

An Examination of Behavioral Factors Affecting the Investment Decisions: The Moderating Role of Financial Literacy and Mediating Role of Risk Perception

Iram Rehmat ¹, Ather Azim Khan ², Moazzam Hussain ³, Shahzeb Khurshid ⁴

Author's Affiliation:

¹Lecturer, Deptt. Of Business

Administration, University of Sialkot

²Professor, Faculty of Management and Administrative Sciences, University of Sialkot.

³Assistant Professor, Deptt. Of Commerce, FMAS, University, Sialkot.

⁴Assistant Professor, University Institute of Management Sciences, Arid Agriculture University, Rawalpindi

Article History:

Submitted: August 4, 2023

Revised: November 16, 2023

Accepted: December 09, 2023

Published online: December 12, 2023

Corresponding author(s):

Ather Azim Khan

Ather.azim@uskt.edu.pk

ABSTRACT

Purpose- This study is conducted to determine the impact of behavioral biases on individuals' investment decisions. The focus is to directly analyze behavioral factors' impact on retail investors' investment decisions, as individuals generally neither have in-depth knowledge nor the expertise to make effective decisions, and they do not understand the behavioral biases affecting their decisions.

Study Design/methodology/approach- It is a primary study, and the relationships are developed using structural equation modeling. The respondents of the study are the retail individual security market investors of Pakistan. The instrument's reliability and validity were checked with a small sample before data collection. This study also employs a moderating variable of financial literacy to determine the impact of behavioral biases and financial decisions with the mediation of risk perception. SmartPLS is used to find out the impact.

Findings- The results show that moderator financial literacy significantly affects the relationship between behavioral biases and investment decisions. Similarly, the mediation effect of risk perception is also found significant. Except for loss aversion, all the independent variables significantly impacted investment decision-making. The findings of previous studies support the results.

Research Implications- This study has incorporated four behavioral biases, which are the most common of these. Hence, the findings can benefit individual investors in making financial decisions by reducing these biases, improving financial literacy, and developing a better understanding of risk. Future researchers may check the impact of other biases and study these for institutional investors.

Originality/value- The originality of this study is well-supported by the fact that it is primary research. Most individual investors decide on available fundamental and technical data, ignoring behavioral biases in investment decision-making. Moderated mediation is the missing link addressed in this research.

Keywords: Behavioral Finance, Investment Decision-making, Financial Literacy, Risk Perception

JEL Classification: G4, G11, G32, G53

1 | INTRODUCTION

Investors' behavioral factors mainly contribute to investment decisions ([Jain et al., 2020](#); [Khurshid et al., 2021](#); [Madaan & Singh, 2019](#)). Various studies found that financial literacy positively influences investors' decision-making ([Rasool & Ullah, 2020](#)). Therefore, financial literacy is a moderating variable in this

investigation, as it is a logical factor. Further, investors' risk preferences, considered the route to financial and investment decisions ([Khan & Administration, 2017](#)), are a mediating variable. Financial literacy is a person's ability to manage finances and make investment decisions based on knowledge and skills ([Thomas & Subhashree, 2020](#)). In several studies, good financial behavior is linked with a higher level of financial literacy ([Ahmad & Shah, 2022](#); [Edmiston & Gillett-Fisher, 2006](#); [Khurshid et al., 2021](#)). Therefore, a person's financial knowledge will improve the investor's behavior. Risk refers to uncertainty about the happening of an event ([Khan & Administration, 2017](#)). Risk-taking and risk avoidance are behaviors that vary from person to person. For example, investors may act as risk-avoiders regarding expected returns when their previous returns are higher than the targeted level and risk-seekers in case of prior losses ([Kapoor & Prosad, 2017](#); [Wang et al., 2017](#)). Risk also affects investors' behavior of making positive relationships and maintaining profit, while sometimes investors lose high gains on little investment, affecting investment decision-making. There are several popular investment instruments, and investors decide according to their risk preferences while selecting a financial instrument. According to traditional economics and finance theories, an individual investor is a rational decision-maker because the decision is based on available information. On the contrary, in reality, most investors display herd behavior ([Ivanitsky & Tatyannikov, 2019](#); [Kapoor & Prosad, 2017](#)).

