

IMPACT OF EXTROVERSION AND OVERCONFIDENCE ON STOCK INVESTMENT DECISIONS WITH MEDIATING ROLE OF RISK BEHAVIOR

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ABSTRACT

This study aims to identify the impact of extroversion and overconfidence on stock investment decisions with the mediating role of risk behaviour in the Pakistan Stock Exchange, Karachi, under the current unstable situation of the country, and how these circumstances have affected the cognition of the investors. To test these assumptions, hypotheses were formed. The research was conducted over a year; the population was selected to be investors who are investing in shares in the Pakistan Stock Exchange, particularly in Karachi, and the sample size was decided to be 350 respondents. The data collection method was an adapted questionnaire, and the instrument was distributed via online forms. The measurement instrument was a 5-point Likert scale, and data analysis was conducted on SPSS. The collected data were assessed for reliability and normality through the Cronbach alpha and Shapiro-Wilk tests, respectively; these tests reported the instrument to be reliable and the data to be normal. Further data were analysed using various statistical tools, such as mediation analysis and Pearson correlation, to produce results to test against our proposed hypothesis. The findings of the results indicated that there was indeed an influence on the stock investment decisions of investors in Karachi. These results were mostly found to be consistent with the present literature, though some contradictions were found that can be attributed to the difference in respondents and the dynamics of the current situation. Further research must be conducted to elaborate on these findings

INTRODUCTION

This study is a contribution to the field of behavioural finance; it combines the concepts of finance, economics, psychology, and sociology to identify what factors contribute to causing irrationality among investors and causing the market to be inefficient. According to the prospect theory, investors tend to give more thought and weight to the gains they perceive to receive compared to the losses that they may encounter (Bouteska & Regaieg, 2020). Further studies in the field are based on prospect theory; researchers have identified other irrationalities among investors (Kahneman &

Tversky, 2018). The idea that market participants behave rationally is the cornerstone of classical finance theory (Mahmood et al., 2024). Considering the information available on the market, rational investors will strive to maximize their utility. There is a sensible behaviour on the part of investors when they buy at low prices and sell at high prices (Wibowo et al., 2023).

Behavioural finance deals with the factors affecting an investor's mentality and thought process, how and why investors are irrational, which elements influence their rationality, how to overcome such

biases, and how to be more rational while making decisions (Ady, 2018). The studies in this field in the context of the stock market and investment decision evidence that investors are greatly affected by these biases and are likely to be anchored to the price at which they bought the stock; similarly, investors are known to buy stocks that they can recall easily (Shah & Butt, 2024).

Conventional finance has been the foundation of financial theory and practice for decades. It is based on a set of assumptions that underpin these principles. However, as the financial market became more complicated, that assumption came under fire (Al-Jarhi, 2017). Behavioural finance, the field of finance, tries to explain the constraints of traditional finance by incorporating psychological insights and understanding irrational behavior that often leads to financial decisions (Sanjay Bhanushali et al., 2023). Conventional finance often assumes that investors are rational, self-interested, profit-maximizing individuals. These assumptions form the basis of economic models and forecasts. In reality, people do not always act in their own best interests (Islam et al., 2024). Their decisions can be influenced by social and psychological factors, and they may not always seek to maximize their utility. Behavioral finance challenges the idea of *homo economicus*, recognizing that human behavior is not always driven by rational self-interest alone (Ahmed et al., 2022). Social factors, emotions, and limited rationality play an important role in financial decision-making (ul Abidin et al., 2022).

Traditional finance theories are also based on Efficient Market Theory, which makes assumptions that financial markets always incorporate available information and asset prices fully reflect this information. In an efficient market, investors cannot get ahead of the regular market because all new information is directly reflected in the asset's price. However, behavioral finance recognizes that markets are not always efficient because of the attitudes and behaviors of investors (Kamoune & Ibenrissoul, 2022). Market anomalies can be explained by investor sentiment and misunderstandings, leading to the wrong asset choices. Such cases of investor behavior lead to market inefficiencies and price volatility, such as market bubbles, irrational inflation, and price volatility (Sharma et al., 2025). Traditional finance often relies on the assumptions of risk-free probabilities, making decisions based on expected returns rather than selecting risks. Ignoring risk

preferences can lead to suboptimal decisions and inconsistent models. Behavioral finance considers risk behavior and how it affects decision-making. Futures theory explains, for example, that one can be risk-averse in the realm of gains but risk-seeking in the realm of losses, leading to different investment behaviour (Almansour et al., 2023).

In this study, we will analyse how the personality traits of extroversion and overconfidence influence an investor's decision-making in the presence of risk behaviour as a mediating variable between extroversion, overconfidence, and stock investment decisions.

1.1. Extroversion

Extroversion, overconfidence, and risk behavior impact an investor's decision-making regarding stocks, and these variables correlate. Extroversion is a part of the Big Five Personality Trait. Extroversion indicates how confident, social, outgoing, energetic, and passionate an individual is, and how well the individual's networking skills are. Such individuals tend to be overconfident and high-risk takers (Taqadus Bashir, 2013).

1.2. Overconfidence bias

Overconfidence bias is an investor's excessive belief in their skills and abilities to succeed in the stock market and that they are better than average investors. Overconfidence bias causes investors to trade excessively and take on unnecessary risks; this also causes investors to miscalculate information and act upon their instincts (Zain ul Abidin et al., 2022).

