural biases, nor improve trading performance centrally to Sung and Hanna (1996) who concluded that financial literacy was significant in determining investors' willingness to assume greater risk.	The conflicting findings, the different contextual set ups and methodological approaches provide a research gap.	The current study uses a different methodology, is based in a different context and also incorporates other demographic factors into the study.
Kumar (2005)	Analysis price trends of stocks bought by more than 62,000 households at a discount brokerage during a five-year period.	The study found that stock prices increased by 0.6% during the week before the purchase. The increase was 1.2%, 2.2%, and 7.3% for the two weeks, one month, and three months before the purchase, respectively.	The study does not clearly explain why prices increased and the nature of households studied as well as how the decision affected the portfolio performance.	The current study looks at individual investors' behaviour and how they affect portfolio performance.

Lishenga (2010)	Tests the pervasiveness of profitability of momentum strategies at the Nairobi Securities Exchange	The study found that past winners outperform past losers for most of the periods.	The study did not consider other investment styles other than the momentum strategies and it also did not focus on performance of individual investors.	The current study looks at investment styles and how they affect the performance of individual investors and also how the style is influenced by behaviour.
Agrawal (2012)	Framework of behavioural biases in finance.	The study found that announcement returns were lower for overconfident bidders as compared to rational bidders.	The study did not consider other investor behaviours or other factors that could poor performance.	The current study focuses on three investor behaviours and how they influence performance and also considers whether the relationship is mediated or moderated by other factors. The current study is also based in a different market.
Chen et al. (2007)	The effect of overconfidence behaviour on investor returns in the Chinese market.	The study found that overconfidence produced superior returns among the Chinese investors.	Methodological differences and conflicting findings with other studies.	The current study is based in a different market set up, uses primary data to measure behaviour and also looks at performance in a wider sense than just returns.
Goetzman and Kumar (2008)	Equity portfolio diversification based on demographics and investor behavior	U.S. individual investors hold under-diversified portfolios, where the level of under-diversification is greater among younger, less-educated, and less-sophisticated investors. The level of under-diversification is also correlated with investment choices that are	The study considers various types of investor behavior in line with literature on behavioral finance. It however does not link these behavior to investor demographics and how such factors influence investment decisions and	The current study considers the effects of demographic variables on investment outcome on one hand, the influence of investment behavior on investment outcome on another hand and the relationships between demographic characteristics and

		consistent with over-confidence, trend-following behavior, and local bias. Furthermore, investors who over-weight stocks with higher volatility and higher skewness are less diversified.	portfolio performance.	investor behavior.
Hsu and Shiu (2010)	Explaining the role of gender in financial markets	Unlike developed Markets, men and women in the People's Republic of China are equally represented. Men have larger average portfolios than women and place slightly larger trades. Males and females exhibit similar behavior along three key dimensions: degree of home bias portfolio performances and trading intensity.	The study focuses on gender effect on investor behavior. It ignores other possible demographic factors that are not explained by gender alone. The study findings are inconsistent with other studies earlier done leading to questions on the effects of study contexts on the relationships established.	The current study incorporates various other demographic characteristics that may explain investor behavior and subsequently investment performance. The study is also set in a different context.
Yao and Hanna (2005)	The effect of Gender and Marital status on financial risk tolerance	Results show significant differences in risk tolerance between married males and married females introducing potential complexities into the analysis of the portfolio allocation decisions of married couple households.	The study only focuses on gender and marital status. There are however other attributes like financial literacy which explains investor behavior and attitudes towards risk which are excluded in this analysis.	The study extends the analysis by incorporating various demographic attributes that are exhaustive.
Eckel and Grossman	Sex differences and statistical stereotyping	The study found that both men and women anticipated the difference in	The study was based on gambles and not on real	The current study models risk aversion as an investment

(2001)	in attitudes toward financial risk	the average choices of women and men, both sexes were equally weak at assessing within-sex heterogeneity in risk attitudes. Both sexes picked up the tendency for women to be less risk accepting than men	investment decisions	behavior influenced by demographic characteristics of which gender is just one of them. The current study further extends to analyzing how the behaviour affects performance.
Barber and Odean (2001)	Gender, Over confidence and investment decisions	The study finds men are more overconfident than women, men will trade more and perform worse than women and these differences are most pronounced between single men and single women.	Though the study distinguishes men from women as overconfident and less confident lots, there may be other factors that contribute to the development of over confidence amongst both lots.	The study does not only consider gender as the contributor of overconfidence. It further reviews various other factors that explain different types of investor behavior other than just over confidence.
Sunden and Surette (1998)	Effects of Gender differences and marital status on allocation of assets.	Gender and marital status significantly affect how individuals choose to allocate assets in defined-contribution plans.	Other than Gender and marital status, there are other investor characteristics that influence such investment decisions.	The current study incorporates various other demographic characteristics that may explain investor behavior and subsequently investment performance.
Grinblatt, <i>et al.</i> (1993)	Used data from Finland to determine whether sophisticated investors who were more likely to follow momentum strategies in their trading	Sophisticated investors who were believed to be the foreigners were more likely to follow momentum trading strategies and less likely to be inclined toward a home bias therefore sophistication leads to poor performance as momentum traders become overconfident.	The study was based in a developed market, was focused on one demographic characteristic and one investment style.	The current study incorporates other demographic characteristics and investment styles, uses a different methodology and is based in an emerging market.

2.5 Conceptual Framework

The focus of this study is the relationships among investor behaviour, demographic characteristics, investment style and portfolio performance. Portfolio performance is the dependent variable in this study. The study measures performance of a portfolio using the Sharpe ratio. This ratio measures whether the returns of portfolio are due to good investment decisions or originate from the investor taking of excess risk. The Sharpe ratio is based on the total risk of the portfolio hence allows for the evaluation of performance of portfolios that are not well diversified such as those of individual investors. The ratio does not make any assumption regarding the distribution of the returns from a portfolio and measures risk using the standard deviation. The ratio is simple to calculate and offers a number of possibilities for calculating portfolio performance by allowing the replacement of the risk-free asset with a benchmark portfolio. In this study, the 91-Treasury bill rate calculated on a monthly basis represents the risk free rate.

The independent variable is investor behavior. Individual investor behavior is motivated by a variety of psychological heuristic driven biases. Agrawal (2012) notes that overconfidence causes people to overestimate their knowledge, undervalue risks and overestimate their ability to control events. Disposition occurs when people avoid regret by refusing to sell securities whose prices are decreasing and willing to sell those whose price is increasing. Herding effect in financial market is identified as tendency of investors' behaviors to follow the others' actions. These are the key behaviors that the study focuses by asking questions intended to measure the behavioral tendencies.

Demographic characteristics are assumed to moderate the relationship between investor behavior and portfolio performance. Demographic characteristics are considered to affect risk tolerance and tolerance affects the decision to invest and hence the value of a portfolio. According to (MacCrimmon & Wehrung, 1986) the factors include financial literacy, age, marital status and gender. These are the demographic characteristics that that this study focuses on.

Investment style is considered an intervening variable in the relationship between the investor behavior and portfolio performance. An investor is said to be active when they buy and sell their investments with the aim of taking advantage of profitable opportunities. A passive investor on the other hand purchases an investment, holds it for a long time awaiting its appreciation and generally has limited turnover. Emerging markets have fewer analysts and financial researchers and hence active managers can provide an edge in the areas where there is less information and hence add value for an active manager (Mamudi, 2009). A value stock has a low P/E ratio and a high dividend yield while a growth stock has a high P/E ratio and a low dividend yield and is a representative of a company with a high earnings growth rate. These are the styles the study focuses on.

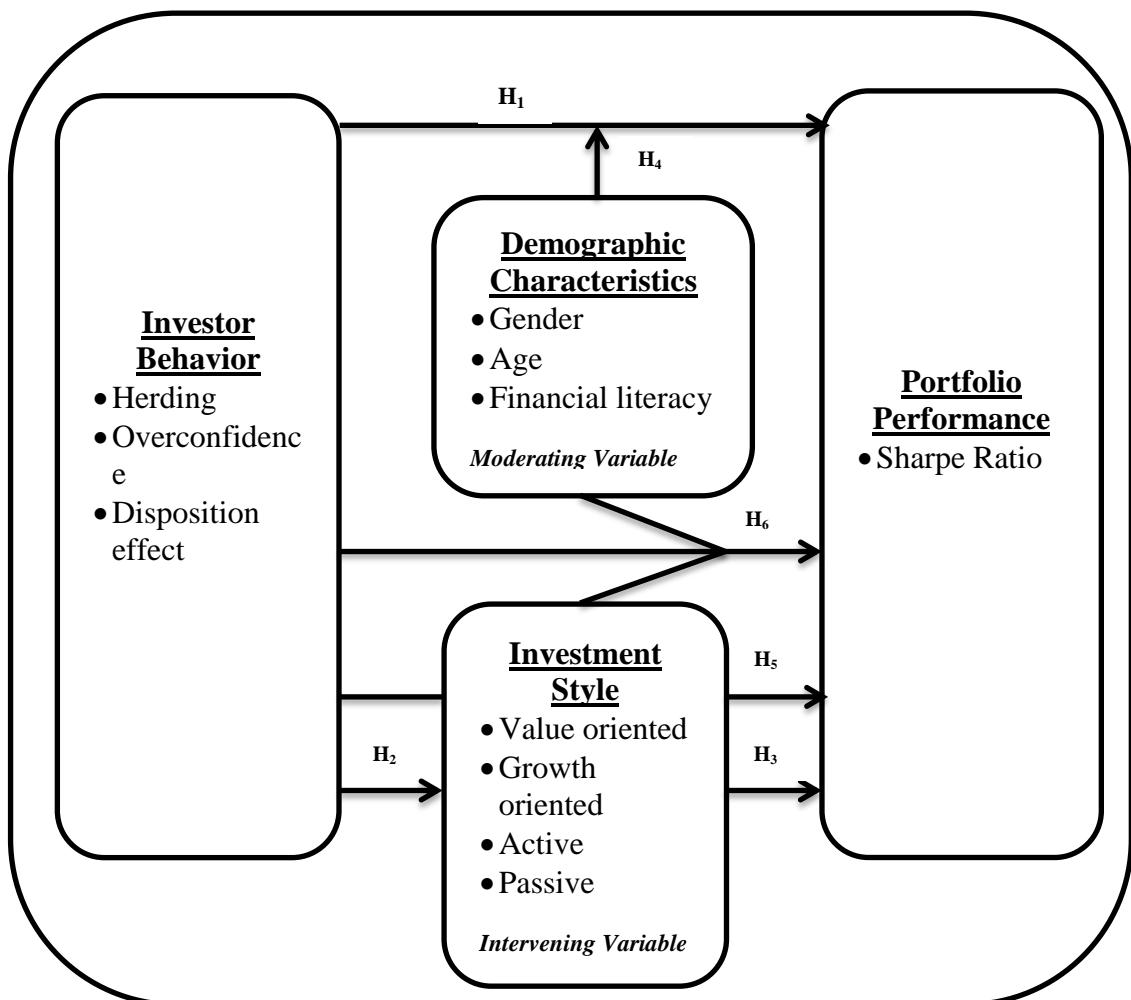


Figure 2.1: Conceptual Model

2.6 Research Hypotheses

This study sought to establish the relationships among investor behaviour, demographic characteristics, investment style and individual investor portfolio performance Nairobi Securities Exchange. Based on the research gaps that exist on the relationships among the study variables and the objectives of this study, six hypotheses were formulated and tested. The first three hypotheses were derived from objectives (i) to (iii) which tested the direct relationship between the variables. The fourth hypothesis tests the moderating effect of demographic characteristics on the relationship between individual investor behaviour and portfolio performance while the fifth tests the intervening effect of investment style on the relationship between individual investor behaviour and portfolio performance. Hypotheses 4 and 5 are derived from objectives (iv) and (v) respectively. The sixth hypothesis is drawn from objective (vi) and tests the joint effect of individual investor behaviour, demographic characteristics and investment style on individual investor portfolio performance. The following are the hypotheses tested in this study:

- H₁:** There is no relationship between investor behavior and portfolio performance at the NSE.
- H₂:** There is no relationship between investor behavior and investment style at the NSE.
- H₃:** There is no relationship between investment style and portfolio performance at the NSE.
- H₄:** The relationship between investor behavior and portfolio performance at the NSE is not moderated by investor demographic characteristics.
- H₅:** The relationship between investor behavior and portfolio performance at the NSE is not intervened by investment style.
- H₆:** The joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance is not significant.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research design that was used in this study. It discusses the population and sampling design, sample size, sampling technique, data collection methods, research procedures and data analysis methods used in this study.

3.2 Research Paradigm

This study was anchored on a positivism research philosophy because it is based on existing theory and it formulates quantitative hypotheses to be tested. The choice is based on the fact that in order to empirically establish the relationships between the variables, hypotheses were formulated and tested and findings generalized. Positivism adopts a philosophical stance of the natural scientist who works with an observable social reality (Remenyi *et al.*, 1998) as cited in Holden and Lynch (2004).

Positivists use existing theory to develop hypotheses which are tested and confirmed, in whole or part, or refuted, leading to further development of theory which then may be tested by further research. It is concerned with facts other than impressions and this is consistent with the notion of observable social reality (Mugenda, 2008). Positivistic research is undertaken in a value-free way as the researcher is external to the process of data collection as there is little that can be done to alter the substance of the data collected (Saunders *et al.*, 2007). The researcher was independent of and neither affected or was affected by the subject of the research. Emphasis was on quantifiable observations that lend themselves to statistical analysis.

3.3 Research Design

This study sought to establish relationships among individual investor behaviour, investor demographic characteristics, investment style and individual investor portfolio performance. Since the researcher was dealing with events that had already happened and had no control over variables, a descriptive cross-sectional design was

appropriate to use for collecting data from a cross section of investors to determine the linkages between the study variables over a five year period from January, 2010 to December, 2014.

Gravetter and Forzano (2011) posit that descriptive research design involves measuring a set of variables as they exist naturally. Houser (2011) notes that it is designed to provide in-depth information about the characteristics of subjects within a particular field of study, thus, it can help identify relationships between variables. According to Sekaran (2003), this design offers the researcher a profile to describe relevant aspects of the phenomena of interest for an individual, organization or other perspectives.

3.4 Population of the Study

The population constituted all individual retail stock investors at the Nairobi Securities Exchange. There are 2.4 million retail investors based on Central Depository & Settlement Corporation limited (CDSC) investor data base as on December 31, 2014. The CDSC classifies investors who have not traded for a period of more than one year as dormant investors while the rest are assumed to be active investors. It is this group of active investors that the study focused on since the study was looking at how investors behave when making investment decisions and the implication of the behaviour on their portfolio performance. The study focused on retail investors since institutional investors are governed by specific investment processes that make them unlikely to be influenced by psychological biases.

3.5 Sampling Frame

The study focused on investors trading in shares on the Nairobi Securities Exchange. Investors can only trade in shares via stock brokerage firms and the 20 operational stock brokerage firms formed the sampling frame. The CDSC data was also used as a sampling frame. The study covered the decisions made from January 1st, 2010 up to December 31st, 2014. The period was relevant since the capital markets had been quite active and the CDSC had also kept investor data comprehensively after

dematerializing share ownership and this is also the most recent period covering five years.

3.6 Sample and Sampling Technique

A total of 385 individual active investors from the CDSC data base as well as from the stock brokerage firms were randomly and conveniently selected. The investors were approached from the 20 stock brokerage firms as they visited and requested to consider filling the questionnaire (appendix 1) in full. Those who agreed formed part of the sample and were handed the questionnaires to fill. Some questionnaires were also sent to randomly selected investors from the CDSC investor data base. The population of individual investors in this study was more than 10,000 therefore the sample size was arrived at using the following formula (Mugenda & Mugenda, 2003).

$$n = \frac{Z^2 pq}{d^2}$$

Where:

n = the desired sample size (if the target population is greater than 10,000).

Z = the standard normal deviate at the required confidence level

p = the proportion in the target population estimated to have characteristics being measured.

q = 1 – p

d = the level of statistical significance set.

Mugenda and Mugenda (2003) assert that if there is no estimate available of the proportion in the target population assumed to have the characteristics of interest, 50% should be used. Since the researcher desires an accuracy of at least 90% (0.1 level), the sample size was calculated as follows:

$$n = \frac{(1.96)^2 (.50)(1-.50)}{(0.05)^2}$$

$$n = 385$$

3.7 Data Collection

The study relied on primary and secondary data collected from the 385 individual investors. The primary data on investor behaviour, demographic characteristics and investment style was collected using a questionnaire (appendix 1) that was administered to investors using the drop and pick later technique, self-administered or electronically sent to the investor. The questions had been designed to capture the necessary information to measure the concepts in the study.

The data on the individual investor's number of shares at the beginning and end of every month and the companies invested in over the period of study was collected using a data collection form administered to the investor at the same time with the questionnaire (Appendix 1). The price of the shares was collected from the Central Depository & Settlement Corporation (CDSC) and also from the NSE's daily price list data base. Majority of the investors did not want to fill the details of their share ownership and transactions manually and opted to print their CDSC investment statements for the required data to be extracted by the researcher. The statement provided the name of the company invested in, the number of shares, when they were purchased or sold and the price. The price and the number of shares were used to calculate the monthly returns of each of the investors.

The 91-day Treasury bill rates were collected from the Central Bank of Kenya's web site and from records in the CBK's research department where these were not available on the web site. The 91-day rate was used as a proxy for the risk free rate since it is assumed that the Government is unlikely to default on both principal and interest payments and hence the return is guaranteed.

3.8 Operationalization of Study Variables

The study variables were operationalized as borrowed from relevant studies reviewed in the literature. These are as summarized in Table 3.1.

Table 3.1 Operationalization of Study Variables

Variable	Indicator	Operational Definition	Scale	Reference Question
Investor Behavior	Overconfidence	Self-attribution bias, illusion of control, illusion of knowledge, high risk propensity, excessive trading	Interval	Section C Q 3,5,8,9,11,12,15,16,17,18, 20, 21
	Herding	Following the actions of others and ignoring the fundamental analysis, all the individual assets move in the same direction, Believing that others have superior knowledge	Interval	Section C Q1,4,7,10,14,22,23,24,25
	Disposition effect	Tendency to ride the losers, integrate the sale of losers, sale of winners, regret-aversion	Interval	Section C Q2,6,26,27,28,29,30,31
Investor Demographic characteristics	Gender	Male, female	Ordinal	Section A Q1
	Age	Number of years since birth	scale	Section A Q2
	Marital Status	Married or single	ordinal	Section A Q3
	Financial literacy	The level of education on investments, returns and associated risk	Interval	Section B Q1-7
Investment style	Passive Oriented	Number of trades made by the investor	Nominal	Section D Q3,4
	Active Oriented	Number of trades made by the investor	Nominal	Section D Q1,2
	Growth oriented	Buying shares with a high dividend payment and earnings	Interval	Section C Q7
	Value Oriented	Buying underpriced shares	Interval	Section D Q5,6
Portfolio performance	Sharpe Ratio for each investor = $\frac{PR - R_F}{\sigma_i}$	A composite measure of financial performance of each investor	Ratio	Secondary data

3.9 Data Analysis

3.9.1 Preliminary Data Analysis

Multiple regression analysis was used to analyze the data. Stepwise regression as advocated by Baron and Kenny (1986) was used to test the intervening effect of investment style on the relationship between investor behavior and performance. Correlation analysis was used to establish relationships among the study variables. Correlation helped reveal the direction and magnitude of the relationship. Multiple regression analysis was used to determine the relationships among investor behavior, demographic characteristics, investment style, and portfolio performance. Multicollinearity of the regression models was tested to establish whether the coefficients of independent variables were statistically significantly correlated. Tests of significance using t-test were carried out on each one of the coefficients to determine whether it was significant in influencing the changes in the dependent variable.