Assimilation of information is a cumbersome task, and relating the available data to the financial world to make investment decisions is even more challenging ([Zaigham et al., 2019](#)). Investors rely more on analysts' recommendations, generating herd behavior ([Qasim et al., 2019](#)). On the other hand, technicians make decisions based on trends and technical indicators, which are also based on these trends ([Nti et al., 2020](#)). Further, the Efficient Market Hypothesis-EMH provided a contrasting view, negating the fundamental and technical analysts, suggesting that markets are efficient. Hence, information is quickly absorbed in the prices, leaving no room for the investors to gain extra profit by using the information ([Kelikume et al., 2020](#); [Woo et al., 2020](#)). Hence, the question is why investors get losses if they behave rationally using information if trends can be projected. Why do trend analysts not beat the market if the markets are efficient? Moreover, why these investment crashes are addressed in investors' psychology is also a question of researchers' interest. The area of knowledge called behavioral finance tackles it by considering emotional, psychological, and cognitive behaviors that impact investors' decision-making. The research in behavioral finance identifies many behaviors opposite to rationality, which are classified under the term Behavioral Biases. It is imperative to note that these behavioral factors contradict the efficient market hypothesis ([Singh et al., 2021](#)).

The two major behavioral finance theories are Prospect Theory and Bounded Rationality Theory. ([Kahneman & Tversky, 1979](#)) introduced the Prospect Theory, a tremendous contribution to behavioral finance. According to this theory, the emotional impact caused by the losses is more significant than the equivalent profit. Therefore, if investors are given two equal choices, they would prefer one that is given in terms of perceived gains and not losses. Prospect Theory is a part of the sub-group of Behavioral Economics. It is about investors' psychology and behavior concerning the perception of losses and gains. They do not weigh them equally. If returns are presented in terms of potential gains, investors tend to prefer them on the same returns when presented in terms of potential losses; hence, they choose the returns presented in terms of gains. In this regard, this theory is also termed as Loss Aversion Theory. The underlying philosophy of this theory is a comparison of the positive and negative emotional impact of gains and losses; the latter is more significant. Returns in terms of gains are

considered to be more specific than losses, and risk appears to be more when returns are given as losses. This theory is relevant to the current study regarding understanding investors' confounding biases and their impact on their decision-making regarding these biases. This study is about the impact of behavioral factors on investment decision-making, which is also the underpinning theory of this research.

On the other hand, Bounded Rationality Theory explains that individuals make decisions based on imperfect information, limited time, and a restricted level of cognition, so their financial and economic decisions are not constrained to rational choices. In the discussions of a perfect market, it is argued that buyers and sellers act rationally, which also applies to stock markets. Rationality is about maximizing profits, minimizing losses, and making decisions supporting this investment process. However, there are always some limitations of rational decisions, which are in terms of knowledge and information. Lack of information is not only due to the unavailability of data but also because of the limitations of the user of information. These limitations include the capacity to process information to make profitable financial decisions and cognitive biases. Hence, even the publicly available information cannot be effectively utilized by the investors. Investors do not make the best choices but satisfy them the most ([Kelikume et al., 2020](#)). This theory includes this study's dependent and independent variables, investment decisions, and cognitive and behavioral factors, so it is also a theory supporting the current study.

These two theories are applied in this research by checking the impact of loss aversion, mental accounting, herd behavior, and overconfidence biases on retail investors' investment decisions. Similarly, the Efficient Market Hypothesis-EMH is another commonly applied financial and investment-related research theory. EMH states that all information, including past, publicly available, and inside information, is efficiently reflected in the market prices, which is only possible if the investors are rational and can understand and reflect the information in terms of gains or losses that is, increase or decrease in the prices of the securities. Hence, this theory also supports this research ([Fama, 1970](#)).