1.3. Risk Behavior

Risk behavior is how an investor reacts to risk (Arnold et al., 2022). When faced with the choice of selecting 1) higher risk and higher return stocks or 2) lower risk and lower return stocks, do investors prefer option 1 or 2 based on their degree of risk tolerance? Investors who select option 1 are considered risk-takers, while those who select option 2 are risk-averse (Ahmed et al., 2022).

1.4. Stock Investment Decision

A stock investment decision refers to how investors invest in the stock market, what their behavior and attitudes towards investing are, and what factors influence these decisions. According to past research, these decisions are not as rational as previously believed in the literature of traditional

finance, and some biases cause some degree of irrationality in this decision-making (Hossain & Siddiqua, 2022).

For this research, the stock market that we selected was the Pakistan Stock Exchange (PSX). The research on these heuristics has been extensive, but most have been conducted in developed countries. This study targets investors in Pakistan and aims to identify their attitude and behavior towards the stock market, considering the recent events occurring in the country, especially since the country is still recovering from the impact of COVID-19 and is currently facing ever-growing inflation, the risk of default, political instability, etc. Such research is important and much needed to identify if results from previous studies have deviated. Such a study will be beneficial for educational purposes and for future research, which can use this study as a base to further explore how investors can adapt to the ever-changing environment of the country and make necessary adjustments to succeed in the stock market.

1.5. Problem Statement

It is a known fact that individuals try to be as rational as possible; they try to think about every decision rationally and produce a rational solution to all categories of problems. This case is true for investors; they try to make all their decisions rationally, using the equations and theories of finance to make a rational decision regarding stocks (Wibowo et al., 2023). Recent studies have shown that even though investors try to be rational and make rational decisions, several factors compromise their rationality and influence them to make irrational decisions, even overlooking some vital facts. These factors are called heuristics or biases (Sawitri & Candraningrat, 2025).

Some of the biases studied so far are the herding effect, familiarity, status quo, etc (Islam et al., 2024). However, no such study has studied the factor of

extroversion and overconfidence mediated by risk behavior, which influences the decision-making capabilities of investors and hinders their rationality; therefore, there is a research gap that this study aims to fill. For future research, researchers can consider these variables along with regret, gambler's fallacy, herding effect, status quo, familiarity, etc.

1.6. Research Questions

- Does extroversion impact the stock investment decision of investors in the presence of risk behavior as a mediating variable?
- Does overconfidence impact the stock investment decision of investors in the presence of risk behavior as a mediating variable?

1.7. Research Objectives

- To identify the impact of extroversion on the stock investment decision of investors in the presence of risk behavior as a mediating variable.
- To identify the impact of overconfidence on the stock investment decision of investors in the presence of risk behavior as a mediating variable.

1.8. Conceptual framework

The conceptual framework for this study is based on the concepts of heuristics theory, judgment under uncertainty: heuristics and biases, prospect theory, and the theory of planned behavior (Kahneman & Tversky, 1979). The prospect theory suggests that investors perceive and weigh their gains and losses differently, and depending upon their perceived gains or losses, they can either be willing to take a risk or avoid it. According to the Theory of Planned Behavior, an investor's attitude and perceived control over the stock returns may lead them to believe that they have better required skills to succeed in the stock market, resulting in overconfidence in the investor, which influences their investment intentions, behaviors, and decision-making (Kahneman & Tversky, 2018).



1.9. Significance of the Study

This study is a contribution to the field of behavioral finance. The findings from this study can be used to increase rationality and overcome components causing irrational decisions.

The findings in this study will shed light on how extroversion and overconfidence impact the decision-making of investors in the presence of risk behavior as a mediating variable and how investors

can adjust their behavior and attitude to overcome this impact and make better decisions.

This study is also significant for academic and educational purposes. The findings of this study can be used to guide the upcoming generation to make better-informed decisions, improve their rational cognitive abilities, and enable them to overcome such biases, improving their decision-making and judgmental abilities.

The findings of this study can not only be used in the context of finance and financial decision-making, but also in other aspects as well. Thus, this study holds great importance and significance for a better understanding of heuristics and identifying methods to be more rational.

1.10. Hypotheses

For this study, after conducting an extensive literature review, gaps were identified, and based on those literature gaps, these hypotheses were formed.
H₁ = Extroversion impacts the decision-making of investors.

H_{O1} = Extroversion has no impact on the decision-making of investors.

H₂ = Overconfidence impacts the decision-making of investors.

H_{O2} = Overconfidence has no impact on the decision-making of investors.

H₃ = The relationship between Extroversion and Stock Investment Decisions is mediated by Risk Behavior.

H_{O3} = The relationship between Extroversion and Stock Investment Decisions is not mediated by Risk Behavior.

H₄ = The relationship between Overconfidence and Stock Investment Decisions is mediated by Risk Behavior.

H_{O4} = The relationship between Overconfidence and Stock Investment Decision is not mediated by Risk Behavior

2. Literature Review

2.1. Extroversion

Extroversion is a part of the Big Five Model of personality traits. The extroversion trait is associated with individuals who are cheerful, sociable, optimistic, talkative, and energetic. There is no significant relationship between personality and stock investment decisions (Pak & Mahmood, 2015). One study also concluded that investors could identify the psychological biases they can encounter by knowing about their personalities.