The variables were measured as follows:

3.9.1.1 Sharpe Ratio

Unlike the other measures of performance, the Sharpe ratio does not assume that the returns of the portfolio must be well diversified. This study makes no assumption of the diversification of the individual investor's portfolio since the investors are assumed to suffer from behavioral biases hence the Sharpe ratio is appropriate as it does not assume that a portfolio should be well diversified and hence uses the standard deviation as a measure of risk.

The **Sharpe ratio** was calculated as follows:

Number of shares x Price = The capitalization value which represents the Net asset value; denoted by **NAV**. This was determined at the beginning and at the end of each month over a period of five years. The beginning value was denoted by NAV_0 while the value at the end of the month was denoted by NAV_1 .

The returns for the period (month) were determined by comparing the net asset value of each investor at the beginning with that at the end of each month. Possible dividends paid during the month form part of the returns of the investor hence they were added to the numerator. The result is then divided by the beginning net asset value to determine the return for that period (month) as follows:

$$\text{Period Returns (PR)} = \frac{\text{NAV}_1 - \text{NAV}_0 + \text{DIV}}{\text{NAV}_0} \dots\dots\dots 3.1$$

Where:

(PR) is the monthly return for the investor,

NAV₁ is the net asset value at the end of the month,

NAV₀ is the net asset value at the beginning of the month,

DIV represent dividends paid during the month,

The average returns for each investor over the period of five years(60 months) were calculated by dividing the sum of the holding period (monthly) returns for each investor by the number of months (=60 months) as follows:

$$\text{Average Returns (PR)} = \sum_{i=1}^n \frac{\text{PR}}{n=60} = \overline{\text{PR}} \dots\dots\dots 3.2$$

Where

$\overline{\text{PR}}$ is average monthly returns,

n represents the number of periods(months)under study,

The standard deviation of the each investor's returns was then calculated using the monthly returns (PR) and average monthly returns (\overline{PR}) as follows:

Standard Deviation of the returns for each investor (σ_i)=

$$\sqrt{\sum_{i=1}^n \frac{(PR - \overline{PR})^2}{n=60}} \dots\dots\dots 3.3$$

Where

σ is standard deviation of the returns for each investor,

PR is the monthly return for each investor,

\overline{PR} is the average monthly return for each investor,

n is the number of months under study,

Sharpe ratio was then computed using the average monthly returns of each investor, the standard deviation, and the risk free rate. The 91-day Treasury bill rate for the respective periods was taken as the risk free rate since the Government is not expected to default on interest and principal payment.

Sharpe Ratio for each investor = $\frac{\overline{PR} - R_F}{\sigma_i}$ 3.4

\overline{PR} is the average monthly return for each investor,

R_F is the risk free rate as measured by the 91-T bill,

σ is standard deviation of the returns for each investor,

This study made no assumption of the diversification of the individual investor's portfolio hence the Sharpe ratio is an appropriate measure of performance as it does not assume that a portfolio should be well diversified and uses the standard deviation as a measure of risk which can easily be calculated once the returns and average returns are determined. Investors are assumed to be suffering from behavioral biases thus their portfolio of assets is not expected to be well diversified.

3.9.1.2 Investor Behavior

The herding, disposition effect and overconfidence scores were determined by getting the average of the scores from the questionnaire for each one the above indicators of investor behavior for each investor in the sample. The composite score of investor behavior was calculated as the mean of herding, disposition effect and overconfidence.

3.9.1.3 Demographic characteristics

The composite score of demographic characteristics was calculated as the mean of financial literacy for each investor in the sample. The results were also discussed along gender and age.

3.9.1.4 Investment Style

This was measured as the mean of the scores on investment style (as shown in Table 3.1 above) for each investor in the sample.

3.9.2 Regression Models

3.9.2.1 The Relationship between Investor Behaviour and Portfolio Performance

To determine the relationship between investor behavior and portfolio performance (objective i), the first hypothesis (**H₁**) was tested as follows:

$$Perf = \beta_0 + \beta_1 Herding + \beta_2 Disposition\ effect + \beta_3 Overconfidence + a \dots\dots\dots 3.5$$

Where:

Perf is the dependent variable, performance

β_0 is the regression constant or intercept,

β_i are the regression coefficients,

Herding, *disposition effect* and *overconfidence* represent independent variables measuring investor behaviour

α is the error term that accounts for the variability in the dependent variable that cannot be explained by the linear effect of the independent variables.

The correlation coefficient was determined and the tests of significant carried out using the t-test to establish if there was a relationship between the dependent variable and the independent variables. A relationship exists if any one of the coefficients (β_i) is significant.

3.9.2.2 The Relationship between Investor Behavior and Investment Style

To examine the relationship between investor behavior and investment style (objective ii), the second hypothesis (H_2) was tested as follows:

$$\text{Style} = \beta_1 \text{ Herding} + \beta_2 \text{ Disposition effect} + \beta_3 \text{ Overconfidence} + \alpha \dots\dots\dots 3.6$$

Where:

Style is the dependent variable, investment style which could be passive, active, growth or value oriented

β_0 is the regression constant or intercept,

β_i is the regression coefficient,

Herding, *disposition effect* and *overconfidence* represent independent variables measuring investor behavior

α is the error term that accounts for the variability in the dependent variable that cannot be explained by the linear effect of the independent variables.

The correlation coefficient was determined and the tests of significant carried out using the t-test to establish if there was a relationship between the dependent variable and the independent variables. A relationship exists if any one of the coefficients (β_i) is found to be statistically significant.

3.9.2.3 The Relationship between Investment Style and Portfolio Performance

To determine the relationship between investment style and portfolio performance (objective iii), the third hypothesis (H_3) was tested as follows:

$$Perf = \beta_0 + \beta_1 Passive + \beta_2 Active + \beta_3 Value + \beta_4 Growth + \alpha \dots\dots\dots 3.7$$

Where:

Perf is the dependent variable, performance

β_0 is the regression constant or intercept,

β_i is the regression coefficient,

Active, Passive, Value and *Growth* represent independent variables measuring investment style,

α is the error term that accounts for the variability in the dependent variable that cannot be explained by the linear effect of the independent variables.

The correlation coefficient was determined and the tests of significant carried out using the t-test to establish if there was a relationship between the dependent variable and the independent variables. A relationship exists if any one of the coefficients (β_i) is found to be statistically significant.

3.9.2.4 The Moderating Effect of Demographic Characteristics on the Relationship between Investor Behaviour and Portfolio Performance

To determine the moderating effect of demographic characteristics on the relationship between investor behaviour and portfolio performance (objective iv), the fourth hypothesis (**H₄**) was tested.

Multiple hierarchical regressions were used to explore the relationship. Prior to conducting hierarchical multiple regression, the relevant assumptions of this statistical analysis were tested. An examination of correlations revealed that no independent variables were highly correlated. Collinearity statistics of tolerance and variance inflation factor (VIF) were all within accepted limits and therefore the assumption of multicollinearity was deemed to have been met and thus the variables can be used for purposes of multiple regressions.

The moderating effect was computed using the method proposed by Baron and Kenny (1986). According to Baron and Kenny (1986) in the first step the predictor variables (investor behavior and demographic characteristics) are entered in to the regression equation to test the main effects. Generally the model should be significant.

Secondly an interaction term is created by multiplying the scores of the independent variable and the moderator variable. The creation of a new variable by multiplying the scores of investor behaviour and demographic characteristics risks creating a multicollinearity problem. To address the multicollinearity problem which can affect the estimation of the regression coefficients for the main effects, the predictor variable and the moderator variable were first centered. This is accomplished by subtracting the mean from the respective variable, thereby obtaining a centered deviation score with a mean of zero. This interaction term (Investor behavior*demographic characteristics) was then entered into the regression equation after the linear main effects on the outcome of the moderating (investor demographic characteristics) and moderated variables (investor behaviour) are estimated.

If the effect of the interaction term is significant, then the effect of investor behaviour on Portfolio performance is dependent upon the levels of demographic characteristics and this is an indication that the moderator variable (demographic characteristics) alters the strength of the causal relationship between investor behavior and performance and the moderator hypothesis is supported. If the interaction term is found to be insignificant, then the moderator hypothesis is not supported. If the change in R² for the interaction term is statistically significant, it is said to have a moderating effect, and the moderator hypothesis is supported (Baron & Kenny, 1986).

$$Perf = \beta_0 + \beta_1 IB + \beta_2 DC + \beta_3((IB) * (DC)) + \alpha \dots \dots \dots 3.8$$

Where:

Perf is the composite portfolio performance score,

β_0 is the regression constant or intercept,

$\beta_1, \beta_2,$ and β_3 are the regression coefficients,

IB is the composite score of investor behaviour,

DC is the demographic characteristics composite score of financial literacy,

α is a random error term that accounts for the unexplained variations.

3.9.2.5 The Intervening Effect of Investment Style on the Relationship between Investor Behaviour and Portfolio Performance

To test the intervening effect of investment style on the relationship between investor behaviour and portfolio performance (objective v), the fifth hypothesis (H_5) was tested using the process advocated by Baron and Kenny (1986) as follows:

In **step one** of the intervening models, regression analysis was performed to assess the relationship between portfolio performance (dependent variable) and investor behaviour (independent variable) while ignoring investment style (the intervener). The model was as follows:

$$Perf = \beta_0 + \beta_1 IB + \alpha \dots\dots\dots 3.9$$

Where:

$Perf$ is the composite portfolio performance score

β_0 is the regression constant or intercept,

β_1 is the regression coefficient,

IB is the composite score of investor behaviour

α is a random error term that accounts for the unexplained variations.

In the **second step** of the intervening analysis, regression analysis was performed to assess the relationship between investment style (intervening variable) and investor behaviour (independent variable) ignoring the dependent variable (portfolio performance). The model is as follows:

$$Style = \beta_0 + \beta_1 IB + \alpha \dots\dots\dots 3.10$$

Where:

Style is the composite score of investment style

β_0 is the regression constant or intercept,

β_1 is the regression coefficient,

IB is the composite score of investor behaviour

α is a random error term that accounts for the unexplained variations

In the **third step** of the intervening analysis, regression analysis was performed to assess the relationship between investment style (intervening variable) and portfolio performance (dependent variable) while ignoring the independent variable investor behavior). The model is follows:

$$Perf = \beta_0 + \beta_1 IS + \alpha \dots\dots\dots 3.11$$

Where:

Perf is the portfolio performance score as measured by the Sharpe ratio

β_0 is the regression constant or intercept,

β_1 is the regression coefficient,

IS is the composite score of investment style

α is a random error term that accounts for the unexplained variations.

The **fourth step** of the intervention analysis was performed to assess the relationship between portfolio performance (dependent variable), of investment style (intervening variable) and investor behavior (independent variable). The model is as follows:

$$Perf = \beta_0 + \beta_1 IB + \beta_2 IS + \alpha \dots\dots\dots 3.12$$

Where:

Perf is the composite portfolio performance score

β_0 is the regression constant or intercept,

β_i are the regression coefficients,

IB is the composite score of investor behaviour

IS is the composite score of investment style

α is a random error term that accounts for the unexplained variations

According to Baron and Kenny (1986) intervention occurs if the independent variable, investor behaviour (IB) predicts the dependant variable, portfolio performance ($Perf$), investor behaviour (IB) predicts intervening variable, investment style (IS), and investment style (IS) predicts portfolio performance ($Perf$) and still investor behaviour (IB) predicts portfolio performance ($Perf$) when investment style (IS) is in the model.

The correlation coefficient was determined and the tests of significant carried out using the t-test to establish if there is a relationship between the dependent variable and the independent variables. A relationship exists if any one of the coefficients (β_i) is found to be statistically significant.

3.9.2.6 The Joint Effect of Investor Behavior, Demographic Characteristics, and Investment Style on Portfolio Performance

To determine the **joint effect** of investor behavior, demographic characteristics, and investment style on portfolio performance (objective 6), hypothesis six (H_6) was tested as follows:

$$Perf = \beta_0 + \beta_1 IB + \beta_2 DC + \beta_3 IS + \alpha \dots\dots\dots 3.13$$

Where:

$Perf$ is the composite investor portfolio performance score

β_0 is the regression constant or intercept,

β_i are the regression coefficient,

IB is the composite score of investor behaviour

DC is the composite score of investor demographic characteristics.

IS is the composite score of investment style

α is a random error term that accounts for the unexplained variations

The correlation coefficient was determined and the tests of significant carried out using the t-test to establish if there is a relationship between the dependent variable and the independent variables. A relationship exists if any one of the coefficients (β_i) is found to be statistically significant.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of data analysis of the study variables and tests of hypotheses as well as the response rate. The chapter presents a discussion of the statistics of investor behavior, investor demographic characteristics, investment style and portfolio performance using among other measures, means, standard deviations, analysis of variance, kurtosis, skewness and Pearson product movement correlations. The chapter also discusses the results in comparison to other studies.

4.2 Response Rate

Questionnaires were administered to a total of 385 investors. To ensure completeness of data, the respondents were first asked whether they were willing to provide data on their investment activities in the stock market before being given the questionnaire. Out of these 385 questionnaires, 348 were completed and returned. This represents a response rate of 90.4% which is a high response rate compared to similar studies.

The respondents were required to indicate their age in years within a given range. The results show that 202 (58%) of the respondents were between the ages of 31 and 40 years old, 64 (18.4%) were 30 years and below, 46 (13.2%) were between 41 and 50 years old and 36 (10.3%) were above 50 years old as shown in Table 4.1.

Table 4.1: Age of the Respondents

Age in Years	Frequency	Percentage (%)
30 and Below	64	18.4%
31-40	202	58.0%
41-50	46	13.2%
>50	36	10.3%
Total	348	100

The gender distribution of respondents was 252 (72.4%) male and 96 (27.6%) female while the distribution in terms of marital status was that 215 (61.8%) married and 133 (38.2%) single.

4.3 Preliminary Analysis

4.3.1 Reliability Testing for Investor Behavior, Financial Literacy and Investment Style

Reliability refers to extent to which a measurement instrument is able to yield consistent results each time it is applied under similar conditions (Kothari, 2004). To measure the reliability of the data collection instrument, Cronbach's alpha (α) was used. Cronbach's alpha is a measure of internal consistency that tests how closely related a set of items are as a group. A value of alpha (close to 1) is high and is often used as evidence that the items measure an underlying (or latent) construct (Kothari, 2004). The reliability tests for the individual items are shown in in appendix 2. Table 4.2 indicates the summary of the reliability statistics for financial literacy, investor behavior and investment style variables. All the variables were quite reliable with a Cronbach's alpha reliability coefficient greater than 0.7. The financial literacy scale has good internal consistency with a Cronbach alpha coefficient of 0.753. Similarly, investor behavior and investment style scales have a good internal consistency with a Cronbach alpha coefficient of 0.946 and 0.828 respectively as shown in Table 4.2.

Table 4.2: Reliability Analysis

Scale	Items	Cronbach's Alpha (α)
Financial Literacy	7	0.753
Investor Behavior	31	0.946
Investment Style	7	0.828

4.3.2 Tests of Normality

Preliminary analysis to assess if the data fits a normal distribution was performed. This was necessary because the concept of normality is central to statistics and especially when parametric tests such as correlation and regression analysis are going

to be used. Normality was assessed by observing graphical displays (histograms) as well as obtaining the skewness and kurtosis values of the measures as shown in appendix 3. Skewness provides information about the symmetry of the distribution while kurtosis provides information about the peakedness of the distribution (Tabachnick & Fidell, 2007). A value of zero indicates a perfectly normal distribution. With a large sample of more than 200 however, skewness does not make a substantive difference in analysis. The measures did not indicate extreme departure from normality assumption as shown in appendix 3 and this confirms the suitability of the data for analysis using parametric tests.

Skewness statistic for financial literacy was -0.293, investor behaviour was 0.383 and for investment style the statistic was -.305. Kurtosis statistic for financial literacy was -0.306, for investor behaviour the statistic was -0.453 and investment style statistic was -.304 as shown in appendix 3. To further investigate the distribution of the scores, histograms were drawn and observed. As shown in Figures 4.1 and 4.2, the scores are reasonably distributed around a normal curve further confirming the suitability of the data for further analysis using parametric tests.

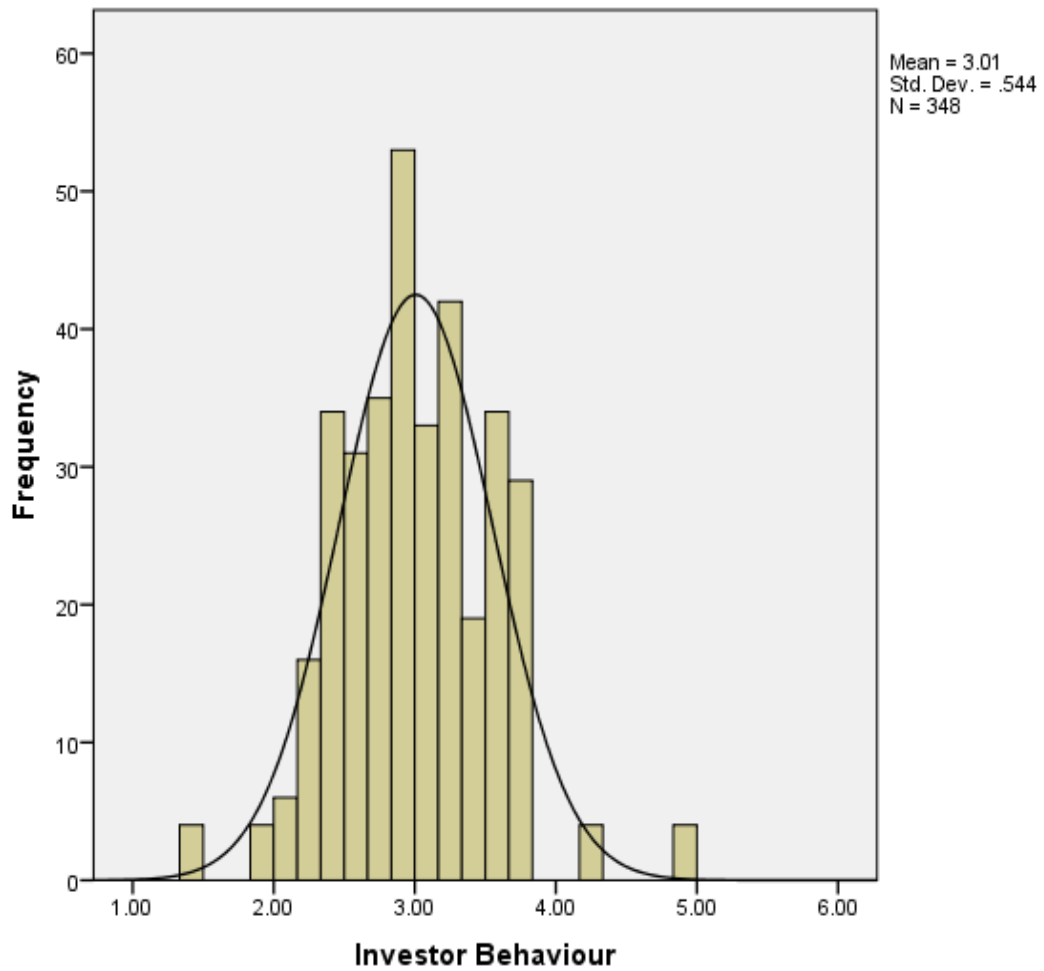


Figure 4.1: Histogram of Investor Behaviour Scale

The scores for investor behavior are reasonably distributed with a mean of 3.01 and a standard deviation of 0.544. These scores are reasonably distributed confirming that the data is suitable for further analysis using parametric tests.