Behavioral biases play a different role in developed and dynamic markets ([Sattar et al., 2020](#)). For example, the Pakistan Stock Exchange-PSX is a vibrant market where investors' behavior changes continuously ([Chauhdry et al., 2021](#)). Capital markets are all about making the right decisions at the right time. Both long and short-position holders must act rationally by controlling their biases. Without a deep understanding of these behavioral biases and how they affect their decision-making, it is challenging to make the most suitable investment decisions; this could result in higher returns for the investors, which is the prime objective of every individual investor. So, there was a need for a study to determine the impact of various behavioral factors on investors' investment behavior in the Pakistani market, which ultimately causes volatility in the market. This research fills the gap. Further, in this research, the mediating role of risk perception is also studied, and the relationship is explored in the presence of the moderating effect of financial literacy.

The objective of this study is to determine the relationship between behavioral factors and investment decisions, in terms of the impact of these factors on the decision-making process of retail investors. We have addressed the two primary research questions: are investors, directly or indirectly (through the mediation through risk perception), influenced by behavioral biases while making investment decisions, and does this relationship significantly change with the change in the level of financial literacy? The first question is perhaps the most important one; the reasons are directly related to the main objective of making investments: getting higher returns.

Anything that affects the decision-making process of individual investors and tends to make irrational or ineffective investment decisions should be investigated. In the presence of several behavioral factors, this investment decision-making process should also be seen from the viewpoint of the direct effect of the factors or the role of some mediation; if it exists, it is taken as the risk perception. This mediation effect is in line with the theoretical support. At the same time, the effect of any other factor that influences the process, that is, the moderator, should also be accounted for because any significant influencing catalyst should be known and employed.

This study is significant in many ways in the field of finance and behavioral economics. This research, considering behavioral factors, provides valuable insights into the psychological and emotional aspects that can guide investors. This understanding can help understand market dynamics and predict investor behaviour. By exploring the moderating role of financial literacy, the study contributes to the enhancement of financial education programs. It highlights the importance of financial literacy in mitigating behavioral biases, thereby emphasizing the need for targeted educational initiatives to empower investors with the knowledge and skills necessary for making informed investment choices.

The findings are useful for investors to make more effective investment strategies considering behavioral tendencies. Results of the moderating and mediating roles of financial literacy and risk perception in making investment decisions lead to better-informed investment decisions. The study's focus on risk perception can help to understand the risk and develop risk management strategies, which could be extremely beneficial for retail investors to make wise and profitable investment decisions. Further, this study also contributes to the field of behavioral economics by providing empirical evidence of the interrelationship between behavioral factors, financial literacy, and risk perception in investment decision-making.

This study contributes to the existing knowledge by investigating the relationship between behavioral biases and investor behaviors through risk perception; this will help investors determine their risk perception to make effective investment decisions. Previous studies have not used the behavioral biases studied in this paper for individual investors in Pakistan. Furthermore, this research assesses behavioral decision modification due to the pandemic.

2 | LITERATURE REVIEW

The introduction of the Prospect Theory by Kahneman and Tversky ([1979](#)) resulted in the production of literature related to behavioral biases. For example, according to the Efficient Market Hypothesis-EMH markets are perfectly efficient, and investors are always rational without any qualification ([Jiang & Li, 2020](#)); further, the Expected Utility Theory emphasizes that an investor makes rational decisions based on the available information ([McCarthy et al., 2020](#)).

Prospect Theory limited the application of the two common schools of thought, the Efficient Market Hypothesis and Expected Utility Theory, by justifying the limitations of rationality. Prospect Theory was first executed by Thaler and organization ([1980](#)); he claimed that investors are not always rational but make irrational decisions because of many factors Barberis et al. ([2021](#)), and this contribution of Thaler earned him the title of father of behavioral finance.

According to the study by [Niroomand et al. \(2020\)](#), traditional finance theories, the Efficient Market Hypothesis, and the Expected Utility Theory do not explain the investors' behavior. Furthermore, these theories do not identify the factors influencing investors to make less rational decisions. The lack of this sagacity allowed the researchers to explore other factors that affect investors' behavior.