Individuals with extroverted personalities were found to have no significant impact on financial decisions (Ozer & Mutlu, 2019). Other research suggests that personality traits such as extroversion do influence overconfidence and risk-taking behavior (Taqadus Bashir, 2013). According to the relationship between extrovert investors and extrovert advisors will positively affect trading performance (Bashir et al., 2013). Extroverts assume that authoritative individuals, such as advisors, have better experience. The similarity of extroversion between investors and advisors increased trading performance (Tauni et al., 2019). Extroverts also tend to engage in trading more frequently than introverts in the Chinese stock market, as discussed in the study (Tauni et al., 2020). A study observed the degree of effect of extroversion on decision-making and found that individuals with less extroversion tend to buy fewer assets, and they also pay lower prices for financial assets. The positive attitude of extroverts may cause them to overestimate the market and underestimate the risks involved (Ishfaq et al., 2020). Extroversion has a negative relationship with risk aversion; therefore, extroverted individuals are likely to take on excessive risk. Contrary to this research, the study discusses that extroverts tend to be riskier, and they continue to hold onto losing stock, being optimistic about the hope of their recovery (Syed et al., 2018). The research provided evidence that extroversion had a significant and positive relationship with overconfidence in the stock market of Lahore (Lahore Stock Exchange). The study also provided evidence that extroversion is positively related to an individual's confidence level (Akhtar et al., 2018).

2.2. Overconfidence

Overconfidence bias is an important heuristic that influences the decision-making abilities of an individual; it leads them to overestimate their skills and abilities and their likelihood of success in the stock market (Hossain & Siddiqua, 2024). According to past research, overconfidence can cause imparity in the quality of investment decisions (Ahmad & Shah, 2022). Overconfident investors assume that their skills and knowledge surpass those of other investors. Individuals become more overconfident as their level of education and expertise increases over time (Qasim et al., 2019). Evident from past studies, upper-class investors are more prone to overconfidence (ul Abidin et al., 2022). Overconfidence is insignificantly affected by

personality traits, but it positively and significantly influences investment intention. Overconfidence bias was found to be a dominant trait among investors, and overconfident investors also tend to take on excessive risk (Lebdaoui et al., 2021).

Overconfidence has a significant positive impact on stock investment decisions. Overconfident investors tend to believe that their investment plan will succeed because the more they believe they can predict future profitable stocks (Phan et al., 2020). They have an internal locus of control, which impacts their overconfidence and increases irrationality among investors (Kartini & Nahda, 2021). An extensive literature review not only evidences that overconfident investors tend to underestimate risk, but they also keep their portfolios undiversified (Jency, 2017). The portfolios of overconfident investors carry idiosyncratic risk due to their inadequate diversification, due to their belief that concentrated stocks will give them super returns (Baker et al., 2019).

Research conducted in emerging markets also confirmed that overconfidence leads to trading mistakes. Overconfident investors also focus only on aspects of trading they have expertise in and ignore various other factors that influence the value of a stock (Wibowo et al., 2023). Overconfidence is caused by two factors: one being that every individual is positive about their judgments, and secondly, individuals want to control their situation and surroundings, and they believe in their ability to accomplish this (Ahmad & Shah, 2022). Overconfident investors also believe that the investment decision of others include their personal feelings, perceptions, and emotions, thus considering their opinions and suggestions as illogical (Bouteska & Regaieg, 2020). As previously discussed in a study, overconfident investors tend to overvalue expected returns and ignore the concepts of market realism. The research conducted contradicts previous studies and identified that the overconfidence of investors increased their investment performance and returns, as opposed to losses (Qasim et al., 2019).

2.3. Risk Behavior

Risk is the uncertainty an investor faces when making a financial investment decision. A study conducted evidence that people with overconfidence have a higher tolerance towards risk; these findings are also confirmed by the findings of

a study, which also finds that risk takers are more affected by heuristics (Mahmood et al., 2024). Overconfident investors tend to take excessive risk, as evidenced by a study (Ahmed et al., 2022). The findings of one study suggest that investors tend to become risk-averse when they are certain about expected returns, and such an attitude can be useful under risky conditions. People who possess high emotional intelligence tend to be better at managing risk (Song et al., 2023). Depending upon their behavior, investors can either take risks, avoid them, or not even care about risk. Risk tolerance can influence investors to make decisions in choosing alternative investments (Jain et al., 2023). Risk behavior varies according to the given situation and circumstances, and a person's risk-taking behavior is influenced by multiple factors such as personality, emotions, and cognitive factors. Similarly, research has provided evidence that there is a significant relationship between risk-taking behavior, financial literacy, and preferred investment instruments (Islam et al., 2024).

According to men tend to have overall more risky behavior compared to females, as they tend to perceive themselves as more competent in financial matters. Demographic factors play an important role in risk tolerance, as evidenced by the study, which finds that age and gender predominantly influence an investor's risk-taking capacity. Male and young investors in Pakistan tend to take risks more openly compared to females, while also displaying reluctance to such risks due to the scarcity of financial resources. The risk tolerance of married individuals was found to be that older respondents were more likely to underestimate their risk tolerance due to experience; similarly, single individuals were found to be more risk-tolerant than married individuals. According to age and occupation tend to influence risk tolerance and risk perceptions of investors (Ahmad & Shah, 2022). According to research, high extroversion and openness tend to have a significant positive impact on the selection of making risky investment decisions (Salman et al., 2021).