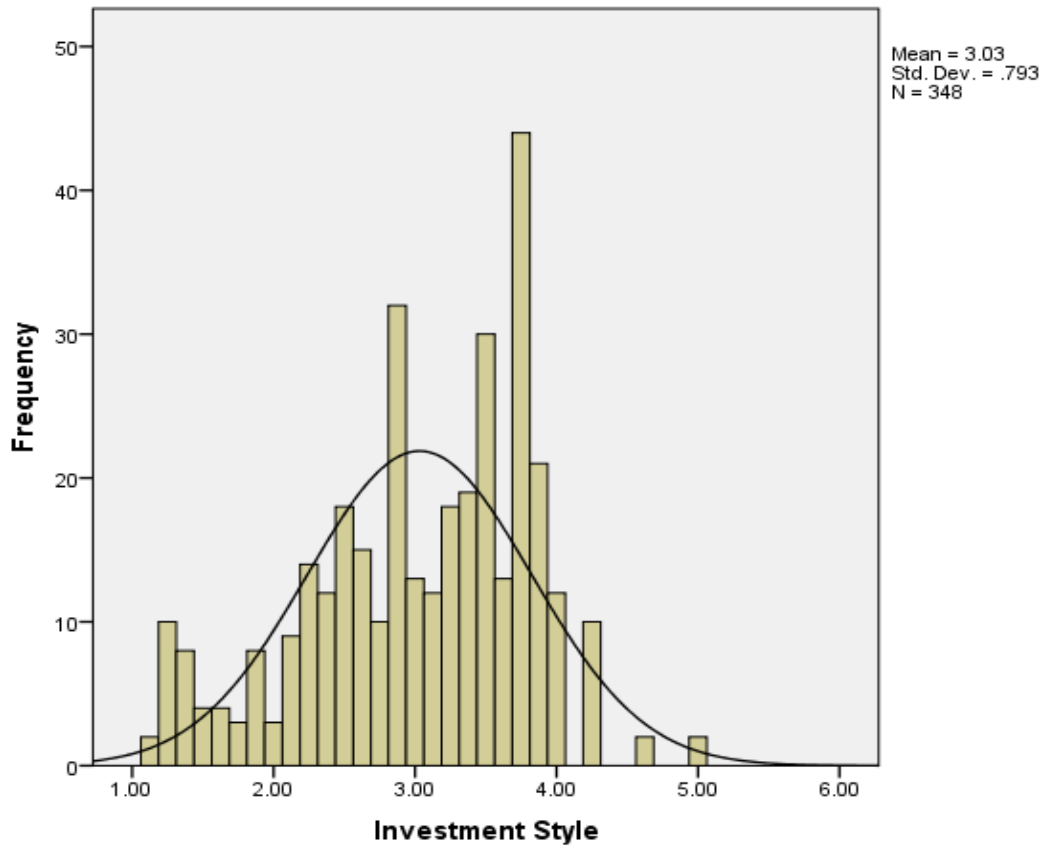


Figure 4.2 Histogram of Investment Style Scale

Figure 4.2 shows that investment style scores are normally distributed with a mean of 3.03 and a standard deviation of 0.793. These scores are reasonably distributed confirming that the data is suitable for further analysis using parametric tests.

4.4 Individual Item Descriptive Statistics

This section presents a summary of the 348 respondents' rating of various items of financial literacy scale, investment behavior scale and investment style scale. The data was analyzed by use of means, standard deviation and percentages. The data has been presented in form of tables, graphs and charts.

Table 4.3: Means and Standard Deviations for financial literacy, investor behavior and investment style Scales

Scale	N	Mean	Std. Deviation
Financial Literacy	348	3.85	0.66
Investor Behaviour	348	3.01	0.54
Investment Style	348	3.01	0.75

The composite score of investor behavior was calculated as the mean of herding, disposition effect and overconfidence. The Mean score of the composite score of financial literacy was 3.85 and the standard deviation (SD) was 0.66 while the mean score of investor behavior was 3.01 and the standard deviation (SD) was 0.54. The mean score of investment style was 3.01 and the standard deviation (SD) was 0.75 as shown in Table 4.3.

4.4.1 Financial Literacy

Seven (7) items were used to measure the level of financial literacy. Respondents were requested to rate Items on a five point Likert-type scale ranging from 1 “Not at all” to 5 “To a very large Extent. Table 4.4 shows how respondents rated various items of the financial literacy scale. When respondents were asked whether they knew about investments (stocks, bonds and mutual funds) most respondents agreed (Mean=4.10, SD=0.772). Similarly, when respondents were asked if they use financial knowledge to make personal financial decisions, the mean score was high (Mean=4.02, SD=0.824). Other items were also rated high by the respondents and they include; I have invested in stock, bonds or mutual funds (Mean=3.63, SD=0.884), I know how to calculate the expected income/return on Investments (Mean=3.92, SD=0.940) and Investing in shares yields a higher long-term growth as compared to treasury bills (Mean=3.80, SD=1.00). On the basis of this study results, most respondents scored high on financial literacy.

Table 4.4 Means and Standard Deviations of Financial Literacy Scale

Items	N	Mean	SD
I know about investments	348	4.10	.772
I have invested in stock, bonds or mutual funds	348	3.63	.884
I know how to calculate the expected income/return on Investments	348	3.92	.940
Investing in the stock market reduces risks associated with poor return	348	3.95	.908
Investing in shares yields a higher long-term growth as compared to treasury bills	348	3.80	1.000
I use financial knowledge to make personal financial decisions	348	4.02	.824
I understand investment options for pension schemes and risks involved	348	3.57	1.001

4.4.2 Investor Behaviour

Thirty two (32) statements/questions were used to measure investor behavior of investors in the companies listed on NSE. Respondents were requested to rate Items on a five point Likert-type scale ranging from 1 “Strongly Agree” to 5 “Strongly Disagree”. Appendix 4 shows how respondents rated various items of the investor behaviour scale and the results show that the investors at the NSE exhibit the behavior of overconfidence, herding and disposition effect. The herding, disposition effect and overconfidence scores were determined by getting the average of the scores from the questionnaire for each one these indicators of investor behavior for each investor in the sample as shown in Table 4.5.

Table 4.5: Means and Standard Deviations of investor behaviour sub-scales

Sub-Scale	N	Mean	SD
Overconfidence	348	2.98	1.00
Herding	348	3.06	0.93
Disposition Effect	348	2.94	0.99

4.4.3 Investment Style

Seven (7) statements were used to measure investment style of investors at the NSE. Respondents were requested to rate items on a five point Likert-type scale ranging from 1 “Strongly Agree” to 5 “Strongly Disagree”. Appendix 4 shows how respondents rated various items of the investor style scale. Passive Oriented Investment Style, Active Oriented Investment Style, Growth Oriented Investment Style and Value Oriented Investment Style scores were determined by getting the average of the scores from the questionnaire for each one these indicators of investor style for each investor in the sample as shown in Table 4.6.

Table 4.6: Means and Standard Deviations of investment Style sub-scales

Sub-scale	N	Mean	SD
Passive Oriented Investment Style	348	2.99	1.25
Active Oriented Investment Style	348	3.02	1.20
Growth Oriented Investment Style	348	3.20	1.32
Value Oriented Investment Style	348	2.94	1.11

4.5 Analysis of Variance (ANOVA)

4.5.1 Investment Behaviour and Age Group

The results of the one-way analysis of variance (ANOVA) regarding investor behaviour are set out in Table 4.7, which illustrates that there were significant differences in investor behavior item scores with regard to overconfidence, $F(3, 344) = 3.032$, p value = .029) and herding, $F(3, 344) = 4.230$, p value = .006) across age groups. The significance value of the F test in the ANOVA Table 4.7 is less than 0.05.

Table 4.7: ANOVA Results of Investor Behaviour and Age Group

Scale	F	Sig.
Overconfidence	3.032	.029
Herding	4.230	.006
Disposition Effect	1.376	.250

The results of Scheffé's post hoc multiple comparisons in Table 4.8 indicate that there were statistically significant differences between respondents in the age of 30 years and below and those between 31 to 40 years in relation to herding (p value=0.007). The mean scores were 3.432 and 2.967 respectively. This implies that those investors in the age group of 30 years and below portrayed an inclination towards herding behavior compared to those in the age group of 31 to 40 years. There was however no significant difference in mean scores between the other age groups (30 and Below, 41-50 years and >50 years) in relation to herding since the mean scores of the age groups with regard to herding were 3.009 (41 to 50 years) and 3.025 (> 50 years) were not statistically different. This indicates that demographic characteristics influence investor behavior and helps in the analysis of objective 4 which tests the moderating effect of demographic characteristics on the relationship between investor behavior and portfolio performance.

Table 4.8: Scheffe's Post Hoc Multiple Comparisons of Age Group in Relation to Herding

Dependent Variable	(I) Age in Years	(J) Age in Years	Mean Difference (I-J)	Std. Error	Sig.
Herding	30 and Below	31-40	.46516*	.13212	.007
		41-50	.42263	.17805	.133
		>50	.40760	.19190	.213
	31-40	30 and Below	-.46516*	.13212	.007
		41-50	-.04253	.15048	.994
		>50	-.05756	.16664	.989
	41-50	30 and Below	-.42263	.17805	.133
		31-40	.04253	.15048	.994
		>50	-.01503	.20497	1.000
	>50	30 and Below	-.40760	.19190	.213
		31-40	.05756	.16664	.989
		41-50	.01503	.20497	1.000

As shown in Figure 4.3, there were statistically significant differences between respondents in the age of 31 to 40 and those above 50 years of age in relation to overconfidence. The mean scores were 3.079 and 2.583 respectively. This is an indication that those in the age of 31 to 40 were more overconfident compared to those in the age above 50 years. The mean scores of the other age groups with regard to overconfidence were 3.038 (41 to 50 years) and 2.583 (> 50 years).

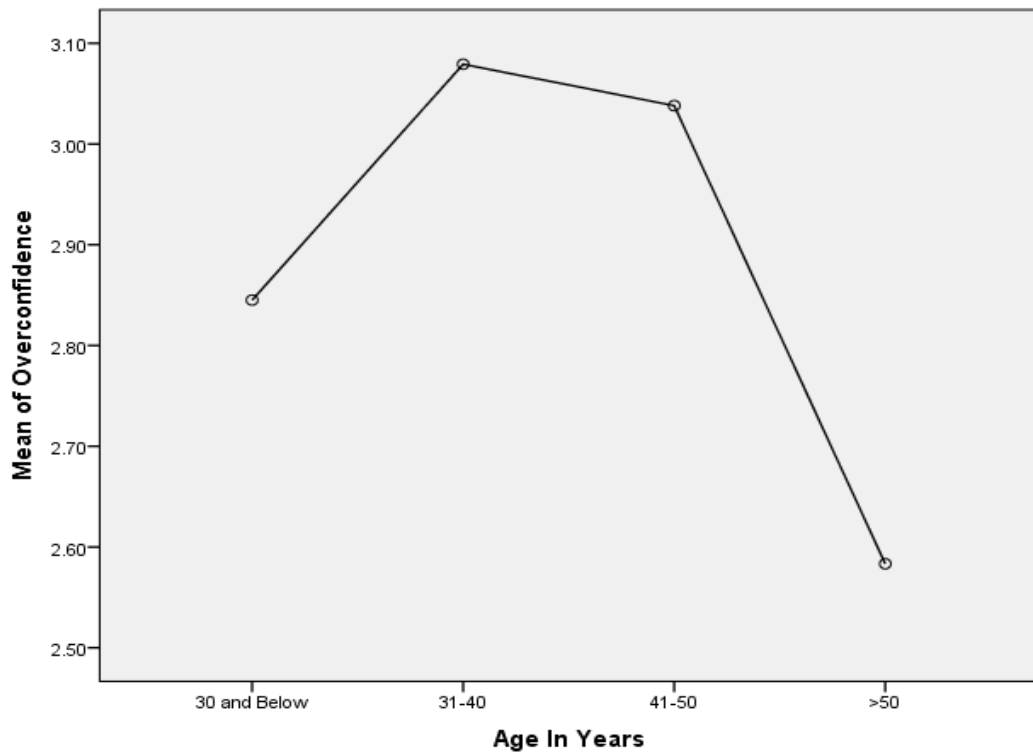


Figure 4.3: Mean Plots for Overconfidence

4.5.2 Performance and Age Group

One-way analysis of variance (ANOVA) was used to compare performance between the various age groups. The findings indicate that the mean scores differ significantly among the age groups. The significance value of the F test in the ANOVA Table 4.9 is less than 0.05, $F(3, 344) = 5.995, p = .001$.

Table 4.9: F-Test of Sharpe Ratio in Relation to Age Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.830	3	6.610	5.995	.001
Within Groups	379.263	344	1.103		
Total	399.093	347			

Scheffe's Post Hoc test was used to reveal the structure of the differences. The results indicate that there were statistically significant differences between

respondents in the age of 30 years and below and those between 41 to 50 years of age (P value =0.001) and those over 50 years of age (p value=0.009) as shown in Table 4.10. There was a significant difference between the performance of those in the age group of 30 and below and those between 41 to 50 years and over 50years with the 30 and below group performing better. There was however no significant difference in the performance of those in the group of 30 and below and those in the age group of 31 to 40 years.

Table 4.10: Scheffe’s Post Hoc Multiple Comparisons of Age Group in Relation to Performance

Dependent Variable	(I) Age In Years	(J) Age In Years	Mean Difference (I-J)	Std. Error	Sig.
Sharpe Ratio	30 and Below	31-40	.385343	.150614	.090
		41-50	.731106*	.202964	.005
		>50	.753731*	.218751	.009
	31-40	30 and Below	-.385343	.150614	.090
		41-50	.345764	.171539	.257
		>50	.368389	.189956	.290
	41-50	30 and Below	-.731106*	.202964	.005
		31-40	-.345764	.171539	.257
		>50	.022625	.233651	1.000
	>50	30 and Below	-.753731*	.218751	.009
		31-40	-.368389	.189956	.290
		41-50	-.022625	.233651	1.000

4.5.3 Financial Literacy and Age Group

One-way analysis of variance (ANOVA) was used to compare financial literacy between the various age groups. The findings reveal that the mean scores differ significantly. The significance value of the F test in the ANOVA Table 4.11 is less than 0.05, $F(3, 3444) = 3.281, p = .021$.

Table 4.11: F-Test of Financial Literacy for Different Age Groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.409	3	1.470	3.281	.021
Within Groups	154.058	344	.448		
Total	158.467	347			

Scheffe's Post Hoc test was used to reveal the structure of the differences. The results indicate that there was statistically significant differences between respondents in the age of 30 years and below and those between 31 to 40 years of age ($p=0.045$) as shown in Table 4.12.

Table 4.12: Scheffe's Post Hoc Multiple Comparisons of Age Groups in Relation to Financial Literacy

Dependent Variable	(I) Age In Years	(J) Age in Years	Mean Difference (I-J)	Std. Error	Sig.
Financial Literacy	30 and Below	31-40	-.27389*	.09599	.045
		41-50	-.16799	.12936	.640
		>50	-.05481	.13942	.985
	31-40	30 and Below	.27389*	.09599	.045
		41-50	.10590	.10933	.816
		>50	.21908	.12107	.353
	41-50	30 and Below	.16799	.12936	.640
		31-40	-.10590	.10933	.816
		>50	.11318	.14892	.901
	>50	30 and Below	.05481	.13942	.985
		31-40	-.21908	.12107	.353
		41-50	-.11318	.14892	.901

As shown in Table 4.13, the mean scores were 3.667 (SD=0.655) and 3.941 (SD=0.632) respectively for both age groups (30 and below and 31 to 40). This is an indication that those in the age of 31 to 40 were more financially literate compared to those in the age of 30 years and below.

Table 4.13: Means and Standard Deviations for Different Age Groups with Respect to Financial Literacy

Age	N	Mean	Std. Deviation
30 and Below	64	3.6674	.65592
31-40	202	3.9413	.63224
41-50	46	3.8354	.74076
>50	36	3.7222	.79131

4.5.4 Investor Behaviour and Gender

One-way analysis of variance (ANOVA) was used to compare overconfidence, herding and disposition effect with respect to gender. The significance value of the F test in the ANOVA Table 4.14 is less than 0.05 for both Herding, $F(1, 346) = 5.793$, $p = .017$) and Disposition effect, $F(1, 346) = 6.626$, $p = .010$). This is an indication that the mean scores of Herding and Disposition effect are significantly different between males and females. The significance value of F-test for overconfidence is more than 0.05.

Table 4.14: F-Test of Investor Behaviour Subscales with respect to Gender

		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	1.788	1	1.788	1.785	.182
	Within Groups	346.585	346	1.002		
	Total	348.373	347			
Herding	Between Groups	4.984	1	4.984	5.793	.017
	Within Groups	297.644	346	.860		
	Total	302.627	347			
Disposition Effect	Between Groups	6.390	1	6.390	6.626	.010
	Within Groups	333.678	346	.964		
	Total	340.068	347			

As shown in the Table 4.15. Male respondents portrayed more herding investor behavior compared to female respondents. The mean scores are 3.138 (SD=0.932) and 2.870 (SD=0.913) respectively. Women however portrayed more Disposition effect related investor behavior compared to men. The mean scores are 3.161 (SD=0.971) and 2.858 (SD=0.986) respectively.

Table 4.15: Means and Standard Deviations for Herding and Disposition Effect with respect to Gender

		N	Mean	Std. Deviation
Herding	Male	252	3.1381	.93279
	Female	96	2.8704	.91336
	Total	348	3.0643	.93388
Disposition Effect	Male	252	2.8583	.98607
	Female	96	3.1615	.97128
	Total	348	2.9419	.98996

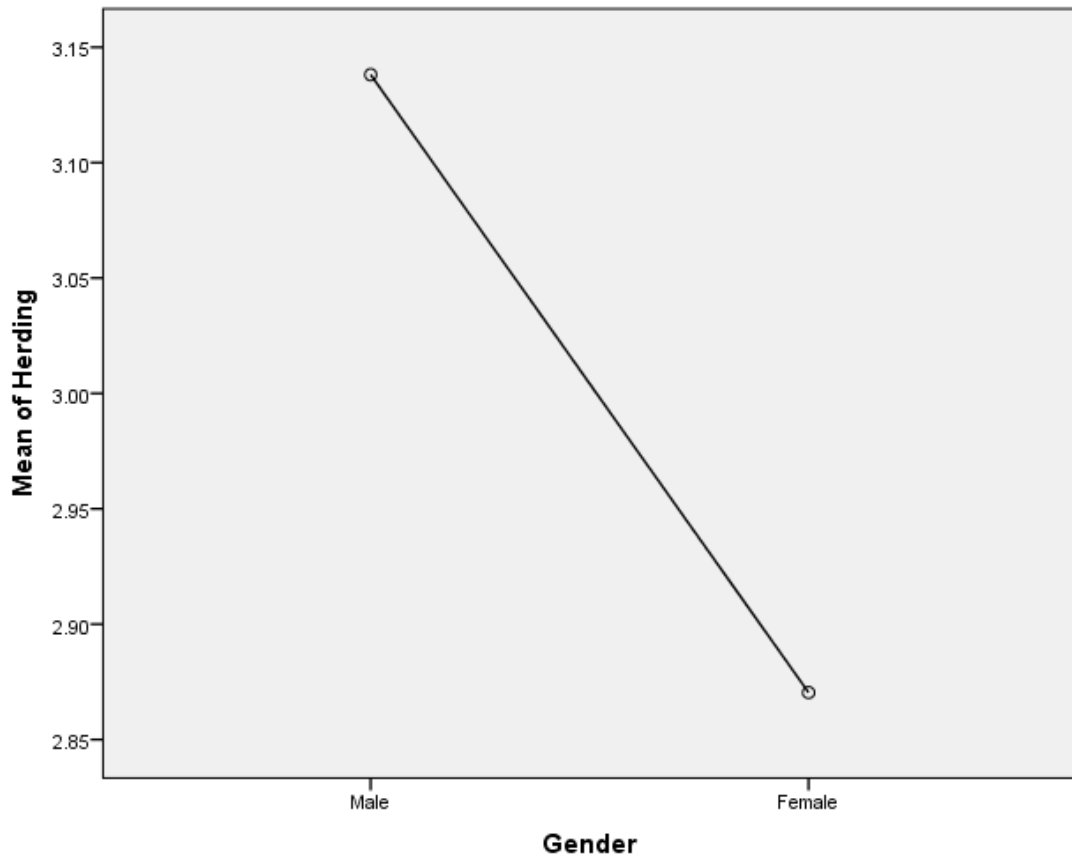


Figure 4.4: Mean Plot of Herding Investor Behaviour

Figure 4.4 shows that herding behavior is more prevalent in men compared to women while Figure 4.5 indicates that women are more to disposition effect compared to men.

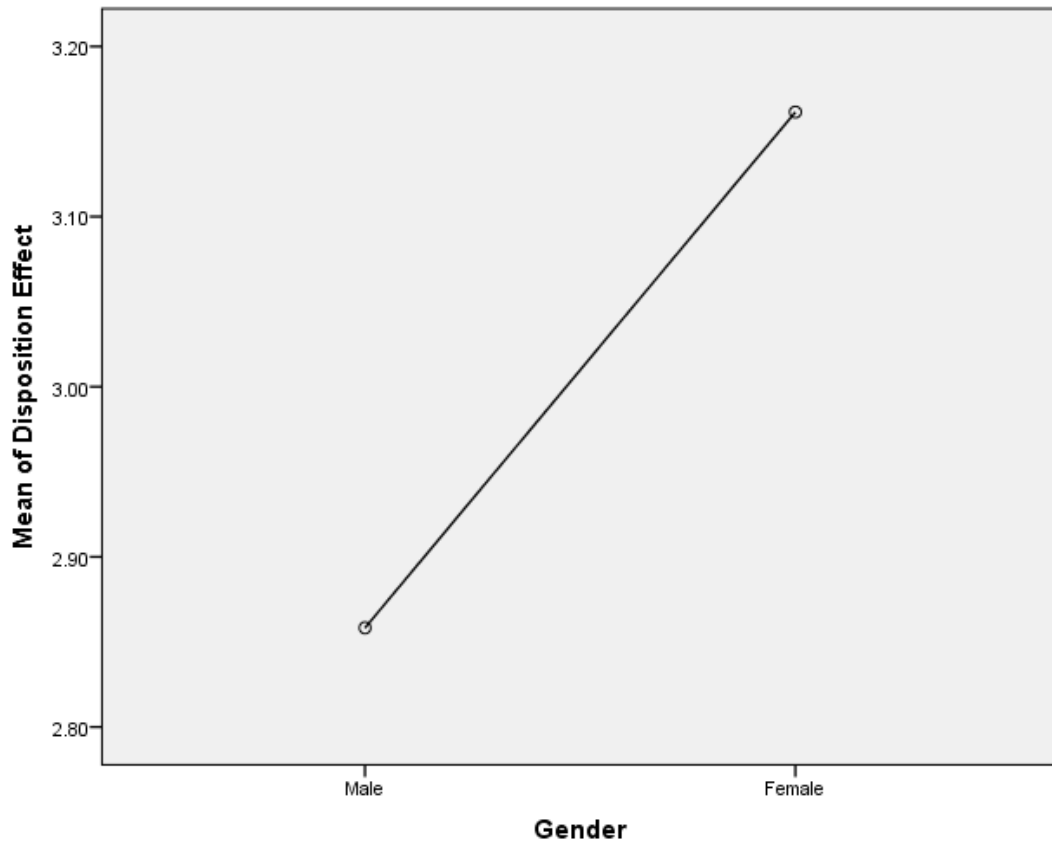


Figure 4.5: Mean Plots of Disposition Effect

4.6 Correlation Analysis

The study sought to establish whether there were significant relationships between demographic characteristics, investor behaviour and portfolio performance at the Nairobi Securities Exchange. Pearson correlation analysis was used to explore relationships between the study variables. Correlation analysis was used to reveal the direction and strength of the relationship between the variables. This was crucial to assess whether any relationship exists between the variables before carrying out further analysis. In addition, the correlation matrix also helped to determine whether multicollinearity existed between the independent variables of the study.

Table 4.16: Pearson Product-Moment Correlations between Portfolio Performance, Demographic Characteristics, Investor Behaviour and Investment Style

Scale	1	2	3	4
1. Sharpe Ratio	1	-.107*	.147*	.132*
2. Demographic Characteristics		1	.103	.078
3. Investor Behaviour			1	.262**
4. Investment Style				1

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

**. Correlation is significant at the 0.01 level (2-tailed)

Results of correlation analysis between portfolio performance (Sharpe ratio), demographic characteristics, investor behavior and investment style are shown in Table 4.16. There is negative correlation between portfolio performance (Sharpe ratio) and demographic characteristics which is statistically significant ($r = -.107$, $p\text{-value} < 0.05$). This implies that demographic characteristics negatively influence individual portfolio performance of investors at NSE. Similarly, the relationship between performance and investor behaviour was statistically significant ($r = .147$, $p\text{-value} < 0.05$). The relationship between performance and investment style is statistically significant ($r = .132$, $p\text{-value} < 0.05$).

The relationship between demographic characteristics and investor behaviour is positive and not statistically significant ($r = .103$, $p\text{-value} > 0.05$). Similarly the relationship between demographic characteristics and investment style is not statistically significant ($r = .078$, $p\text{-value} > 0.05$). There is positive correlation between investor behaviour and investment style which is statistically significant ($r = .262$, $p\text{-value} < 0.01$), an indication that investor behaviour positively influence investment

style. Since the correlation coefficients among the independent variables are not more than 0.8, multicollinearity does not exist (Cooper & Schindler, 2003).

Table 4.17: Pearson Product-Moment Correlations between Performance and Investment Style Subscales

Scale	1	2	3	4	5
1. Sharpe Ratio	1	.150**	-.047	-.154*	.040
2. Passive Oriented Investment Style		1	-.196**	.416**	.253**
3. Active Oriented Investment Style			1	.304**	.121*
4. Growth Oriented Investment Style				1	.453**
5. Value Oriented Investment Style					1

****.** Correlation is significant at the 0.01 level (2-tailed)

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

The results of correlation analysis between portfolio performance (Sharpe ratio) and investment style subscales are shown in Table 4.17. The correlation between performance and passive investment style is positive and statistically significant ($r = .150$, $p\text{-value} < 0.01$). There is a negative correlation between performance (Sharpe ratio) and active oriented investment style which is not statistically significant ($r = -.047$, $p\text{-value} = 0.379$). The correlation between performance and growth oriented investment style is negative and statistically significant ($r = -.154$, $p\text{-value} < 0.05$). The relationship between performance and value oriented investment style is positive and not statistically significant ($r = .040$, $p\text{-value} = 0.462$) while the correlation between passive oriented investment style and growth oriented investment style is positive and statistically significant ($r = .416$, $p\text{-value} < 0.01$). Similarly, the correlation between growth oriented investment style and value oriented investment style is positive and statistically significant ($r = .453$, $p\text{-value} < 0.01$). According to Cooper and Schindler (2003), the correlation between the variables must be more than 0.8 for multicollinearity to be a problem. Since none of the correlation coefficients is more than 0.8, there is no concern of multicollinearity.

Table 4.18: Pearson Product-Moment Correlations between Performance and Investor Behaviour Subscales

Scale	1	2	3	4
Sharpe Ratio	1	-.161**	.136**	.144**
Overconfidence		1	.143**	-.265**
Herding			1	-.205**
Disposition Effect				1

****.** Correlation is significant at the 0.01 level (2-tailed)

The results of correlation analysis between portfolio performance (Sharpe ratio) and investor behaviour sub-scales (herding, disposition effect and overconfidence) are shown in Table 4.18. There is a negative correlation between performance and overconfidence which is statistically significant ($r = -.161$, $p\text{-value} < 0.01$). The correlation between performance and herding investor behaviour is positive and statistically significant ($r = .136$, $p\text{-value} < 0.01$). The correlation between performance and disposition effect investor behaviour is positive and statistically significant ($r = .144$, $p\text{-value} < 0.01$). The correlation between overconfidence and herding investor behaviour is positive and statistically significant ($r = .143$, $p\text{-value} < 0.01$). These results indicate that all the three subscales of investor behaviour do influence individual investor portfolio performance.

Table 4.19: Pearson Product-Moment Correlations between Gender, Performance and Investor Behaviour Subscales

Scale	1	2	3	4	5
1. Gender	1	.023	.072	-.128*	.137*
2. Sharpe Ratio		1	-.161**	.136**	.144**
3. Overconfidence			1	.143**	-.265**
4. Herding				1	-.205**
5. Disposition Effect					1

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

****.** Correlation is significant at the 0.01 level (2-tailed)

The results of correlation analysis between genders, investor behaviour and portfolio performance are shown in Table 4.19. The results of correlation coefficient between gender and portfolio performance (Sharpe ratio) is not statistically significant ($r = 0.023$, $p\text{-value} > 0.05$). The correlation between gender and overconfidence behaviour is not statistically significant ($r = 0.072$, $p\text{-value} > 0.05$). There is a negative correlation between gender and herding which is statistically significant ($r = -.128$, $p\text{-value} < 0.05$) while the correlation between gender and disposition effect is positive and statistically significant ($r = .137$, $p\text{-value} < 0.05$). The correlation between performance and overconfidence behaviour was negative and statistically significant ($r = -.161$, $p\text{-value} < 0.01$). The correlation between performance and disposition effect is positive and statistically significant ($r = .144$, $p\text{-value} < 0.01$) while the correlation between performance and herding investor behaviour is also positive and statistically significant ($r = .136$, $p\text{-value} < 0.01$). The correlation between overconfidence and herding is positive and significant while overconfidence and disposition effect is negative and statistically significant. Herding and disposition effect have a significant positive correlation with performance implying that adoption of these behaviors increases individual portfolio performance while investors who are overconfident get poor results. There is no problem of multicollinearity since none of the correlation coefficients is more than 0.8 (Cooper & Schindler, 2003).

4.7 Results of Hypothesis Testing and Discussion

Multiple regression analysis was used to analyze the data and to test the hypothesized relationships between the study variables. Multiple regression analysis is used to explore the predictive ability of a set of independent variables on one dependent measure. The justification for the use of multiple regressions in this study was based on the fact that in the hypothesized relationships, multiple predictors were considered to have predictive ability on a single dependent measure. Since the aim of this study was to predict the relationships between a dependent variable and one or multiple independent variables using a regression equation, unstandardized regression coefficients were used. The study was based on the premise that there is no

relationship between investor behavior and portfolio performance at the NSE and that the relationship is not moderated by investor demographic characteristics and intervened by investment style.

4.7.1 Relationship between Investor Behaviour and Portfolio Performance

The first objective of the study was to determine the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange. Standard multiple regression was used to test the hypothesized relationship. Investor behaviour was operationalized into overconfidence, herding and disposition effect. Hypothesis one (H_1) was stated as follows:

Hypothesis 1: There is no relationship between investor behavior and portfolio performance at the NSE

In the column titled collinearity statistics in Table 4.22, we get statistics for testing multicollinearity in the model. Collinearity statistics give two values, tolerance and VIF (variance inflation factor). Tolerance is the inverse of VIF and a value of VIF higher than five (or tolerance less than 0.2) indicates the presence of multicollinearity. As shown in Table 4.22, $VIF < 5$ and $Tolerance > 0.2$ an indication that the variables were not highly correlated, hence no existence of multicollinearity. This is an indication of the suitability of variables for multiple regression analysis.

Table 4.20: Model Goodness of Fit of Investor Behaviour Subscales and Portfolio Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.257 ^a	.066	.048	1.062991

a. Predictors: (Constant), Overconfidence, Herding, Disposition Effect

The multiple regression model produced $R^2 = .066$, $F(3, 344) = 3.065$, $p < 0.05$. The results of regression analysis in Table 4.20 indicate that investor behaviour explained 6.6% of the variance in portfolio performance ($R^2 = 0.066$). The overall model reveals a statistically significant relationship ($p < 0.05$) between portfolio performance and

investor behaviour. These results thus indicate that investor behaviour influences portfolio performance.

Table 4.21: Model Overall Significance of Portfolio Performance and Investor Behaviour Subscales

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.390	3	3.463	3.065	.028 ^b
	Residual	388.703	344	1.130		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Overconfidence, Herding, Disposition Effect

The results indicate that herding ($\beta = .182$, $t = 2.301$, $p < .05$) and disposition effect ($\beta = .163$, $t = 2.676$, $p < .05$) both have a positive and significant relationship ($p < .05$) with portfolio performance as shown in Table 4.22. Similarly, overconfidence ($\beta = -.154$, $t = -2.567$, $p < .05$) is a significant predictor of portfolio performance and the relationship was negative.

Table 4.22: Model Regression coefficients of Portfolio Performance and Investor Behavior Subscales

Model		Unstandardized		t	Sig.	Collinearity	
		Coefficients				Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-.886	.353	-2.513	.012		
	Herding	.182	.063	2.301	.045	.950	1.053
	Disposition Effect	.163	.061	2.676	.008	.901	1.110
	Overconfidence	-.154	.059	-2.567	.041	.921	1.085

a. Dependent Variable: Sharpe Ratio

The prediction equation was as follows:

$$Performance = \beta_0 + \beta_1 Herding + \beta_2 Disposition\ effect + \beta_3 Overconfidence + \mathcal{E}$$

Where the variables are as operationalized in 3.9.2.1 and the values for the regression coefficients give the following regression equation:

$$\text{Performance} = -0.886 + 0.182 \text{ Herding} + 0.163 \text{ Disposition Effect} - 0.154 \text{ Overconfidence} + \varepsilon$$

Objective one of the study was to determine the relationship between investor behavior and portfolio performance at the NSE. The study hypothesized that there was no relationship between investor behavior and portfolio performance (H_1). Standard multiple regressions were used to test this direct hypothesized relationship while operationalizing investor behavior into overconfidence, herding and disposition effect. The multiple regression model produced $R^2 = .066$, $F(3, 344) = 3.065$, $p < 0.05$. These results indicate that investor behaviour explained 6.6% of the variance in portfolio performance ($R^2 = 0.066$). The overall model reveals a statistically significant relationship ($p < 0.05$) between portfolio performance and investor behaviour. These results therefore indicate that investor behaviour influences portfolio performance with herding ($\beta = .182$, $t = 2.301$, $p < .05$) and disposition effect ($\beta = .163$, $t = -2.676$, $p < .05$) having a positive significant effect on portfolio performance. The findings further reveal that the overconfidence component of investor behaviour was a statistically significant predictor of portfolio performance ($\beta = -.154$, $t = -2.567$, $p < .05$) and had a negative effect on performance.

Hypothesis one (H_1) explored the relationship between portfolio performance and investor behavior at NSE by suggesting that there is no relationship between investor behavior and portfolio performance at the NSE. The results indicate that the model has a predictive value and therefore we reject the hypothesis (H_1) hence it can be concluded that investor behavior does influence the investor's portfolio performance. This means that investors should evaluate their investment behaviour and take a cue from other investors as well as trying to avoid regret for better portfolio performance. Investors should avoid being overconfident as this results in high risk taking leading to poor results.

These findings agree with Barber and Odean (2000; 2001) and Odean (1999) who found that individual investors trade excessively, exposing themselves to high levels of risk and therefore making poor ex post investing decisions that lead to poor performance. High risk taking is a key characteristic of overconfident investors who underestimate their risk and end up buying or selling securities that negatively affect their performance. Odean (1999) also found that stocks that individuals sell outperform stocks that they buy, an indication that investors are suffering from behavioural biases. Hirshleifer (2001) posits that mental accounting may explain the disposition effect where people want their good decisions to be recognized immediately in their mental accounts, but they postpone acknowledging their bad decisions. Odean (1998) found further empirical support of disposition effect that individual investors are more willing to recognize paper gains than paper losses while Sherfrin (2000) observed that one mental shortcut, the representativeness bias, which makes the assumption that certain qualities of an item must imply other qualities for that same (or related) item, often in a positively correlated way. Merton (1987) notes that individual investors tend to hold only a few different common stocks in their portfolios. He points out that gathering information on stocks requires resources and suggests that investors conserve these resources by actively following only a few stocks.

Agrawal (2012) also noted that announcement returns were lower for overconfident bidders as compared to rational bidders thus supporting the findings of this study. The findings are also consistent with Goodfellow *et al* (2009) who found that individual investors were very prone to herding. This study found herding to have a significant effect on individual investor portfolio performance at the Nairobi Securities Exchange. Herding was largely motivated by the fact that investors were trying to guard their reputation and did not want to be seen to have made a loss when the masses were gaining. Moreover, informational herding was also common among the investors as they followed the advice of the various stock brokerage firms where they are clients.

4.7.2 Relationship between Investor Behaviour and Investment Style

The second objective of the study was to determine the relationship between investor behavior and investment style at the NSE. Standard multiple regression was used to test the hypothesized relationship. Investor behaviour was operationalized into overconfidence, herding and disposition effect. Hypothesis two (H_2) was stated as follows:

Hypothesis 2: There is no relationship between investor behaviour and investment style at the NSE

The statistics for testing multicollinearity in the model are shown in Table 4.25. Collinearity Statistics show a $VIF < 5$ and tolerance > 0.2 an indication that the variables were not highly correlated, hence no existence of multicollinearity. This is an indication of the suitability of variables for multiple regression purposes.