Past research has also provided evidence that financial literacy influences a positive attitude towards risk, as individuals who possess higher financial literacy tend to take on a greater degree of risk (Hermansson & Jonsson, 2021). Contrary to this study suggests that investors with lesser financial knowledge tend to take higher risks compared to those investors who have sufficient financial

knowledge (Sawitri & Candraningrat, 2025). One study has also provided evidence that individuals who tend to consider themselves low financial experts tend to take less risk and allocate their funds to low-risk assets, while consumers of financial products tend to invest less in the product they perceive to have high risk and more in products they perceive to be less risky (Pak & Mahmood, 2015). Risk tolerance and risky asset allocation are significantly influenced by risk perception; therefore, compared to risk avoiders, risk takers tend to perceive a particular investment to be less risky, thus allocating more funds towards that asset (Sharma et al., 2025). Every time an investor tends to make an investment decision and must reduce various possibilities of risk that arise due to changes that occur in the micro and macroeconomic levels, the investor will have to strategize accordingly to get the returns (Oehler et al., 2018).

2.4. Stock Investment Decision

This section of the literature review will discuss in detail the findings of past research regarding the stock investment decisions of investors. According to research conducted in the past, there was found to be no impact of personality on the stock investment decision-making of investors, as confirmed (Hossain & Siddiqua, 2024). The results of one of the past studies have identified that extroverts pay higher prices for stocks. Researchers have also found that extroversion and overconfidence can be influencing factors for investors to take risky decisions regarding investment in stocks (Hossain & Siddiqua, 2022). Extrovert investors and extrovert advisors tend to make decisions that positively impact their investment performance. Extroversion can cause investors to underestimate the risk involved in stock investment. Extroverts do not avoid making risky investments (Ahmed et al., 2022). Overconfidence is positively associated with stock investment decisions, and overconfident investors assume they are more likely to have success in the stock market. The quality of investment decisions of investors decreases based on their overconfidence. Overconfident investors were also found to make excessive and frequent investment decisions in the stock market (Shah & Butt, 2024). Overconfident individuals have higher intentions to invest in the stock market. When making investment decisions, overconfident investors tend to take on excessive risk (Jain et al., 2023).

According to, overconfident investors can make rational decisions with improved quality and quantity of information. Overconfident investors are shown to make mistakes in investment decision-making according to research conducted in emerging markets. The decisions taken by overconfident investors increased their returns on investment (Parveen et al., 2020). Overconfident investors decide to keep their portfolios undiversified these findings are also confirmed by the finding has also confirmed that overconfident investors decide to keep their stock portfolios inadequately diversified has identified that investors are not optimistic about the whole stock market but they are optimistic about the stocks they have invested in have identified risk behavior to be a positive mediator of the relationship between overconfidence and stock investment decisions (Ahmad & Shah, 2022). A study conducted by provided evidence that investors who tend to take more risks tend to be more influenced by heuristics. There is a significant positive relationship between risk aversion and stock investment decision-making. This research provides evidence that there is a significant positive relationship between risk-taking and stock investment decision-making (Wibowo et al., 2023).

Investors decide to take risk-averse investments if they are certain about some returns this approach to decision-making can be beneficial under high-risk conditions According a past research individuals with a high degree of risk tolerance prefer to make riskier investment decisions these findings can be confirmed by has identified that individuals with a higher degree of openness to experience and extroversion tend to make risky investment decisions (Salman et al., 2021). The degree of risk tolerance of an investor can influence them to take alternative investment options. There has also been evidence that there is a significant relationship between an individual's risk-taking behavior, financial literacy, and their preferred investment option (Pak & Mahmood, 2015).

3. Research Methodology

This study is a quantitative study, explanatory in nature. The target population for this research was decided to be investors investing in the Pakistan Stock Exchange, available and easily accessible in Karachi, Pakistan. In the case of this study, the initial sample size was decided to be 350 respondents, and the sampling technique used was

the non-probability sampling snowball technique. For this research study, questionnaires were distributed in an online form as well as in the form of printed hard copies. The instrument used for the collection of data was a closed-ended questionnaire of two sections. In this study, the first section of the questionnaire focused on the demographics of investors, while the second section consisted of questions regarding the variables of the study. The demographic section consists of questions regarding gender, age, income, level of education, occupation, and years of experience in the stock market (a total of 6 questions). The second section, which discusses the variables, consists of 6 items regarding extroversion, 4 for risk behavior, 4 items for overconfidence, and 6 questions regarding stock investment decisions (a total of 20 research items). The instrument adopted items for extroversion from (Nareswari et al., 2021), risk behavior and overconfidence from (Hossain & Siddiqua, 2024), and stock investment decision making from (Salman et al., 2021). The procedure for collecting data was printing the questionnaire as well as giving out online forms to investors conveniently within reach. The statistical tool used to test the reliability of data was Cronbach alpha and the statistical tool to analyze data was mediation analysis for the identification of the mediating effect of a mediating variable on independent and dependent variables,

regression analysis to find out the impact of independent variables on dependent variables and correlation analysis to analyze the relationship of the inter-independent variables. Statistical tools were applied using SPSS software. Variables were limited to extroversion, risk behavior, overconfidence, and stock investment decisions. The tool to be used for the measurement of research items was decided to be a five-point Likert scale.

4. Results and Discussion

4.1. Reliability Test

To test the internal reliability of the instrument, the Cronbach's Alpha test was conducted on SPSS. A pilot test was conducted with a small sample of 35 respondents, data was collected from these respondents, and analyzed in SPSS using the above-mentioned Cronbach alpha tool. The acceptable ranges for the test were previously proposed (Nunnally, 1967). According to him Cronbach alpha value of at least 0.5 or 0.6 is acceptable for early stages of research, for allied research, he proposed that the value should be at least 0.8 to be acceptable, and when making important decisions, the Cronbach alpha value of a minimum of 0.9 is considered acceptable, but 0.95 is the recommended value. Later, he revised the minimum acceptable range from 0.5 to 0.7 (Thorndike, 1995).