Table 4.23: Model Goodness of Fit of Investor Behaviour Subscales and Investment Style

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.334 ^a	.112	.104	.75087

a. Predictors: (Constant), Overconfidence, Herding, Disposition Effect

The multiple regression model produced $R^2 = .112$, $F(3, 344) = 14.397$, $p < 0.05$. The results of regression analysis in Table 4.23 indicate that investor behaviour explained 11.2% of the variance in investment style ($R^2 = 0.112$). The overall model reveals a statistically significant relationship ($p < 0.05$) between investment style and investor behavior as shown in Table 24. This study thus indicates that investor behaviour influences investment style.

Table 4.24: Model Overall Significance of Investment Style and Investor Behaviour Subscales

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.352	3	8.117	14.397	.000 ^b
	Residual	193.949	344	.564		
	Total	218.301	347			

a. Dependent Variable: Investment Style

b. Predictors: (Constant), Overconfidence, Herding, Disposition Effect

The results in Table 4.25 show that disposition effect ($\beta = .013$, $t = 0.291$, $p > .05$) has a positive though not significant relationship with investment style. Herding ($\beta = .233$, $t = 5.256$, $p < .05$) and overconfidence ($\beta = 0.129$, $t = 3.076$, $p < .05$) both have a significant relationship with investment style an indication that herding and overconfidence positively influence investment style.

Table 4.25: Model Regression coefficients of Investment Style and Investor Behavior Subscales

Model		Unstandardized		t	Sig.	Collinearity	
		Coefficients				Statistics	
		B	Std. Error	Tolerance	VIF		
1	(Constant)	1.897	.249	7.616	.000		
	Herding	.233	.044	5.256	.000	.950	1.053
	Disposition Effect	.013	.043	.291	.771	.901	1.110
	Overconfidence	.129	.042	3.076	.002	.921	1.085

a. Dependent Variable: Investment Style

The prediction equation was as follows:

$$Investment\ style = \beta_0 + \beta_1 Herding + \beta_2 Disposition\ effect + \beta_3 Overconfidence + \varepsilon$$

Where the variables are as operationalized in 3.9.2.2 and the values for the regression coefficients give the following regression equation:

$$Investment\ style = 1.897 + 0.233 Herding + 0.129 Overconfidence + \varepsilon$$

The second objective of this study was to examine the relationship between investor behavior and investment style at the Nairobi Securities Exchange. The study hypothesized that there is no relationship between investor behavior and investment style (H_2). Standard multiple regression was used to test the hypothesized relationship while investor behavior was operationalized into overconfidence, herding and disposition effect. The multiple regression model produced $R^2 = .112$, $F(3, 344) = 14.397$, $p < 0.05$ and was statistically significant with investor behaviour explaining 11.2% of the variance in investment style ($R^2 = 0.112$). The results for the individual investor behaviour components indicated that disposition effect has a positive though not significant relationship with investment style ($\beta = .013$, $t = 0.291$, $p > .05$) while herding ($\beta = .233$, $t = 5.256$, $p < .05$) and overconfidence ($\beta = 0.129$, $t = 3.076$, $p < .05$) both have a positive and significant relationship with investment style; an indication that they positively influence the investment style adopted by the investor.

Hypothesis two (H_2) tested the relationship between investment style and investor behavior at Nairobi Securities Exchange by suggesting that there is no relationship between investor behavior and investment style at the NSE. These results indicate that the model has predictive power therefore reject hypothesis two (H_2) was rejected and we conclude that investor behavior determines investment style. These results imply that it is possible to predict the style an investor will adopt in investing in stocks if their individual investor behaviour is known.

These findings are consistent with Kallinterakis *et al.*(2010) who posits that herding can contribute to the evaluation of professional performance because low-ability professionals may mimic the behaviour of their high-ability peers in order to develop their professional reputation and end up adopting investment styles that are similar to those of professionals. The findings also agree with Waweru *et al.*(2008) who proposed that herding can drive stock trading and create the momentum for stock trading leading to active investment style. The results show that herding and overconfidence investor behaviours influence the investment style adopted by the investor in making investment decisions. Agrawal (2012) noted that overconfidence

causes investors to overestimate their knowledge, undervalue risks and overestimate their ability to control events hence leading them to overtrade thus adopting the active investment style implying that investor behavior influences investment style.

4.7.3 Relationship between Investment Style and Portfolio Performance

The third objective of the study was to determine the relationship between investment style and portfolio performance at the NSE. Standard multiple regression was used to test the hypothesized relationship. Investment style was operationalized into value oriented investment style, growth oriented investment style, active investment style and passive investment style. Hypothesis three (**H₃**) was stated as follows:

Hypothesis 3: There is no relationship between investment style and portfolio performance at the NSE

Collinearity Statistics give a VIF<5 and tolerance > 0.2 as shown in Table 4.28 an implication that the variables were not highly correlated, hence no existence of multicollinearity. This is an indication of the suitability of variables for multiple regression purposes.

Table 4.26: Model Goodness of Fit of Investment Style Subscales and Portfolio Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.210 ^a	.044	.033	1.054597

a. Predictors: (Constant), Growth, Active, Value and Passive Oriented Investment Style

The multiple regression model produced $R^2 = .044$, $F(4, 343) = 3.960$, $p < 0.05$. The results of regression analysis in Table 4.26 indicate that investment style explained 4.4% of the variance in portfolio performance ($R^2 = 0.044$).

The overall model in Table 4.27 reveals a statistically significant relationship ($p < 0.05$) between investment style and performance, an indication that investment style influences portfolio performance.

Table 4.27: Model Overall Significance of Investment Style Subscales and Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.617	4	4.404	3.960	.004 ^b
	Residual	381.476	343	1.112		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Growth Oriented Investment Style, Active Oriented Investment Style, Value Oriented Investment Style, Passive Oriented Investment Style

The results of the tests in Table 4.28 show that Active oriented investment style and Value oriented investment style both have a positive though not significant relationship ($p > .05$) with portfolio performance as shown in the table below. Passive investment style ($\beta = .191$, $t = 3.544$, $p < .05$) and Growth oriented investment style ($\beta = -.154$, $t = -2.756$, $p < .05$) both have a significant relationship with portfolio performance an indication that passive oriented investment style and growth oriented investment style both influence portfolio performance. Passive investment style has a positive influence on portfolio performance while growth oriented investment style has a negative influence on portfolio performance showing that passive investors make better returns while investors who adopt growth oriented investment style earn poor returns. Active and value oriented investment styles have a positive but insignificant relationship with portfolio performance implying that adopting these styles will not affect the investors' performance.

Table 4.28: Model Regression Coefficients of Performance and Investment Style Subscales

Model	Unstandardized		t	Sig.	Collinearity	
	Coefficients				Statistics	
	B	Std. Error			Tolerance	VIF
1 (Constant)	-.651	.245	-2.651	.008		
Passive Oriented Investment Style	.191	.054	3.544	.000	.708	1.411
Active Oriented Investment Style	.042	.054	.776	.438	.782	1.279
Value Oriented Investment Style	.062	.057	1.073	.284	.790	1.267
Growth Oriented Investment Style	-.154	.056	-2.756	.006	.586	1.706

a. Dependent Variable: Sharpe Ratio

The prediction equation was as follows:

$$Perf = \beta_0 + \beta_1 Passive + \beta_2 Active + \beta_3 Value + \beta_4 Growth + \mathcal{E}$$

Where the variables are as operationalized in 3.9.2.3 and since the regression coefficients of active oriented investment style and value oriented investment style are not significant, the regression equation can be rewritten as follows:

$$Perf = -.651 + 0.191Passive - 0.154Growth + \mathcal{E}$$

Objective three of this study sought to establish the relationship between investment style and portfolio performance at the NSE. The study hypothesized that there is no relationship between investment style and portfolio performance (**H₃**) implying that the style adopted by investors will not influence the performance of their portfolio. Standard multiple regression was used to test the hypothesized relationship while investment style was operationalized into four components: Value oriented investment style, Growth oriented investment style, Active investment style and passive investment style. The multiple regression model produced $R^2 = .044$, $F(4,$

343) = 3.960, $p < 0.05$ with investment style explaining 4.4% of the variance in portfolio performance ($R^2 = 0.044$). The overall model was also statistically significant relationship ($p < 0.05$) indicating that investment style influences portfolio performance.

Passive investment style ($\beta = .191$, $t = 3.544$, $p < .05$) and growth oriented investment style ($\beta = -.154$, $t = -2.756$, $p < .05$) both have a significant relationship with portfolio performance an indication that passive oriented investment style and growth oriented investment style both influence portfolio performance although passive investment style has a positive effect while growth oriented investment style has a negative influence on portfolio performance. Active and value oriented investment styles have a positive but insignificant relationship with portfolio performance implying that adopting these styles will not significantly affect the investors' portfolio performance. Passive investment style has a positive relationship with performance implying that investors this style will outperform active investors.

Hypothesis three (**H₃**) explored the relationship between investment style and portfolio performance at NSE by suggesting that there is no relationship between investment style and performance at the NSE. Results of this study indicate that the model has predictive power. The relationship between investment style and portfolio performance is significant ($p < 0.05$) an indication that investment style influences portfolio performance. Investment style explained 4.4% of the variance in portfolio performance ($R^2 = 0.044$). Hypothesis three (**H₃**) was therefore rejected and we conclude that the investment style adopted by the investor will influence the investor's portfolio performance. This can be explained by the fact that different investment styles lead investors to trade less or more often and to pick varied stocks which perform differently leading to variations investors' portfolio performance.

These findings are consistent with Basu (1977) who found that the style of investing in value stocks provides returns that surpass that of investing in growth stocks. Chan *et al.* (1991) also concluded that investing in value stocks in the Japanese market was

more profitable than investing in growth stocks. Fama and French (1992) on the other hand argue that the superior performance of value stocks is due to the higher underlying risk of these stocks. Lakonishok *et al.* (1994) suggested that the higher returns achieved by value styles are due to the fact that these are contrarian to the strategies of noise traders that make investors pay too much attention to recent earnings growth and hence overreact to both good or bad news leading to overpricing of the growth stocks and underpricing of the value strategies. Investors who follow value strategies and invest in undervalued stocks eventually achieve higher returns than those invested in growth companies. The findings by French (2008) who concluded that active portfolio managers incur high fees, expenses and trading costs which end up lowering their returns hence passive managers tend to perform better are also consistent with the findings of this study.

The results also support the findings of Lakonishok *et al.* (1994) which were provided in the research by Porta *et al.* (1997) who used data from NYSE for the period 1971-1993 and concluded that value stocks outperformed growth stocks as investors often make errors in their expectations about the future earnings of growth stocks and eventually when the earnings are announced, value stocks, whose expectations were lower were found to outperform glamour stocks that represented the growth stocks. Agrawal (2012) also posits that active investors have been found to end up with poor performance due to high risk taking implying that passive investors outperform active investors.

4.7.4 Investor Behaviour, Demographic Characteristics and Individual Portfolio Performance

The fourth objective of this study was to determine the moderating effect of demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE by formulating the following hypothesis:

Hypothesis 4: The relationship between investor behavior and portfolio performance at the NSE is not moderated by investor demographic characteristics

Multiple hierarchical regressions were used to explore the relationship. Prior to conducting hierarchical multiple regression, the relevant assumptions of this statistical analysis were tested. An examination of correlations revealed that no independent variables were highly correlated. Collinearity statistics of tolerance and VIF were all within accepted limits as can be seen in Table 4.32 and therefore the assumption of multicollinearity was deemed to have been met and thus the variables can be used for purposes of multiple regressions.

The moderating effect was computed using the method proposed by Baron and Kenny (1986). According to Baron and Kenny (1986) in the first step the predictor variables (investor behavior and demographic characteristics) were entered in to the regression equation to test the main effects. Secondly an interaction term was created by multiplying the scores of the independent variable and the moderator variable. The creation of a new variable by multiplying the scores of investor behaviour and demographic characteristics risks creating a multicollinearity problem. To address the multicollinearity problem which can affect the estimation of the regression coefficients for the moderating effect, investor behaviour (the predictor variable) and demographic characteristics (the moderator) were first centered. This was accomplished by subtracting the mean from the respective variable, thereby obtaining a centered deviation score with a mean of zero. This interaction term (investor behavior*demographic characteristics) was then entered into the regression equation after the linear main effects on the outcome of the moderating (investor demographic characteristics) and moderated variables (investor behaviour) were estimated.

The effect of the interaction term was significant implying that the effect of investor behaviour on portfolio performance is dependent upon the levels of demographic characteristics and this is an indication that demographic characteristics (the moderator variable) alter the strength of the causal relationship between investor behaviour and performance and therefore the moderator hypothesis is supported. The change in R^2 for the interaction term is statistically significant implying that demographic characteristics have a moderating effect on the relationship between

investor behaviour and performance and therefore the moderator hypothesis is supported (Baron & Kenny, 1986).

In *step 1*, the results of hierarchical multiple regression predicting portfolio performance from investor behaviour and demographic characteristics are reported in Table 4.29. The multiple regression model (model 1) produced Adjusted $R^2 = .019$, $F(2, 345) = 3.382$, $p < .05$. The model (model 1) reveals a statistically significant relationship between portfolio performance, investor behaviour (independent variable) and demographic characteristics (moderator).

Table 4.29: Model Goodness of Fit of Investor Behaviour, Demographic Characteristics, Interaction Term and Portfolio Performance

Model R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
				R Square Change	F Change	df1	df2	Sig. F Change	
1	.139 ^a	.019	.014	1.065151	.019	3.382	2	345	.035
2	.163 ^b	.026	.018	1.062767	.017	2.549	1	344	.048

a. Predictors: (Constant), Demographic Characteristics, Investor Behaviour

b. Predictors: (Constant), Demographic Characteristics, Investor Behaviour, IB*DC

In *step 2* (model 2), the interaction between investor behaviour and demographic characteristics (IB*DC) was entered into the regression equation. The change in variance (ΔR^2) accounted for was equal to .007, which was statistically significant increase (36.8%) in variance accounted for over the step one model as shown in Table 4.29. Model 2 shows that the relationship between portfolio performance, investor behaviour, demographic characteristics and the interaction term (IB*DC) jointly was statistically significant, $R^2 = .026$, $F(3, 344) = 3.115$, $p < .05$ as shown in Table 4.30. Model 2 accounted for 2.6% ($R^2 = .026$) of the variance in portfolio performance.

Table 4.30: Model Overall Significance of Investor behaviour, Demographic Characteristics, Interaction Term and Portfolio Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.674	2	3.837	3.382	.035 ^b
	Residual	391.419	345	1.135		
	Total	399.093	347			
2	Regression	10.554	3	3.518	3.115	.026 ^c
	Residual	388.539	344	1.129		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Demographic Characteristics, Investor Behaviour

c. Predictors: (Constant), Demographic Characteristics, Investor Behaviour, IB*DC

As shown in Table 4.31, before the inclusion of the interaction term (model 1), the regression coefficient (β) value of investor behaviour was .192 with a t-test of 1.657 and significance level (p-value) of 0.098. The regression coefficient (β) value of demographic characteristics was -.184 with a t-test of -2.164 and significance level (p-value) of 0.031. After the inclusion of the interaction term, the beta coefficient of investor behaviour was .273 and it was significant ($p < 0.05$). The beta coefficient of demographic characteristics was -.195 and it was significant ($p < 0.05$). The interaction term (investor behavior * demographic characteristics) was found to be statistically significant as shown in Table 4.31.

Table 4.31: Model Regression Coefficients of Investor Behaviour, Demographic Characteristics, Interaction Term and Portfolio Performance

Model		Unstandardized		t	Sig.	Collinearity	
		Coefficients				Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-.124	.456	-.271	.786		
	Investor Behaviour	.192	.116	1.657	.098	.989	1.011
	Demographic Characteristics	-.184	.085	-2.164	.031	.989	1.011
2	(Constant)	-.319	.471	-.677	.499		
	Investor Behaviour	.273	.126	2.162	.031	.830	1.205
	Demographic Characteristics	-.195	.085	-2.293	.022	.983	1.018
	IB*DC	-.233	.146	-2.157	.049	.838	1.193

a. Dependent Variable: Sharpe Ratio

The fourth objective of the study sought to determine the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE. The study hypothesized that the relationship between investor behavior and portfolio performance at the NSE is not moderated by investor demographic characteristics (**H₄**). Multiple hierarchical regressions were used to test moderating effect in the relationship.

The results of hierarchical multiple regression predicting portfolio performance from investor behaviour and demographic characteristics produced adjusted $R^2 = .019$, $F(2, 345) = 3.382$, $p < .05$ revealing a statistically significant relationship between portfolio performance (dependent variable), investor behaviour (independent variable) and demographic characteristics (moderator). The introduction of the interaction term between investor behaviour and demographic characteristics (IB*DC) into the regression equation led to the change in variance accounted for (ΔR^2) of .007, which was a statistically significant increase (36.8%) in variance accounted for over that accounted for without the interaction term. This shows that the relationship between portfolio performance, investor behaviour, demographic characteristics and the interaction term (IB*DC) jointly was statistically significant with $R^2 = .026$, $F(3, 344) = 3.115$, $p < .05$ implying that the model with the interaction term accounted for 2.6% of the variance in portfolio performance.

Before the inclusion of the interaction term, the regression coefficient (β) value of investor behaviour was .192 with a t-test of 1.657 and significance level (p-value) of 0.098. The regression coefficient (β) value of demographic characteristics was -.184 with a t-test of -2.164 and significance level (p-value) of 0.031. After the inclusion of the interaction term, the beta coefficient of investor behaviour was .273 and it was significant ($p < 0.05$). The beta coefficient of demographic characteristics was -.195 and it was significant ($p < 0.05$). The interaction term (investor behavior * demographic characteristics) was found to be statistically significant.

Hypothesis four (**H₄**) explored the moderating effect of demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE by suggesting that relationship between investor behavior and portfolio performance

is not moderated by investor demographic characteristics. Including the interaction (moderating) term, the magnitude of the regression coefficient of investor behavior and demographic characteristics change and the model remains statistically significant. The interaction term was also statistically significant an indication that demographic characteristics have a moderating effect on the relationship between portfolio performance and investor behavior. We reject hypothesis four (**H₄**) and hence be concluded that demographic characteristics moderate the relationship between investor behaviour and portfolio performance. This could be explained by the fact that as people grow and acquire financial literacy, they tend to look at decisions differently and this change in behaviour influences the stocks they pick and consequently, portfolio performance.

These findings are consistent with Griffin and Tversky (1992) who found that a stock market environment with a very low level of predictability usually leads the financially literate investors to be overconfident than the less financially literate since they have theories and models with which they may tend to overweigh their expected returns. Barber and Odean (2001) found that men exhibit more overconfident characteristics, such as excessive trading and higher risk taking than women. These findings agree with those of Lee and Hanna (1995) who concluded that the proportion of individuals willing to take risks increased significantly with education and Sung and Hanna (1996) who found that financial literacy was statistically significant in determining one's willingness to assume greater risk. This study had a big proportion of respondents being financially literate and this could explain the high risk taking behaviour leading to over trading due to overconfidence. McInish (1982) however found that gender was not a significant factor in explaining risk tolerances. The findings of this study indicate that men were more prone to herding while women were more inclined to disposition effect although there were gender differences as far as overconfidence is concerned. This study used financial literacy as the key measurement of demographic characteristics and since literacy is associated with high risk taking, this could explain the negative effect of demographic characteristics on investor portfolio performance.

4.7.5 Investor Behaviour, Investment Style and Portfolio Performance

The fifth objective of this study was to determine the mediating role (intervening role) of investment style on the relationship between investor behavior and portfolio performance at the NSE. Hypothesis five (**H₅**) was stated as follows:

Hypothesis 5: The relationship between investor behavior and portfolio performance at the NSE is not intervened by investment style.

The mediating effect was computed using the method proposed by Baron and Kenny (1986). In *step one* of the intervening models, regression analysis was performed to assess the relationship between portfolio performance (dependent variable) and investor behaviour (independent variable) ignoring investment style (the intervener). The model was as follows:

$$Perf = \beta_0 + \beta_1 IB + \mathcal{E}$$

The model was statistically significant (p-value<.05) as shown in Table 4.32. The multiple regression model produced $R^2 = .066$, $F(1, 346) = 2.060$, $p < .05$ as shown in Table 4.33. Investor behaviour explained 6.6% of the variance in portfolio performance. The regression coefficient of investor behaviour was 0.166 and it was statistically significant (p<0.05) as shown in Table 4.34. The regression model was as follows:

$$Perf = -0.756 + 0.166IB + \mathcal{E}$$

Table 4.32: Model Goodness of Fit for Investor Behavior and Portfolio Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.256 ^a	.066	.043	1.070803

a. Predictors: (Constant), Investor Behaviour

Table 4.33: Model Overall Significance for Portfolio Performance and Investor Behaviour

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.362	1	2.362	2.060	.046
	Residual	396.731	346	1.147		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Investor Behaviour

Table 4.34: Model Overall Significance for Portfolio Performance and Investor Behaviour

Model		Unstandardized		t	Sig.	Collinearity	
		Coefficients				Statistics	
		B	Std. Error			Tolerance	VIF
	(Constant)	-.756	.352	-2.151	.032		
1	Investor Behaviour	.166	.116	2.135	.048	1.000	1.000

a. Dependent Variable: Sharpe Ratio

In *step two* of the intervening model, regression analysis was performed to assess the relationship between investment style (intervening variable) and investor behaviour (independent variable) ignoring portfolio performance (the dependent variable). The model was as follows:

$$\text{Investment style} = \beta_0 + \beta_1 IB + \mathcal{E}$$

The model was statistically significant ($p\text{-value} < .05$) as shown in Table 4.35. The multiple regression model produced $R^2 = .112$, $F(1, 346) = 25.479$, $p < .05$. Investor behaviour explained 11.2% of the variance in investment style. The regression coefficient of investor behaviour was 0.418 which was statistically significant ($p < 0.05$) as shown in Table 4.37. The regression model is as follows:

$$\text{Investment style} = 1.778 + 0.418IB + \mathcal{E}$$

Table 4.35: Model Goodness of Fit for Investor Behaviour Subscales and Investment Style

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.334 ^a	.112	.104	.75087

a. Predictors: (Constant), Investor Behaviour

Table 4.36: Model Overall Significance for Investment Style and Investor Behaviour

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	14.973	1	14.973	25.479	.000 ^b
1	Residual	203.328	346	.588		
	Total	218.301	347			

a. Dependent Variable: Investment Style

b. Predictors: (Constant), Investor Behaviour

Table 4.37: Model Regression Coefficients for Investment Style and Investor Behaviour

Model		Unstandardized		t	Sig.	Collinearity	
		Coefficients				Statistics	
		B	Std. Error			Tolerance	VIF
	(Constant)	1.778	.252	7.065	.000		
1	Investor Behaviour	.418	.083	5.048	.000	1.000	1.000

a. Dependent Variable: Investment Style

In the *third step* of the intervening model, regression analysis was performed to assess the relationship between investment style (intervening variable) and portfolio performance (dependent variable) ignoring the independent variable (investor behaviour). The model was as follows:

$$Perf = \beta_0 + \beta_1 IS + \varepsilon$$

The multiple regression model produced $R^2 = .044$, $F(4, 343) = 3.960$, $p < 0.05$. The results of regression analysis in Table 4.38 indicate that investment style explained 4.4% of the variance in portfolio performance ($R^2 = 0.044$). The overall model reveals a statistically significant relationship ($p < 0.05$) between investment style and performance, an indication that investment style influences portfolio performance.

Table 4.38: Model Overall Significance of Investment Style Subscales and Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.617	4	4.404	3.960	.004 ^b
	Residual	381.476	343	1.112		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Growth Oriented Investment Style, Active Oriented Investment Style, Value Oriented Investment Style, Passive Oriented Investment Style

The *fourth step* of the intervention analysis was performed to assess the relationship between portfolio performance (dependent variable), investment style (intervening variable) and investor behavior (independent variable). The model was as follows:

$$Perf = \beta_0 + \beta_1 IB + \beta_2 IS + \mathcal{E}$$

The model was statistically significant ($p\text{-value} < .05$) as shown in Table 4.41. The multiple regression model produced $R^2 = .046$, $F(2, 345) = 2.055$, $p < .05$. Investor behaviour and investment style explained 4.6% of the variance in portfolio performance. The regression coefficients of investment style and investor behavior were 0.018 and 0.159 respectively. The regression coefficient of investor behaviour (IB) was statistically significant but the coefficient for investment style was not significant indicating that investment style does not predict performance when investor behavior is present as shown in Table 4.41. The joint effect of investor behavior and investment style is statistically significant. The regression model is as follows:

$$Perf = -0.787 + 0.159IB + 0.018IS + \mathcal{E}$$

Table 4.39: Model Goodness of Fit for Investment Style, Investor Behaviour and Portfolio Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.214 ^a	.046	.034	1.072268

a. Predictors: (Constant), Investment Style, Investor Behaviour

Table 4.40 Model Overall Significance for Investment Style, Investor Behaviour and Portfolio Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	2.426	2	1.213	2.055	.049 ^b
1	Residual	396.667	345	1.150		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Investment Style, Investor Behaviour

Table 4.41: Model Overall Significance for Investment Style, Investor Behaviour and Portfolio Performance

Model	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	-.787	.377	-2.091	.037		
Investor Behaviour	.159	.120	1.322	.047	.931	1.074
Investment Style	.018	.075	.235	.814	.931	1.074

a. Dependent Variable: Sharpe Ratio

Objective five of the study was to test the intervening effect of investment style on the relationship between investor behavior and portfolio performance at the NSE. The study hypothesized that the relationship between investor behavior and portfolio performance at the NSE is not intervened by investment style (**H₅**). Using the method proposed by Baron and Kenny (1986) regression analysis was performed to assess

the relationship between portfolio performance and investor behavior ignoring investment style. The model was statistically significant with the multiple regression model producing $R^2 = .066$, $F(1, 346) = 2.060$, $p < .05$). Investor behaviour explained 6.6% of the variance in portfolio performance and the regression coefficient of investor behaviour of 0.166 was also statistically significant.

Regression analysis was then performed to assess the relationship between investment style (intervening variable) and investor behaviour (independent variable) ignoring the dependent variable (portfolio performance). The model was statistically significant producing a multiple regression $R^2 = .112$, $F(1, 346) = 25.479$, $p < .05$. Investor behaviour explained 11.2% of the variance in investment style. The regression coefficient of investor behaviour was 0.418 which was statistically significant.

The test of the relationship between investment style and performance produced $R^2 = .044$, $F(4, 343) = 3.960$, $p < 0.05$ indicating that investment style explained 4.4% of the variance in portfolio performance ($R^2 = 0.044$ implying that investment style influences portfolio performance).

The *final step* of the intervention analysis was performed to assess the relationship between portfolio performance (dependent variable), investment style (intervening/mediating variable) and investor behavior (independent variable). The model was statistically significant ($p\text{-value} < .05$) with the multiple regression model producing $R^2 = .046$, $F(2, 345) = 2.055$, $p < .05$. Investor behaviour and investment style explained 4.6% of the variance in portfolio performance. The regression coefficients of investment style and investor behavior were 0.018 and 0.159 respectively. The regression coefficient of IB was statistically significant. The joint effect of Investor behavior and investment style is statistically significant.

Hypothesis five (**H₅**) explored the relationship between investor behavior, investment style and portfolio performance at NSE by suggesting that the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange is not intervened by investment style. Intervention occurs if investor behaviour (IB)

predicts portfolio performance (Perf), investor behaviour (IB) predicts investment style (IS), and investment style (IS) predicts portfolio performance (Perf) and still investor behaviour (IB) predicts portfolio performance (Perf) when investment style (IS) is in the model. Since investment style does not predict Performance, investment style has no intervening role in the relationship between investor behavior and portfolio performance at the NSE and therefore we fail to reject hypothesis (**H₅**).

These findings are consistent with Shapira and Itzhak (2001) who posits that investors are influenced by behavioural biases and this affects their portfolio performance confirming the importance of investor behavior and portfolio returns. Investors at the Nairobi Securities Exchange were found to be suffering from herding, disposition effect and overconfidence and this behaviour influences the individual investor portfolio performance. The findings of this study are however inconsistent with Barber and Odean (2001) who posits that since men are more overconfident than women, men will trade more and perform worse than women. Although this study had a gender distribution of 72.4% male and 27.6% female, there was no significant difference in overconfidence behaviour between male and female respondents. These could be explained by the fact that overconfidence is a result of financial literacy that leads to high risk taking and not gender.

4.7.6 Investor Behaviour, Demographic Characteristics, Investment Style and Portfolio Performance

The sixth objective of this study was to determine the joint effect of investor behavior, demographic characteristics and investment style on portfolio performance at the NSE. Standard multiple regressions were used to test the hypothesized relationship. Hypothesis six (**H₆**) was stated as follows:

Hypothesis 6: The joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance is not significant

Collinearity statistics indicate that the variables are not highly correlated hence no existence of multicollinearity indicating that the variables are suitable for multiple regressions analysis.

Table 4.42: Model Goodness of Fit for Investor Behaviour, Demographic Characteristics, Investment Style and Portfolio Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.283 ^a	.080	.071	1.066506

a. Predictors: (Constant), Investment Style, Financial Literacy, Investor Behaviour

The multiple regression model produced $R^2 = .080$, $F(3, 344) = 3.290$, $p < 0.05$. The results of regression analysis from Table 4.42 indicate that investor behavior, demographic characteristics and investment style explained 8% of the variance in portfolio performance ($R^2 = 0.080$). The overall model reveals a statistically significant relationship ($p < 0.05$) between investor behavior, demographic characteristics, investment style and portfolio performance as shown in Table 4.43.

Table 4.43: Model Overall Significance for Investor Behaviour, Demographic Characteristics, Investment Style and Portfolio Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	7.815	3	2.605	3.290	.048 ^b
1	Residual	391.278	344	1.137		
	Total	399.093	347			

a. Dependent Variable: Sharpe Ratio

b. Predictors: (Constant), Investment Style, demographic characteristics, Investor Behaviour

The results indicate that investor behaviour has a positive and statistically significant relationship ($\beta = 0.181$, $t = 2.510$, $p < .05$) with portfolio performance as shown in the Table 4.44. Investment style however is not a significant predictor of performance. Demographic characteristics ($\beta = -.186$, $t = -2.177$, $p < .05$) have a significant relationship with portfolio performance an indication that demographic characteristics influence portfolio performance.

Table 4.44: Model Regression Coefficients for Investor Behavior, Demographic Characteristics, Investment Style and Portfolio Performance

Model	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	-.165	.471	-2.350	.046		
1 Investor Behaviour	.181	.120	2.510	.032	.925	1.082
Demographic Characteristics	-.186	.085	-2.177	.030	.987	1.014
Investment Style	.026	.075	.352	.725	.929	1.077

a. Dependent Variable: Sharpe Ratio

The prediction equation was as follows:

$$Perf = \beta_0 + \beta_1 IB + \beta_2 DC + \beta_3 IS + \varepsilon$$

Where the variables are as operationalized in 3.9.2.6 and given the values of regression model, the regression equation is as follows:

$$Perf = -0.165 + 0.181IB - 0.186DC + \varepsilon$$

The sixth objective of this study was to determine the joint effect of investor behavior, demographic characteristics and investment style on portfolio performance at the NSE. The hypothesized relationship was that the joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance is not significant (**H₆**).

The multiple regression model produced $R^2 = .080$, $F(3, 344) = 3.290$, $p < 0.05$ indicating that investor behavior, demographic characteristics and investment style explained 8% of the variance in portfolio performance. The overall model reveals a statistically significant relationship between investor behavior, demographic characteristics, investment style and portfolio performance. Investor behaviour has a positive and statistically significant relationship with portfolio performance while investment style is not a statistically significant predictor of performance.

Demographic characteristics have a significant negative relationship with portfolio performance an indication that demographic characteristics influence portfolio performance.

Hypothesis six (H_6) explored the relationship between investor behavior, demographic characteristics, investment style and portfolio performance at NSE by suggesting that the joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance at the NSE is not significant. The relationship between investor behavior, demographic characteristics, investment style and portfolio performance at NSE is statistically significant ($p < 0.05$) and $F = 3.29$. Hypothesis six (H_6) was not therefore supported and we therefore reject H_6 and conclude that jointly, investor behavior, demographic characteristics and investment style do influence portfolio performance at the Nairobi Securities Exchange. The implication of this is that investors and other market operators need to consider all these factors jointly and the effect they have on performance to make better returns and avoid market distortions.

These findings are in line with Lee and Hanna (1991) who argue that individual investors unlike institutional investors are less sophisticated and therefore irrational behavior and market anomalies are attributed to individual investors trading. Uninformed individual investors trading on sentiment is a common theme in the herding literature. Shiller (1984) and De Long, *et al* (1990), suggest that fad and fashion, rather than fundamentals, are likely to impact the investment decisions of individual investors. This study was about individual investors and their behavioural biases in making investment decisions and the findings show that individual investors suffer from herding, overconfidence and disposition effect that impact their portfolio performance. These findings are consistent with Griffin and Tversky (1992) who found that a stock market environment with a very low level of predictability usually lead the financially literate investors to be overconfident than the less financially literate since they have theories and models with which they may tend to overweigh their expected returns.

Shiller (1984) and De Long, *et al.* (1990) posits that fads and fashions, rather than fundamentals, impact the investment decisions of individual investors and hence performance may not be a reflection of market fundamentals. Emerging capital markets are characterized by few investment analysts leading the rest of the individual investors to follow the actions of those they consider to be investment gurus or trade on noise. The Nairobi Securities Exchange is in the emerging capital markets and this could explain the significance of investor behaviour in explaining the variations in the individual investor portfolio performance.

4.8 Chapter Summary

This section presents a summary of the results of the tests of hypotheses and discussions of the results in line with the objectives of the study. The objectives and hypotheses were derived from the conceptual model in Figure 2.1. The hypotheses tested the direct relationship among the variables, the moderating effect, the intervening effect and the joint effect among the variables in this study. The tests of goodness of fit, tests of standard error, tests of overall significance and analysis of variance (ANOVA) were carried out. The relationships among the variables were tested using different hypotheses. The study had six objectives and six hypotheses whose results are discussed below.

The results show that there was statistically significant differences between respondents in the age of 30 years and below and those between 31 to 40 years in relation to herding ($p=0.007$). Investors in the age group of 30 years and below portrayed an inclination towards herding behavior compared to those in the age group of 31 to 40 years. There was however no significant difference in mean scores between the other age groups (30 and below, 41-50 years and >50 years) in relation to herding. Those in the age of 31 to 40 were more financially literate compared to those in the other age groups and were also prone to be more overconfident than the others. This supports the findings of Evans (2006) that financial analysts and investors revise their assessment of a company slowly, even in cases where there is a strong indication proving that the assessment is no longer correct due to overconfidence in areas that they believe they have knowledge. This study had 58%

of the respondents in the age group of 31-40 years and this was found to be the most overconfident age group. The study also found that herding and overconfidence were significantly evident as behaviors adopted by investor in the Nairobi Securities Exchange.

Comparing gender and investor behaviour, there was no significant difference between the genders on investor overconfidence and this could be explained by the fact that those who were overconfident were financially literate irrespective of the gender and hence the illusion of knowledge contributes to overconfidence and not gender. Male respondents however portrayed more herding investor behavior compared to female respondents while women were more inclined to disposition effect related investor behavior compared to men.

Correlation analysis revealed a statistically significant ($r = -.107$, $p\text{-value} < 0.05$) negative correlation between performance and demographic characteristics indicating that demographic characteristics negatively influence portfolio performance at the NSE. The findings also reveal that investor behaviour positively determines investment style. Similarly, the relationship between performance and investor behaviour was statistically significant. Passive oriented investment and growth oriented investment styles positively influence portfolio performance indicating that those who adopt these styles will earn superior returns.

The findings show that overconfidence significantly and negatively affects performance and this can be explained by the fact that overconfidence leads to investors assuming a lot of risks thus making errors in their investment decisions which leads to poor returns. Herding investor behaviour on the other hand leads to a positive effect on performance an indication that those who adopt a wait and see approach end up avoiding the mistakes that are made by their predecessors.

Objective one of the study was to determine the relationship between investor behavior and portfolio performance at the NSE. Hypothesis one (H_1) explored the relationship between portfolio performance and investor behaviour at Nairobi Securities Exchange by suggesting that there is a no relationship between investor

behavior and portfolio performance at the NSE. The results indicate that the model has a predictive value and therefore reject hypothesis one (**H₁**) and conclude that investor behaviour does influence the investor's portfolio performance at Nairobi Securities Exchange.

The second objective of this study was to examine the relationship between investor behaviour and investment style at the NSE. Hypothesis two (**H₂**) tested the relationship between investment style and investor behavior at NSE by suggesting that there is no relationship between investor behavior and investment style at the NSE. These results indicate that the model has a predictive value therefore reject hypothesis (**H₂**) and conclude that investor behavior determines investment style adopted by investors at Nairobi Securities Exchange.

Objective three of this study sought to establish the relationship between investment style and portfolio performance at the NSE. Hypothesis three (**H₃**) suggested that there is no relationship between investment style and portfolio performance at the NSE. Results of this study indicate that the model has a predictive value implying that the relationship between investment style and portfolio performance is significant. We therefore reject hypothesis (**H₃**) and conclude that investment style influences portfolio performance at Nairobi Securities Exchange.

The fourth objective of this study sought to determine the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE. Hypothesis four (**H₄**) explored the moderating effect of demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE by suggesting that relationship between investor behavior and portfolio performance is not moderated by investor demographic characteristics. The interaction term was also statistically significant an indication that demographic characteristics have a moderating effect on the relationship between portfolio performance and investor behavior and we therefore reject hypothesis four (**H₄**) and conclude that demographic characteristics moderate the relationship between investor behavior and portfolio performance at Nairobi Securities Exchange.