The results are summarized in Table 4.1.

Table 4.1: Reliability Test

Variable	Cronbach Alpha Value	Remarks
Extroversion	0.834	Reliable
Risk Behavior	0.730	Reliable
Overconfidence Bias	0.865	Reliable
Stock Investment Decision	0.748	Reliable

The result of reliability testing using Cronbach's alpha indicates that the data collection instrument was reliable and showed internal consistency; therefore, we can go further with the questionnaire and use this instrument for further data collection.

4.2. Normality Test

To identify the normal distribution of our data, normality tests of Skewness and Kurtosis, and

the Shapiro-Wilk test were applied to the collected data.

First, we tested the normality of the data using the skewness and kurtosis tests on the data. The following results for Extroversion, Overconfidence, Risk Behavior, and Stock Investment Decision were obtained.

The results are summarized in Table 4.2.

Table 4.2: Normality Test

	Skewness		Kurtosis	
Extroversion	.028	.137	-.928	.273

Risk Behavior	1.296	.137	.951	.273
Overconfidence	.854	.137	.881	.273
Investment Decision	.273	.137	1.096	.273

As can be observed from the above analysis, there are a few outliers present in the data as a result of Risk Behavior. The skewness is out of the acceptance region, the acceptance range is -1 to +1; therefore, the normality of the data will be decided based upon the values of the Shapiro-Wilk Test, which we are going to discuss below.

After the skewness and kurtosis test, we tested the normality of data using the Shapiro-Wilk Test. The data were tested for normality with a confidence level of 95% which means the significance level was at 5% or 0.05.

The decision criteria for the Shapiro - Wilk test is that if the value of p is less than 0.05 ($p < 0.05$) we reject the null hypothesis and assume that data is not normally distributed, whereas if the value of p is greater than 0.05 ($p > 0.05$) we accept the null hypothesis and assume that the data is normally distributed and that the data came from a normally distributed population. The Shapiro-Wilk test provided the results, which can be seen in the chart below.

Table 4.3: Shapiro-Wilk Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Extroversion	.120	318	.000	.936	318	.000
Risk Behavior	.218	318	.000	.828	318	.000
Overconfidence	.106	318	.000	.952	318	.000
Investment Decision	.140	318	.000	.930	318	.000

a. Lilliefors Significance Correction

As can be observed in the above-attached table extracted from SPSS after running the normality test, the following results were obtained. Based on the results obtained, all variables have significant values in the acceptable range.

As skewness and kurtosis, and the Shapiro-Wilk test, posted contradictory results for Risk Behavior and Investment decision-making, we consider the results of the Shapiro-Wilk test, as this test has been

regarded as statistically more reliable. Based on these facts, we can conclude that our data is normally distributed and has been obtained from a normally distributed population.

4.3. Descriptive Statistics

To analyze the demographic variables of the study, descriptive statistics were used. The frequency distribution tables can be seen below.

Table 4.4: Frequency Distribution of Gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	58	18.2	18.2	18.2
	Male	260	81.8	81.8	100.0
	Total	318	100.0	100.0	

From the above table, we can observe that most of our respondents were males, constituting 260 responses out of a total of 318, which makes 81.8%

of our total male respondents. While females, on the other hand, were only 58 of the respondents, constituting 18.2% of the total 318 responses.

Table 4.5: Frequency Distribution of Age

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	128	40.3	40.3	40.3
	26-30	120	37.7	37.7	78.0
	31-35	39	12.3	12.3	90.3
	Above 40	31	9.7	9.7	100.0
	Total	318	100.0	100.0	

From the above frequency table detailing the frequency distribution of age, we can observe that most of our respondents were aged between 18 and 25, with 128 responses, while the age bracket of 26-30 was also the closest with 120 responses. The percentage for the age bracket of 18-25 and 26-30

was 40.3% and 37.7% respectively. Out of 318 responses, 39 respondents reported themselves as being in the age bracket of 31-35, making up 12.3% of all respondents, and respondents who were above 40 were counted to be 31 respondents or 9.7% out of 100% or 318 respondents.

Table 4.6: Frequency Distribution of Education

Education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graduate	146	45.9	45.9	45.9
	Masters	71	22.3	22.3	68.2
	MPhil	30	9.4	9.4	77.7
	PhD	10	3.1	3.1	80.8
	Undergraduate	61	19.2	19.2	100.0
	Total	318	100.0	100.0	

The frequency table for the respondent's level of education indicates that out of 318 of our respondents, 146 were graduates, constituting 45.9% of all responses, while 71 respondents held a master's degree, respondents with MPhil degrees 30 and Ph.D. were only 10, while those who were undergraduate constituted a total of 61 responses, the percentages for these responses were 22.3%, 9.4%, 3.1%, and 19.2% respectively.

Table 4.7: Frequency Distribution of Occupation

Occupation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employed	206	64.8	64.8	64.8
	Only Student	62	19.5	19.5	84.3
	Self Employed	20	6.3	6.3	90.6
	Unemployed	30	9.4	9.4	100.0
	Total	318	100.0	100.0	

As can be observed, 206 of our respondents were employed individuals, 62 of the 318 respondents were only students, 20 were self-employed, these can be business personnel or freelancers, and 30 were currently unemployed. In terms of percentage, out of the 318 respondents, 64.8% were employed, 19.5% were only students, 6.3% were self-employed, and 9.4% were unemployed.

Table 4.8: Frequency Distribution of Income

Income (Per Month)					
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		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50,001-65,000	124	39.0	39.0	39.0
	65,001-80,000	30	9.4	9.4	48.4
	80,001-95,000	19	6.0	6.0	54.4
	Above 95,000	66	20.8	20.8	75.2
	Below 50,000	79	24.8	24.8	100.0
	Total	318	100.0	100.0	

From the income per month table, it can be observed that most of the respondents earned Rs 50,000 to Rs 60,000 with 39% or 124 respondents falling in that category, followed by above 90,000, below 50,000, 65,001-80,000 and then 80,001-95,000 with 79, 66, 30 and 19 or 24.8%, 20.8% 9.4% and 6% of our respondents respectively.

Table 4.9: Frequency Distribution of Level of Experience in the Stock Market

Level of Experience in the Stock Market					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-1 year	80	25.2	25.2	25.2
	1-5 Years	159	50.0	50.0	75.2
	11-15 Years	22	6.9	6.9	82.1
	6-10 Years	32	10.1	10.1	92.1
	More than 15 Years	25	7.9	7.9	100.0
	Total	318	100.0	100.0	

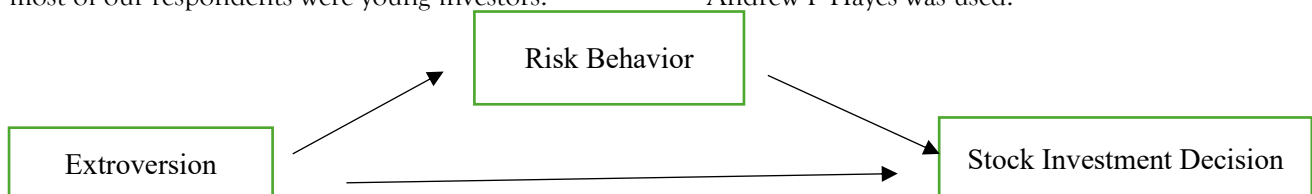
Out of 318 of our respondents 159 (50%) of them had 1 to 5 years of experience in the stock markets, followed by none to up to 1 year, then 6-10 years of experience, more than 15 years of experience, and then 11-15 years of experience, with the bracket consisting of 80 (25.2%), 32 (10.1%), 25 (7.9%) and 22 (6.9%) responses respectively.

From the above frequency distribution tables, we can observe that most of our respondents were male, aged between 18-25 years of age, holding a graduate degree, currently employed, and earning between Rs 50,000 to Rs 65,000 per month, and having 1-5 years of experience investing in the stock market. Based on this observation, we can conclude that most of our respondents were young investors.

Such information can be vital, as discussed in a previous study conducted, demographic factors can influence an investor's investment decision; therefore, such factors can deviate from past research, as there is a difference in demographics, but studying such influences is beyond the scope of this study. But future research can take such factors into consideration

4.4. Mediation Analysis

To identify the mediating relation of risk with independent variables of extroversion and overconfidence and the dependent variable of stock investment decision, Model 4 of PROCESS by Andrew F Hayes was used.



The test was conducted by using the independent variable of extroversion mediated by risk behavior

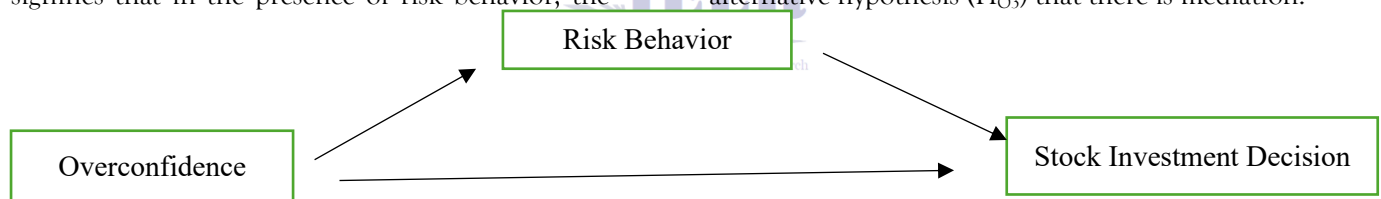
on the dependent variable of stock investment decision. The model can be observed above.

Table 4.10: Mediation Analysis (Extroversion on Stock Investment Decision)

Total Effect		Direct Effect		Indirect Effect of Extroversion on Stock Investment Decision				
Coefficient	P-value	Coefficient	P-value	Hypothesis	Coefficient	P-value	Percentile Bootstrap 95% Confidence Interval	
							Lower	Upper
0.1596	0.0005	-0.0708	0.1897	Ext→RB→SID	0.0333	0.0000	0.0070	0.0672

The results obtained from the analysis indicated that the model is significant with a significant value (0.0005) being lower than our significance level of 5% and the values of lower confidence interval (0.0704) and upper confidence intervals (0.2489) are in the same direction, signifying there is the presence of no zero point between the values of the confidence interval, hence on this basis we can confirm with 95% confidence that our model is fit. Through mediation, the effect of extroversion on stock investment decisions has a coefficient value of 0.1596. When we take into consideration the mediating effect of risk behavior between extroversion and stock investment decision, we identify that the values lower confidence interval (-0.1767) and upper confidence interval (0.0352) is in the opposite direction, hence there is the presence of a zero between these values, the presence of zero signifies that in the presence of risk behavior, the

effect of extroversion is insignificant, while the effect of risk behavior is significant with both lower confidence interval and upper confidence interval in a similar direction, hence there is no zero between them. On this basis, we can conclude that risk behavior is a positive mediator between the independent variable of extroversion and the dependent variable of stock investment decisions. Since in the presence of the mediator variable of risk behavior, the effect of the independent variable of extroversion becomes insignificant, we can, on this basis, conclude that risk behavior fully mediates the relationship between the independent variable of extroversion and the dependent variable of stock investment decision. Hence, based on this, we accept our null hypothesis (H_{01}) that extroversion has no impact on stock investment decisions, reject (H_{03}) that there is no mediation, and accept the alternative hypothesis (H_{03}) that there is mediation.