Objective five of the study was to test the intervening effect of investment style on the relationship between investor behavior and portfolio performance at the NSE. Hypothesis five (**H₅**) explored the relationship between investor behavior, investment style and portfolio performance at NSE by suggesting that the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange is not intervened by investment style. A four step regression analysis was carried out and investment style does not predict performance when investor behaviour is present therefore investment style has no intervening role in the relationship between investor behavior and portfolio performance at the Nairobi Securities Exchange hence we fail to reject hypothesis (**H₅**).

The sixth objective of this study was to determine the joint effect of investor behavior, demographic characteristics and investment style on portfolio performance at the NSE. Hypothesis six (**H₆**) explored the relationship between investor behavior, demographic characteristics, investment style and portfolio performance at NSE by suggesting that the joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance at the NSE is not significant. The results indicate a significant relationship between investor behavior, demographic characteristics, investment style and portfolio performance at Nairobi Securities Exchange therefore we reject hypothesis six (**H₆**) and conclude that jointly investor behavior, demographic characteristics and investment style influence portfolio performance at the Nairobi Securities Exchange. The implication of this is that investors and other market operators need to consider all these factors jointly and the effect they have on performance to make better returns and avoid market distortion.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study set out to determine the relationships among investor behaviour, demographic characteristics, investment style and portfolio performance at the Nairobi Securities Exchange. The study sought to achieve six objectives by testing six hypotheses. The findings of the study, conclusions, recommendations, implications, limitations and suggested areas of future research are summarized in this chapter.

5.2 Summary of the Findings

The first objective sought to determine the relationship between investor behavior and portfolio performance at the NSE. A summary of the tests of hypotheses show that the first hypothesis (**H₁**) which explored the relationship between investor behavior and portfolio performance at the NSE was rejected. Standard multiple regression was used and overall model reveals a statistically significant relationship ($p < 0.05$) between portfolio performance and investor behaviour. These results therefore indicate that investor behaviour influences portfolio performance with herding ($\beta = .182$, $t = 2.301$, $p < .05$) and disposition effect ($\beta = .163$, $t = 2.676$, $p < .05$) having a positive significant effect on portfolio performance. The findings further revealed that the overconfidence component of investor behaviour was a statistically significant predictor of portfolio performance ($\beta = -.154$, $t = -2.567$, $p < .05$) and had a negative effect on performance. The results of this study fail to support the hypothesis implying that investor behaviour affects portfolio performance.

The second objective sought to examine the relationship between investor behavior and investment style at the NSE. The second hypothesis (**H₂**) tested the relationship between investor behavior and investment style at the NSE and the findings did not support the hypothesis therefore **H₂** was rejected. Standard multiple regression was used and the overall model was statistically significant with investor behaviour

explaining 11.2% of the variance in investment style ($R^2 = 0.112$). The results for the individual investor components indicate that disposition effect ($\beta = .013$, $t = 0.291$, $p > .05$) has a positive though not significant relationship with investment style while herding ($\beta = .233$, $t = 5.256$, $p < .05$) and overconfidence ($\beta = 0.129$, $t = 3.076$, $p < .05$) both have a positive and significant relationship with investment style. The findings do not support the hypothesis implying that investor behaviour affects investment style.

The third objective sought to establish the relationship between investment style and portfolio performance at the NSE. The third hypothesis (**H₃**) examined the relationship between investment style and portfolio performance at the NSE and the findings do not support the hypothesis hence **H₃** was rejected. Standard multiple regression was used and the multiple regression model produced $R^2 = .044$, $F(4, 343) = 3.960$, $p < 0.05$ with the overall model being statistically significant ($p < 0.05$). Passive investment style ($\beta = .191$, $t = 3.544$, $p < .05$) and growth oriented investment style ($\beta = -.154$, $t = -2.756$, $p < .05$) both have a significant relationship with portfolio performance while the other two styles had an insignificant effect on performance. The findings of this study do not support the hypothesis implying that the investment style adopted by the investor will affect the performance of their portfolio.

The fourth objective sought to determine the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE. The fourth hypothesis (**H₄**) tested the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE. Multiple hierarchical regressions were used and the results of hierarchical multiple regression predicting portfolio performance from investor behaviour and demographic characteristics produced adjusted $R^2 = .019$, $F(2, 345) = 3.382$, $p < .05$ revealing a statistically significant relationship between portfolio performance, investor behaviour and demographic characteristics. The introduction of the interaction term between investor behaviour and demographic characteristics (**IB*DC**) into the regression equation led a significant change (36.8%) in the variance accounted for (ΔR^2) without the

interaction term. This shows that the relationship between portfolio performance, investor behaviour, demographic characteristics and the interaction term (IB*DC) jointly was statistically significant with $R^2 = .026$, $F(3, 344) = 3.115$, $p < .05$ implying that demographic characteristics do moderate the relationship between investor behavior and portfolio performance at the NSE. These results do not support hypothesis four (**H₄**) and therefore we reject the hypothesis.

The fifth objective sought to test the intervening effect of investment style on the relationship between investor behavior and portfolio performance at the NSE. The fifth hypothesis (**H₅**) assumed that investment style has no intervening/mediating effect on the relationship between investor behavior and portfolio performance at the NSE. Step wise regression as proposed by Baron and Kenny (1986) was used and the overall regression model was statistically significant with $R^2 = .066$, $F(1, 346) = 2.060$, $p < .05$) and the regression coefficient of investor behaviour of 0.166 was also statistically significant. Regression analysis on investment style and investor behaviour model was statistically significant and the joint effect of investor behavior and investment style on portfolio performance is statistically significant. Regression analysis on investment style and portfolio performance showed that the model was not statistically significant ($p\text{-value} > .05$) when investor behaviour was present and therefore hypothesis five (**H₅**) was supported and we fail to reject the hypothesis.

The sixth objective sought to determine the joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance at the NSE. Hypothesis six (**H₆**) made the assumption that the joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance is significant. Standard multiple regressions were used and the overall model was not statistically significant. The multiple regression model produced $R^2 = .080$, $F(3, 344) = 3.290$, $p < 0.05$ indicating that investor behavior, demographic characteristics and investment style jointly explained 8% of the variance in portfolio performance. The findings do not support the hypothesis and hypothesis six (**H₆**) was therefore rejected.

The summary of tests of research findings, research hypotheses, interpretation and implications is given in the Table 5.1.

Table 5.1: Summary of Tests of Research Findings, Research Hypotheses, Interpretation and Implications

Objective	Hypotheses	Statistical Tests/Research Findings	Interpretation & Implications
<p>1. To determine the relationship between investor behavior and portfolio performance at the NSE.</p>	<p>Hypothesis 1: There is no relationship between investor behavior and portfolio performance at the NSE.</p>	<p>Standard multiple regression was used. The overall model reveals a statistically significant relationship ($p < 0.05$) between portfolio performance and investor behaviour. The multiple regression model produced $R^2 = .066$, $F(3, 344) = 3.065$, $p < 0.05$. These results indicate that investor behaviour explained 6.6% of the variance in portfolio performance ($R^2 = 0.066$). The overall model reveals a statistically significant relationship ($p < 0.05$) between portfolio performance and investor behaviour. These results therefore indicate that investor behaviour influences portfolio performance with herding ($\beta = .182$, $t = 2.301$, $p < .05$) and disposition effect ($\beta = .163$, $t = 2.676$, $p < .05$) having a positive significant effect on portfolio performance. The findings further revealed that the overconfidence component of investor behaviour was a statistically significant predictor of portfolio performance ($\beta = -.154$, $t = -2.567$, $p < .05$) and had a negative effect on performance.</p>	<p>Hypothesis 1 was not supported hence reject the hypothesis implying that investor behaviour does influence investor's portfolio performance at NSE with the following predictive equation:</p> $Perf = 0.886 + 0.182 Herding + 0.163 Disposition Effect - 0.154 Overconfidence + \epsilon$
<p>2. To examine the relationship between investor behavior and investment style at the NSE.</p>	<p>Hypothesis 2: There is no relationship between investor behavior and investment style at the NSE.</p>	<p>Standard multiple regression was used. The multiple regression model produced $R^2 = .112$, $F(3, 344) = 14.397$, $p < 0.05$ and was statistically significant with investor behaviour explaining 11.2% of the variance in investment style ($R^2 = 0.112$). The results for the individual investor components indicated that disposition effect ($\beta = .013$, $t = 0.291$, $p > .05$) has a positive though not significant relationship with investment style while herding ($\beta = .233$, $t = 5.256$, $p < .05$) and overconfidence ($\beta = 0.129$, $t =$</p>	<p>Hypothesis 2 was not supported thus we reject the hypothesis and conclude that investor behaviour influences investment style at the NSE. The predictive equation is:</p> $Style = 1.897 + 0.233 Herd$

Objective	Hypotheses	Statistical Tests/Research Findings	Interpretation & Implications
		3.076, $p < .05$) both have a positive and significant relationship with investment style.	<i>ing</i> $+0.129$ <i>Overconfidence</i> + ϵ
<p>3. To establish the relationship between investment style and portfolio performance at the NSE</p>	<p>Hypothesis 3: There is no relationship between investment style and portfolio performance at the NSE.</p>	<p>Standard multiple regression was used. Investment style was operationalized into four components: Value oriented investment style, growth oriented investment style, active investment style and passive investment style. The multiple regression model produced $R^2 = .044$, $F(4, 343) = 3.960$, $p < 0.05$ with investment style explaining 4.4% of the variance in portfolio performance ($R^2 = 0.044$). The overall model was statistically significant relationship ($p < 0.05$). Passive investment style ($\beta = .191$, $t = 3.544$, $p < .05$) and growth oriented investment style ($\beta = -.154$, $t = -2.756$, $p < .05$) both have a significant relationship with portfolio performance while the other two styles had an insignificant effect.</p>	<p>Hypothesis 3 was not supported thus we reject the hypothesis implying that investment style influences portfolio performance at the NSE. The predictive equation is as follows: $Perf = -.651 + 0.191Passive - 0.154Growth + \epsilon$</p>
<p>4. To determine the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE.</p>	<p>Hypothesis 4: The relationship between investor behavior and portfolio performance at the NSE is not moderated by investor demographic characteristics.</p>	<p>Multiple hierarchical regressions were used to test moderating effect. The results of hierarchical multiple regression predicting portfolio performance from investor behaviour and demographic characteristics produced adjusted $R^2 = .019$, $F(2, 345) = 3.382$, $p < .05$ revealing a statistically significant relationship between portfolio performance, investor behaviour and demographic characteristics. The introduction of the interaction term between investor behaviour and demographic characteristics (IB*DC) into the regression equation led a significant change (ΔR^2) in the variance accounted for without the interaction term. This shows that the relationship between portfolio performance, investor behaviour, demographic characteristics and the interaction term (IB*DC) jointly was statistically significant with $R^2 = .026$, $F(3, 344) = 3.115$, $p < .05$ implying that the model with the</p>	<p>Hypothesis 4 was not supported thus we reject the hypothesis hence we conclude that demographic characteristics moderate the relationship between investor behaviour and portfolio performance at the NSE.</p>

Objective	Hypotheses	Statistical Tests/Research Findings	Interpretation & Implications
		interaction term accounted for 2.6% of the variance in portfolio performance.	
<p>5. To determine the intervening effect of investment style on the relationship between investor behavior and portfolio performance at the NSE.</p>	<p>Hypothesis 5: The relationship between investor behavior and portfolio performance at the NSE is not intervened by investment style.</p>	<p>Stepwise regression was used. Regression analysis on the relationship between portfolio performance and investor behaviour produced a statistically significant model with the multiple regression $R^2 = .066$, $F(1, 346) = 2.060$, $p < .05$. and the regression coefficient of investor behaviour of 0.166 was also statistically significant.</p> <p>Regression analysis on investment style and investor behaviour model was statistically significant with $R^2 = .069$, $F(1, 346) = 25.479$, $p < .05$ and the regression coefficient of investor behaviour was 0.418 which was statistically significant.</p> <p>Regression analysis on investment style and portfolio performance showed that the multiple regression model produced $R^2 = .044$, $F(4, 343) = 3.960$, $p < 0.05$. The results of regression analysis indicate that investment style explained 4.4% of the variance in portfolio performance ($R^2 = 0.044$). The overall model reveals a statistically significant relationship ($p < 0.05$) between investment style and performance, an indication that investment style influences portfolio performance.</p> <p>The regression analysis of portfolio performance, investment style and investor behavior was statistically significant ($p\text{-value} < .05$) with the multiple regression model producing $R^2 = .046$, $F(2, 345) = 2.055$, $p < .05$. Investor behaviour and investment style explained 4.6% of the variance in portfolio performance. The regression coefficient of investor behaviour was statistically significant. The joint effect of Investor behavior and investment style is statistically significant.</p>	<p>We fail to reject hypothesis 5 implying that investment style does not mediate the relationship between investor behaviour and portfolio performance at the NSE. The predictive equation is as follows:</p> $Perf = -0.787 + 0.018IB + 0.159IS + \epsilon$

Objective	Hypotheses	Statistical Tests/Research Findings	Interpretation & Implications
<p>6. To determine the joint effect of investor behavior, investor demographic characteristics and investment style on portfolio performance at the NSE.</p>	<p>Hypothesis 6: The joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance is not significant.</p>	<p>Standard multiple regression was used. The joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance is statistically significant ($R^2 = .080$, $F(3, 344) = 3.290$, $p < 0.05$).</p> <p>Investor behaviour has a positive and statistically significant relationship ($\beta = 0.181$, $t = 2.510$, $p < 0.05$) with portfolio performance while investment style is not a significant predictor of performance. Demographic characteristics ($\beta = -.186$, $t = -2.177$, $p < .05$) have a significant relationship with portfolio performance.</p>	<p>Hypothesis 6 is not supported and we reject the hypothesis. The implication is that jointly investor behaviour, investment style and demographic characteristics influence portfolio performance therefore The predictive equation is as follows:</p> $Perf = -0.165 + 0.181IB - 0.186DC + \epsilon.$

5.3 Conclusions

The main purpose of this study was to determine the interrelationships among investor behaviour, demographic characteristics, investment style and individual portfolio performance at the Nairobi Securities Exchange. The study was based on the theory of behavioural finance which presupposes that individuals suffer from behavioural biases in making investment decisions rather than following traditional finance theory that requires investors to be rational and to consider key fundamentals in making financial and investment decisions. This study had a 90.4% response rate with 72.4% of the respondents being male while 27.6% were female. The age group of 31 to 40 years was found to be the most financially literate. The study had 58% of the respondents in the age group of 31 and 40 years old, 18.4% were 30 years and below, 13.2% were between 41 and 50 years old and 10.3% were above 50 years old. This indicates that males are more prone to investing in stock markets compared to women.

It also shows that most investors on the Nairobi Securities Exchange are in the age group of 31 to 40 years and this may call for the capital market players in Kenya to carry out aggressive investor education to impress upon the other age groups to invest in the capital markets and consider the Nairobi Securities Exchange as an investment avenue.

The results indicate that disposition effect, herding and overconfidence were significantly evident as behaviours adopted by investors at the Nairobi Securities Exchange and that there was no significant difference between the genders on investor overconfidence; this could be explained by the fact that those who were overconfident were financially literate irrespective of the gender and hence the illusion of knowledge contributes to overconfidence and not gender. The implication here is that investors do not often review their biases and the effect they have on performance hence they keep on suffering from the consequences of the same mistakes. Male respondents however portrayed more herding investor behavior compared to female respondents while women were more inclined to disposition effect related investor behavior compared to men.

The rejection of the first hypothesis (**H₁**) which explored the relationship between investor behavior and portfolio performance at the NSE implies that the behaviour of investors will influence the performance of their portfolio. Herding and disposition effect have a positive significant effect on portfolio performance while overconfidence investor behaviour has a negative effect on performance. These indicate that those who herd and suffer from disposition effect make better returns than those who are overconfident. The implication here is that overconfidence leads to high risk taking due an illusion of knowledge or control leading the investors to ignore fundamental information that affects their returns. Herding and disposition effect give better returns since the herders follow the cue from others who have already taken the initial risk and are able to decide which cue to follow depending on the indicative performance. Disposition effect allows the investors to avoid regret hence they are unlikely to suffer from the negative consequences of high risk taking.

The rejection of the second hypothesis (**H₂**) which explored the relationship between investor behavior and investment style at the NSE implies that the behaviour of investors will influence the investment style they adopt. The results for the individual investor components indicate that disposition effect does not significantly influence investment style while herding and overconfidence both have a positive and significant relationship with investment style. The implication of these findings is that the behaviour of the investor determines the investment style they adopt and that for the NSE, herding and overconfidence are key in influencing investment style therefore understanding the behaviour of the investor will help in predicting the style they will adopt in investment.

The rejection of the third hypothesis (**H₃**) which examined the relationship between investment style and portfolio performance at the NSE implies that the investment style adopted by the investor will affect the performance of their portfolio. Passive investment style and Growth oriented investment have a significant relationship with portfolio performance while the other two styles had an insignificant effect on performance. The implication of these findings is that those investors who adopt growth oriented style in a market where there are behavioural biases will earn inferior returns compared to their counterparts since investing in a growth stock is an investment style which is based on a company's fundamentals such as earnings, dividends, cash flows and book value of company and it is be considered as a rational style on behalf of investors. A passive investor on the other hand, holds the investment as they observe the market and takes action when the market is favourable to them hence making better returns.

The rejection of the fourth hypothesis (**H₄**) which tested the moderating effect of investor demographic characteristics on the relationship between investor behavior and portfolio performance at the NSE indicates that demographic characteristics do moderate the relationship between investor behavior and portfolio performance at the NSE. The implication of these findings is that the capital markets players in Kenya need to identify the demographics of the investors and how they affect the behaviour

of the investors plus their portfolio performance then target these areas for investor education to avoid distorting the market.

The failure to reject the fifth hypothesis (**H₅**) which tested the intervening role of investment style on the relationship between investor behavior and portfolio performance at the NSE implies that investment style does not mediate the relationship between investor behavior and portfolio performance at the NSE. Although the relationship between investment style and investor behaviour and the joint effect of investor behavior and investment style on portfolio performance are statistically significant, the regression analysis on investment style and portfolio performance is not statistically significant when investor behaviour is present and this could be explained by the fact that much of the effects of investment style have already been catered for by investor behaviour.

The rejection of the sixth hypothesis (**H₆**) that tested the joint effect of investor behavior, demographic characteristics, and investment style on portfolio performance indicates that together investor behavior, demographic characteristics and investment style influence portfolio performance. Investors and other market players must review the interactions among these variables when making investment decisions to avoid making poor returns from investments that discourage them and other potential market players from investing in capital markets.

5.4 Recommendations

This study set out to determine the relationships among investor behaviour, demographic characteristics, investment style and portfolio performance at the Nairobi Securities Exchange. Investors just like any other business require a good return to remain in the market. A number of recommendations can be drawn from the findings of this study.

Behavioural finance is a new perspective of analyzing and explaining the forces underpinning investment decisions the world over, this study has found that investor behaviour does influence portfolio performance for those investing in shares of the NSE. The findings have clearly shown that behavioural biases affect investors in the

capital markets in Kenya and their effect on performance is significant. These findings contribute to the volume of empirical evidence that helps to build literature and theories on investor behaviour and investment performance in the capital markets in Kenya. The findings of this study provide a review of theory and empirical evidence on behavioral finance which the learning institutions and researchers can use to open up further areas of study.

The capital markets in Kenya are drawing attention to potential investors both institutional and individuals as well as foreign and local investors. Companies going public can use the findings of this study to understand how investor behaviour influence the price of securities and hence be able to set realistic prices that will attract the investors they target without distorting the market. The moderating and intervening effect of demographic characteristics and investment style respectively on the relationship between investor behaviour and portfolio performance at the NSE will also help the capital market players in understanding market dynamics which could help in policy setting and practice.

The study has found that disposition effect, overconfidence and herding behaviours are present in the Kenyan capital markets with overconfidence leading to a negative effect on performance due to illusion of knowledge and control hence under estimation of risk by the investors. Although herding has a positive effect on performance, it will also require a good cue to herd. Disposition effect has a positive effect on performance due to regret aversion but if all investors adopted this investment behaviour, there will be very little activity in the capital markets leading to lack of liquidity and stagnation in development of capital markets. The investors can use the findings of this study to understand how their behaviour affects their portfolio performance and thus they can learn to avoid those behaviours that have a negative impact on the value of their investment and also incorporate fundamental information in their buying and selling decisions.

Stockbrokers and mutual fund companies promise to maximize the wealth of investors who are their clients. More often than not they have failed to meet their end of the bargain as investors have ended up with disappointing returns since the

stockbrokers and fund managers look at market fundamentals whereas the investors rely on behavioural biases thereby distorting the pricing system. The findings of this study can help stockbrokers and fund managers to understand investor behaviour and advise the investors appropriately for them to remain in the market and maximize their portfolio performance.

The study finds that as much as investors are financially literate, their investments are still affected by behavioural biases and demographic characteristics. These findings can be informative to policy making and regulation of capital markets especially with regard to the role played by individual demographic characteristics and investor behaviour on capital market developments. The findings of the study provide a basis for policy setting in the capital markets. The Capital Markets Authority (CMA), the Nairobi Securities Exchange and other market players can use these findings as a basis of investor education and minimization of noise trading in the Kenyan capital markets. These findings provide insight to current and potential investors regarding price movements since they can be able to make viable investment decisions without relying on incorrect information based on market sentiments and individual perceptions.

The public, financial analysts and potential investors monitor the stock market movements on a daily basis. The research has found that investors suffer from both reputational and rational herding and these influence their performance. The findings of this study provide an eye-opener and basis of appreciating of the effect of behavioral bias on trading activities and to understand the market dynamics and look more closely at factors other than price that influence the performance of the securities in the market and how to deal with traded securities.

5.5 Limitations of the Study

The study focused on the effect of demographic characteristics on the relationship between investor behaviour and portfolio performance. The findings have provided insight into the relationships among these variables and this insight can help a number of stakeholders in decision making. The study was however faced with some limitations. The first limitation relates to operationalization of investor behaviour

where only three components of investor behaviour namely overconfidence, disposition effect and herding were used in the study ignoring the other behavioral biases which could possibly have resulted in different findings. Similarly, other measures of demographics could have resulted in different findings if they were used instead of those used in this study. The level of income for example is one demographic characteristic that can influence investor behaviour but it was not possible to use it in this study. These limitations could imply that the complete effect of demographic characteristics on the relationship between investor behaviour and portfolio management may not have been explored.

The data on investor behaviour was collected using a Likert's scale. There is a chance that some of the respondents may have either over/under rated their scoring on some of the questions leading to a score that is different from the actual position. This was however countered by the fact that a number of questions were asked to address the same measure and also the investment statements provided by the investor directly from their Central Depository Settlement Corporation (CDSC) also helped to validate the data.

The study made the assumption that investor behaviour did not change over the period of study. It is possible that investors could adopt different behaviours as time goes by and as they learn from their mistakes; if this happens, it may distort the measurement of investor behaviour used in this which may lead to different conclusions.

5.6 Suggestions for Further Research

This study used both primary and secondary data for analysis. Given the possibility of subjectivity in scoring by the respondents, it may be necessary for a similar study to be carried using secondary data on price movements that can depict investor behavior. This study found style to have no intervening effect on the relationship between investor behavior and portfolio performance. It may be necessary to focus on one specific style to see whether the results will be different. It may also be

worthwhile to consider different measures of demographics in testing the moderating relationship to confirm whether or not the results will be the similar.

The Nairobi Securities Exchange, the Capital Markets Authority together with other capital markets stakeholders can commission a study to review stock price movements and performance to determine the factors that drive momentum in the market and the contribution made by investment decisions based on behavioural biases.

This study focused on individual retail investors under the assumption that institutional investors have clear guidelines and processes to be followed in making investment decisions. It may be necessary to carry out a study comparing the performance of institutional investors and that of individual investors. The study can also look at whether it is true or not that institutional investors do not suffer from behavioural biases.

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APPENDICES

Appendix 1: Questionnaire

Dear investor, my name is Winnie Iminza Nyamute. I am carrying out an academic research on the behavior of investors on the Nairobi Securities Exchange Ltd. Any information provided to me will be treated as confidential and will not be shared with anybody else or used for any other purpose other than that for which it was collected. I will therefore appreciate if you spared a moment of your time to fill the following questionnaire for me.

Thank you.

Section A: Demographic Characteristic

Please tick the appropriate bracket

1. Gender: Male () Female ()
2. Age in years: (i) 30 and below () (ii) 31-40() (iii) 41-50() (iv) Over 50()
3. Marital status? Married [] Single []
4. Financial Literacy

Use the key below and tick as appropriate

Not at all [0]; To a less extent [1]; To a moderate extent [2]; To a large extent [3]; To a very large extent [4]

Please indicate to what extent you agree or disagree with the following statements under each category below

	Not at all	To a less extent	To a moderate extent	To a large extent	To a very large extent
1. I know about investments (stock, bonds, mutual funds)					
2. I have invested in stock, bonds or mutual funds					
3. I know how to calculate the expected income/return on my shares and other investments					
4. Investing in the stock market by buying a wide range of shares and other investments can help to reduce the risk associated with poor income/return					
5. Investing in shares yields a higher long-term growth as compared to treasury bills					
6. I use financial knowledge to make personal financial decisions					
7. I understand investment options for pension schemes and the risks involved					

Section B: Investor Behaviour

Please indicate whether you agree or disagree with the following statements by placing a tick (✓) in the box which best reflects your opinion

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. My past history influences my present investment decisions					
2. Although the price of my investment has gone down, I am holding to it since selling it will make me incur a loss which could be painful					
3. I rely on my knowledge other than trusting other people					
4. Thinking hard and for a long time about something gives me very little satisfaction					
5. I understand all the fundamentals of the company that I am confident in making my investments					
6. I tend to sell my investments immediately the price goes back to its acquisition price					
7. The previous profits generated from similar investments by the company made it very attractive to me to invest in it.					
8. The last investment was more of a bad luck than it was of my own poor judgment					
9. I am holding to my investments because I know the prices will revert soon					
10. I consider the past performance of a share before investing in it					
11. I fix a target price for buying/selling well in advance.					
12. If I hear views from a famous analyst that conflicts with my opinion about a share, I usually change my opinion					
13. If the price of a company's shares falls but investors are demanding the shares, I will buy.					
14. I like buying/selling shares of companies that other investors are buying /selling					
15. I am willing to take <i>high risk</i> in exchange for <i>high</i> expected share returns.					
16. I feel comfortable investing in shares that are considered risky.					
17. My past <i>profitable</i> investments were mainly due to my specific investment skills					
18. Losses from my investments are often a result of factors beyond my control					
19. I am fully responsible for the results of my					

investment decisions.					
20. I make all the important share <i>investment decisions</i> myself.					
21. I am more knowledgeable in share investments compared to the ordinary investor					
22. I often use information gained from media in making investment decisions					
23. I feel that public opinion about profit making investments is often correct					
24. I never make any investment decision without consulting my investment advisor					
25. I feel that my friends have more knowledge about investing than I do					
26. I do not like investing in stocks with high volatility.					
27. I usually hold on my shares whose prices are going down as I wait for the prices to improve.					
28. I often integrate the sale of losers (shares whose prices are have gone down) so that the feeling of regret is confined to one time period					
29. I tend to stagger the sale of winners (shares whose prices are have gone down) over time to prolong the favorable experience.					
30. I am more venturesome with money received as bonus but very conservative with money set aside for children's education					
31. I often prefer shares that pay high dividends because I don't mind spending the dividend income, but I am usually not inclined to sell a few shares and" dip into the capital"					

Section C: Investment Style

How many times do you trade on average per month? **1 () 2 () 3 () 4 ()** Other-specify ()

Please state to which you agree or disagree with the following statements:

Not at all [0]; To a less extent [1]; To a moderate extent [2]; To a large extent [3]; To a very large extent [4]

	0	1	2	3	4
1. I believe that high historical returns may lead to high future returns so I often buy shares with good past prices					
2. When I buy shares I usually hold them for a period of more than one month before selling					
3. I usually buy shares that form part of the 20-share index					
4. I usually buy shares that I believe their					

prices are below their true prices so that I can make a gain when their price goes up.					
5. I usually buy shares that are ignored by other investors					
6. I prefer buying shares of companies with high earnings growth rate					

Section D: Performance of Shares

Please provide me the following monthly information for the period beginning January 2010 to December 2014 (60 months in total). You may alternatively provide me with a copy of your CDSC statements for the same period without your name to allow me extract the same information.

Year	Month	Company invested in	Number of shares at the beginning of the month	Number of shares at the end of the month
2010	January			
	February			
	March			
	April			
	May			
	June			
	July			
	August			
	September			
	October			
	November			
	December			
2011	January			
	February			
	March			
	April			
	May			
	June			
	July			
	August			
	September			
	October			
	November			
	December			
2012	January			
	February			
	March			
	April			
	May			
	June			
	July			
	August			

	September			
	October			
	November			
	December			
2013	January			
	February			
	March			
	April			
	May			
	June			
	July			
	August			
	September			
	October			
	November			
	December			
2014	January			
	February			
	March			
	April			
	May			
	June			
	July			
	August			
	September			
	October			
	November			
	December			

THANK YOU FOR PARTICIPATING

Appendix 2: Tests of Reliability

Reliability Analysis of Financial Literacy Scale

Item	Scale Mean	Scale Variance	Squared Multiple Correlation	Cronbach's Alpha
I know about investments	25.75	10.750	.959	.709
I have invested in stock, bonds or mutual funds	26.42	8.083	.937	.664
I know how to calculate the expected income/return on Investments	26.00	8.364	.971	.657
Investing in the stock market helps to reduce risks associated with poor return	26.08	13.174	.634	.821
Investing in shares yields a higher long-term growth as compared to treasury bills	26.08	9.720	.700	.709
I use financial knowledge to make personal financial decisions	26.00	10.909	.657	.743
I understand investment options for pension schemes and risks involved	26.67	8.606	.914	.706

Reliability Analysis of Investment Style Scale

Items	Scale Mean	Scale Variance	Total Correlation	Squared Multiple Correlation	Cronbach's Alpha
I trade at least three times in a month	15.00	23.000	.459	.928	.830
I believe that high historical returns may lead to high future returns so I often buy shares with good past prices	14.91	24.691	.513	.930	.815

When I buy shares I usually hold them for a period of more than one month before selling	15.00	24.000	.457	.505	.825
I usually buy shares that form part of the 20-share index	15.09	22.891	.695	.860	.787
I usually buy shares that I believe their prices are below their true prices so that I can make a gain when the prices go up	15.36	22.655	.497	.836	.822
I usually buy shares that are ignored by other investors	15.18	22.364	.862	.845	.767
I prefer buying shares of companies with high earnings growth rate	15.27	23.618	.710	.865	.789

Reliability Analysis of Investor Behaviour Scale

Items	Scale Mean	Scale Variance	Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha
Past history influences my present investment decisions	106.11	680.111	.677	.	.943
Although the price of my investment has gone down, I am holding to it	106.11	686.111	.562	.	.944
I rely on my knowledge other than trusting other people	106.33	668.750	.698	.	.943

Thinking hard and for a long time about something gives me satisfaction	105.33	720.000	.165	.	.948
I understand the fundamentals of the company and confident in making my investments	106.22	670.944	.747	.	.943
I tend to sell my investments immediately the prices go back to the acquisition price	104.78	740.944	-.130	.	.949
Previous profits generated from similar investments by the company made it very attractive to me to invest in it	106.00	692.000	.530	.	.945
The last investment was more of a bad luck than it was my own poor judgment	104.78	721.444	.247	.	.946
I am holding to my investments because I know the prices will revert soon	105.33	681.000	.694	.	.943
I consider the past performance of a share before investing in it	106.78	670.944	.944	.	.941

I fix a target price for buying/selling well in advance	106.11	673.111	.823	.	.942
If I hear views from a famous analyst that conflicts with my opinion about a share, I usually change my opinion	105.00	728.000	.097	.	.947
If the price of a company's shares falls but investors are demanding the shares, I will buy	106.11	698.111	.611	.	.944
I like buying/selling shares of companies that other investors are buying /selling	105.78	695.694	.515	.	.945
I am willing to take high risk in exchange for high expected share returns	106.44	666.278	.848	.	.942
I feel comfortable investing in shares that are considered risky	106.33	690.000	.730	.	.943
My past profitable investments were mainly due to my specific investment skills	106.11	680.111	.935	.	.942
My investment losses have often resulted from factors beyond my control	105.33	699.000	.574	.	.944

I am fully responsible for the results of my investment decisions	106.56	664.278	.832	.	.942
I make all the important share investment decisions myself	106.44	670.028	.797	.	.942
I am more knowledgeable in share investments compared to the average investor	106.44	671.278	.965	.	.941
I often use information gained from media in making investment decisions	105.89	679.611	.772	.	.943
I feel public opinion about profit making investment objectives is often correct	104.89	707.361	.493	.	.945
I never make any investment decision without consulting my investment advisor	105.00	714.250	.393	.	.946
I feel that my friends have more knowledge about investing than I do	105.11	704.611	.662	.	.944
I do not like investing in stocks with high volatility	105.22	707.944	.562	.	.945

I usually hold on my shares whose prices are going down as I wait for the prices to improve	105.56	687.778	.604	.	.944
I often integrate the sale of losers so that the feeling of regret is confined to one time period	105.11	721.361	.236	.	.946
I tend to stagger the sale of winners over time to prolong the favourable experience	105.44	701.278	.415	.	.946
I am more venturesome with money received as bonus but very conservative with money set aside for children's education	106.00	683.250	.694	.	.943
I often prefer shares that pay high dividends but I am usually not inclined to sell a few shares and" dip into the capital	105.89	711.861	.325	.	.946
I usually buy shares that form part of the 20-share index	106.56	705.028	.477	.	.945

I usually buy shares that I believe their price is below its true price so that I can make a gain/profit when its price goes up	106.89	683.861	.847	.	.942
I trade at least three times in a month	106.44	733.778	-.013	.	.949
I believe that high historical returns may lead to high future returns so I often buy shares with good past prices	106.22	713.944	.368	.	.946
When I buy shares I usually hold them for a period of more than one month before selling	106.44	711.778	.274	.	.947

Appendix 3: Tests of Normality

Tests of Normality

Scale	N	Skewness		Kurtosis	
		Statistic	Std. Error	Statistic	Std. Error
Sharpe Ratio	348	1.505	.131	5.203	.261
Financial Literacy	348	-.293	.131	-.306	.261
Investor Behaviour	348	.383	.131	0.453	.261
Investment Style	348	-.305	.131	-.304	.261
Overconfidence	348	.293	.131	-.429	.261
Herding	348	.245	.131	-.750	.261
Disposition Effect	348	-.118	.131	-.426	.261
Passive Oriented Investment Style	348	-.104	.131	-1.081	.261
Active Oriented Investment Style	348	-.034	.131	-.824	.261
Growth Oriented Investment Style	348	-.152	.131	-1.185	.261
Value Oriented Investment Style	348	-.097	.131	-.928	.261

Appendix 4: Means and Standard Deviations Scales

Means and Standard Deviations of Investor Behaviour Scale

Items	N	Mean	SD
Past history influences my present investment decisions	348	2.93	1.397
Although the price of my investment has gone down, I am holding to it	348	2.74	1.375
I rely on my knowledge other than trusting other people	348	2.96	1.296
Thinking hard and for a long time about something gives me satisfaction	348	3.18	1.230
I understand the fundamentals of the company and I am confident in making my investments	348	2.80	1.313
I intend to sell my investments immediately it goes back to the acquisition price	346	3.50	1.304
Previous profits generated from similar investments by the company made it very attractive to me to invest in it	345	2.68	1.315
The last investment was more of a bad luck than it was my own poor judgment	348	3.36	1.324
I am holding to my investments because I know the prices will revert soon	348	2.91	1.285
I consider the past performance of a share before investing in it	348	2.55	1.408
I fix a target price for buying/selling well in advance of the event	348	2.84	1.304
If I hear views from a famous analyst that conflicts with my opinion about a share, I usually change my opinion to follow that of the analyst	348	3.26	1.180
If the price of a company's shares falls but investors are demanding the shares, I will also buy	348	3.24	1.106
I like buying/selling shares of companies that other investors are buying/selling	348	3.19	1.245
I am willing to take high risk in exchange for high expected share returns	348	2.67	1.407
I am comfortable investing in shares that are considered risky	348	3.23	1.214

My past profitable investments were mainly due to my specific investment skills	346	2.95	1.250
My investment losses have often resulted from factors beyond my control or just bad luck	348	3.03	1.346
I am fully responsible for the results of my investment decisions	348	3.08	1.464
I make all the important share investment decisions myself without consulting anybody	348	2.92	1.327
I am more knowledgeable in share investments compared to the average investor	348	2.82	1.295
I often use information gained from media in making investment decisions	348	2.94	1.246
I feel public opinion about profit making investment objectives is often correct and I therefore use it in making my decisions	348	3.27	1.109
I never make any investment decision without consulting my investment advisor	348	3.28	1.183
I feel that my friends have more knowledge about investing than I do	348	3.55	1.116
I do not like investing in stocks with high volatility	348	3.08	1.345
I usually hold on my shares whose prices are going down as I wait for the prices to improve	348	2.60	1.349
I often integrate the sale of losers so that the feeling of regret is confined to one time period	348	3.07	1.195
I tend to stagger the sale of winners over time to prolong the favorable experience	348	2.91	1.267
I am more venturesome with money received as bonus but very conservative with money set aside for my children's education	348	2.77	1.214
I often prefer shares that pay high dividends but I am usually not inclined to sell a few shares and dip into my capital	348	2.88	1.174

Means and Standard Deviations of investment Style Scale

Item	N	Mean	SD
I trade at least three times in a month	348	3.10	1.322
I believe that high historical returns may lead to high future returns so I often buy shares with good past prices	348	2.95	1.345
When I buy shares I usually hold them for a period of more than one month before selling	348	3.00	1.378
I usually buy shares that form part of the 20-share index	348	3.00	1.312
I usually buy shares that I believe their price is below its true price so that I can make a gain/profit when its price goes up	348	2.76	1.348
I usually buy shares that are ignored by other investors	348	3.11	1.154
I prefer buying shares of companies with high earnings growth rate	348	3.17	1.324