The same test was conducted again with the intended variable of overconfidence in place of extroversion, with the mediator being risk behavior and the dependent variable stock investment decision, which can be observed above. The results of this analysis indicate that the model is significant

and there is a significant total effect of the model on the dependent variable of the stock investment decision. This finding is confirmed by the significance value (0.000), which is lower than the significance level of 5%; therefore, we can confirm with a confidence level of 95% that our model is fit.

Table 4.11: Mediation Analysis (Overconfidence on Stock Investment Decision)

Total Effect		Direct Effect		Indirect Effect of Overconfidence on Stock Investment Decision				
Coefficient	P-value	Coefficient	P-value	Hypothesis	Coefficient	P-value	Percentile Bootstrap 95% Confidence Interval	
							Lower	Upper
0.3275	0.0000	0.3123	0.0000	OC→RB→SID	-0.0112	0.6193	-0.0508	0.0265

Observing the value of the coefficient at (0.3275), we can identify that there is a strong effect of the independent variable of overconfidence on stock

investment decisions. From the model, we can also identify that the independent variable of overconfidence is significant with the dependent

variable of stock investment decision, as the lower confidence interval (0.2211) and upper confidence interval (0.4036) have no presence of zero points, and the significant value (0.000) is lower than our 5% significance level. From the model, we can also identify that the mediating variable of risk behavior is insignificant with stock investment decisions, as there is the presence of a zero point between the lower confidence interval and upper confidence interval, and the value of significance is greater than our 5% level of significance. These findings are also confirmed by indirect and direct effects. The direct effect identified the overconfidence to be significant ($p = 0.000 < 0.05$) with the stock investment decision, indicating that overconfidence is a positive influence on the stock investment decision. On the other hand, in the presence of the mediating variable of risk behavior, the indirect path between the relationship between overconfidence and stock investment decision was found to be insignificant ($p = 0.6193 > 0.05$).

These findings confirm that there is no mediation effect of mediator risk behavior towards the independent variable of overconfidence and the dependent variable of stock investment decision. Based on such findings, we accept our alternate

hypothesis (H_2) and reject the null hypothesis (H_{02}). But we cannot accept our alternate hypothesis (H_4) and are unable to reject our null hypothesis (H_{04}). To conclude, we have identified through mediation analysis that the mediator variable of risk behavior has a fully mediating effect towards extroversion and stock investment decision, while on the other hand, there is found to be no mediating effect of mediator risk behavior towards the independent variable of overconfidence and dependent variable of stock investment decision. Based on these results, we are unable to accept our alternate hypothesis that there is a mediation effect and accept the null hypothesis that there is no effect of mediation.

4.5. Correlation

The Pearson correlation test is a common test used to identify the degree of correlation among variables. The test was conducted at a Confidence Level of 95% which means the value of significance is 0.05 or 5%. The results of the test are in the table below of correlation which details the findings of the Pearson Correlation test. As can be observed from the correlation table below, several conclusions can be drawn.

Table 4.12: Pearson Correlation Test

Correlations					
		Extroversion	Risk Behavior	Overconfidence	Investment Decision
Extroversion	Pearson Correlation	1	.194**	.184**	-.039
	Sig. (2-tailed)		.000	.001	.484
	N	318	318	318	318
Risk Behavior	Pearson Correlation	.194**	1	.487**	.165**
	Sig. (2-tailed)	.000		.000	.003
	N	318	318	318	318
Overconfidence	Pearson Correlation	.184**	.487**	1	.386**
	Sig. (2-tailed)	.001	.000		.000
	N	318	318	318	318
Investment Decision	Pearson Correlation	-.039	.165**	.386**	1
	Sig. (2-tailed)	.484	.003	.000	
	N	318	318	318	318

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

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

From the above table, we can identify that extroversion has an insignificant relationship with the Stock Investment Decision, where $p > 0.05$; therefore, we can conclude that these relationships are insignificant. On the other hand, extroversion

has a significant relation with Risk Behavior and Overconfidence, and these relationships are positive and directly proportional to each other. The level of correlation at Pearson values of 0.194, 0.184, and 0.117 suggests a slight positive correlation with these

variables. Hence, we can conclude that as the level of extroversion in an individual increases, these variables to some degree tend to increase as well, and individuals tend to grow in overconfidence and take on excessive risk.

The relationship of Risk Behavior with all other variables is significant and positive. The reported correlation by Pearson test results in values of 0.194, 0.487, and 0.165 for Extroversion, Overconfidence, and Stock Investment Decision, respectively. From these results, we can identify that risk behavior has a slight correlation with extroversion and stock investment decisions, while the correlation with risk behavior and overconfidence is high. Hence, as individuals become more risk-taking, they tend to exhibit more overconfidence and extroversion traits, and their biases increase, which also causes them to make excessive decisions regarding investment.

Overconfidence is observed to be significant with all the other variables. As observed from the table above, it has a high correlation with risk behavior, a moderate relation with an investment decision, and a slight correlation with extroversion, with observed values of 0.487, 0.386, and 0.184, respectively.

The dependent variable of the stock investment decision is significantly correlated with all the variables except extroversion, which shows insignificance (i.e., the value of significance is higher than the level of significance).

From the above-discussed results, we can conclude that all the above-mentioned variables are positively correlated with each other, and a change in the value of one of these variables can influence other variables as well as their output. From the above-discussed results, we can also conclude that extroversion is the variable that has an insignificant correlation with stock investment decision-making; therefore, any change in the degree of extroversion does not have its effect on the mentioned variables.

4.6. Discussion

The results of mediation analysis imply that the personality trait of extroversion is fully mediated by the mediator risk behavior, indicating that extroverted individuals are more prone to adopting risky behaviors in stock investment and engaging in investing in high-risk assets. The direct path effect of extroversion was insignificant ($p = 0.1897 > 0.05$), while the indirect path was identified to be significant ($p = 0.000 < 0.05$), which indicates that extroversion itself had no effect on the stock investment decision and that there is full mediation

of the relationship between these two variables. These findings are in line with previous studies conducted by Ozer & Mutlu (2019), which identified no effect of extroversion on stock investment decisions, but such findings contradict the research of Oehler et al. (2018), which observed that there is some degree of effect of extroversion personality trait on stock investment decisions.

The full mediation of risk behavior on extroversion and stock investment decision implies that it is the underlying variable of risk behavior that causes a relationship between the independent variable of extroversion and the dependent variable of stock investment decision, suggesting that it is not solely the personality trait of extroversion that propels investors to make investment decisions regarding stock rather extroverts tend to embrace risk which causes this relationship and the independent variable of extroversion to influence dependent variable of stock investment decision. Past research has indicated the mediation effect of risk behavior on extroversion and stock investment decision, though that effect has been a partial mediation, which is contrary to the findings we observed in the study (Taqadus Bashir, 2013). Therefore, further research on the matter must be conducted to confirm such findings.

The same test when conducted to identify the mediating effect of risk behavior on the relationship between our independent variable of overconfidence and the dependent variable of stock investment decision. The results identify that the mediating effect of risk behavior on this relationship is insignificant, indicating that risk behavior does not mediate the relationship between overconfidence and stock investment decisions. Past researchers have identified the direct effect of overconfidence on stock investment decisions. Past research has contradicted the findings of this study that the relationship between overconfidence and stock investment decisions is not mediated by risk behavior.

The test results for the Pearson correlation test indicate that extroversion has an insignificant relationship with stock investment decisions. An insignificant relation with these variables suggests that the extroversion personality trait does not influence these variables, nor is it influenced by these variables. Extroversion does have a significant positive correlation with overconfidence and risk behavior, indicating that with an increase in extraversion, the investor's overconfidence and risk-

taking behavior increase as well. Such findings can be confirmed by past literature.

Aside from extroversion, all the rest of the variables have some varying degree of positive correlation with each other. This suggests that these variables are directly proportional; as such, causing an increase or decrease in one of these variables will cause the rest of the other variables to increase or decrease accordingly. Out of all variables, risk behavior has a highly positive correlation with overconfidence, indicating that as overconfidence in an individual investor increases, they are increasingly likely to take excessive risks.

Overconfidence bias has a significant positive correlation with all variables. The correlation between overconfidence and risk behavior, as previously discussed, is high. The correlation

between overconfidence and stock investment decisions is weak but significant, which is positive and directly proportional, suggesting that overconfidence, to some extent, does increase stock investment decisions.

The stock investment decision was identified to be significantly correlated to all variables except extroversion, which, as we have discussed through our mediation analysis, has no direct significant impact on the stock investment decision. Positive correlation with other variables is indicative of the fact that investors' decision-making is influenced by these factors, which were found to have the highest correlation among the discussed variables.

To summarize the findings of this research, the table below identifies the alternate hypotheses that we have accepted and those we were unable to accept.

H ₁	Extroversion impacts the decision-making of investors.	Rejected
H ₂	Overconfidence impacts the decision-making of investors.	Accepted
H ₃	The relationship between Extroversion and Stock Investment Decisions is mediated by Risk Behavior.	Accepted
H ₄	The relationship between Overconfidence and Stock Investment Decisions is mediated by Risk Behavior.	Rejected

5. Conclusion

In this research, we have found adequate pieces of evidence that investors are indeed irrational, and biases influence an investor to take mental shortcuts or irrational decisions. The findings of this research mostly follow the current literature we have established so far. There have been contradictory findings that require further investigation but are beyond the current scope of this research. Such a contradiction can be attributed to the dynamic shift in the political and economic landscape of the country; such shifts may have caused investors to rethink their investment strategies. Another explanation can be the fact that individuals are becoming more aware of such biases, hence there may have been considerations taken to avoid such irrationality to the possible degree.

As external factors change, there is a possibility of a change in human behavior; therefore, there is a need for future research to keep the current body of knowledge updated and provide individuals with the latest knowledge to improve their rationality and the quality of decision-making.

6. Recommendation for Future Research

Due to constraints the selection of variables was limited to extroversion, risk behavior, overconfidence, and stock investment decisions,

future research can add more variables to the existing model such as gambler's fallacy, herding bias, hindsight bias, introversion, openness to experience, agreeableness, conscientiousness, neuroticism, risk aversion, framing bias, status quo bias, endowment bias, mental accounting, halo effect, blind spot bias, self-serving bias, loss aversion, the illusion of control, financial literacy, etc.

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