2.1 | Overconfidence and Investment Decisions

According to Qasim et al. ([2019](#)), overconfidence is an emotional bias in which an investor overestimates his information based on his previous positive experience. Overconfidence results in an increased trend toward investment, and sometimes, it is a reason for irrational behavior leading to losses. Moreover, Kumar and Goyal ([2016](#)) and Hussain et al. ([2021](#)) found that the main reason for overconfidence is investors' reliance on their information and skills. As a result, overconfident investors take higher risks, which causes irrational decision-making. A study was conducted by Barber and Odean ([2001](#)) on the impact of overconfidence on trading activities among the two genders; the data were collected from 3,500 households. The study indicated that men are more confident than women, with a more significant number of trading and less return; the study was also supported by work done later ([Bao & Li, 2020](#)). Furthermore, a study by ([Madaan & Singh, 2019](#)) proved that overconfidence positively affects investment decisions. However, investors have found a varied association between overconfidence and investors' decisions ([Ahmad et al., 2020](#); [Ul Abidin et al., 2022](#)). Due to the diverse findings of the researchers, the following hypothesis has been developed: overconfidence bias is likely to be a significant factor affecting investment decisions because it is supported by both the theories of bounded rationality and the prospect theory. Further, there is enough evidence from the literature, though not in the same direction, to include this factor as an important influencing factor of behavioral biases.

H₁: *Overconfidence bias has a significant impact on investment decisions.*

2.2 | Loss Aversion and Investment Decisions

Loss aversion refers to an individual's propensity toward saving capital ([Jain et al., 2020](#)). Loss-averse investors tend to save money rather than focus on increasing their income. As a result, loss is twice as powerful as profit ([Kostin et al., 2021](#)). An investor who suffers from this bias becomes risk-averse ([Combrink & Lew, 2020](#)). An earlier study conducted by Arora and Kumari ([2015](#)) to examine the impact of age and gender on the risk-taking capacity of investors through the mediation of loss aversion and regret aversion bias, where data were collected from 450 investors in India, showed that loss aversion bias has a significant impact on decision-making. The results also revealed that females are more loss-averse than men. The study of Ainia et al. ([2019](#)) on the impact of loss aversion on investment decision-making with a sample of 400 respondents proved that loss aversion does not affect decision-making. On the other hand, Mahina et al. ([2017](#)) studied the impact of loss aversion bias on decision-making; they concluded that loss aversion bias has a significant positive effect on investment. However, their results and findings were not similar to various previous studies. Some of the behavioral biases are very common and researched by several authors. Loss aversion is one of them. Sufficient literature and theoretical support are available to include it in this study. Even a logical relationship also exists between the two variables. The fundamental risk-related theories discuss the element of behaviors of investors to be risk takers or risk avoiders. In light of this discussion and the conclusions of researchers, the following hypothesis is aptly developed:

H₂: *Loss Aversion Bias has a significant impact on investment decisions.*

2.3 | Herding Behavior and Investment Decisions

Herding Bias refers to the behavior of investors in which they copy others in the market rather than relying on their judgment ([Huang & Wang, 2017](#); [Neuman & Cohen, 2023](#)). Following market movements increases the chances of irrational behavior increase. Individual investors show more herd behavior as compared to institutional investors. Individual investors follow others as they do not have enough information about the market trends to make effective decisions ([Metawa et al., 2019](#)). A study examined the effect of herd behavior on investment decisions among individuals. The results showed that herding behavior positively relates to investment decisions; male and female investors have different tendencies toward herd behavior ([Lin, 2011](#)). On the other hand, Kengatharan et al. ([2014](#)) found no relationship between herd behavior and investment decisions. Their findings were based on a sample of more than four hundred individual investors. Nevertheless, findings show that herd behavior positively affects the investment decisions of retail investors. Herd behavior has been under discussion with diverse references; stock markets are among the most important as this bias is found to be shared in the behavior of people in their lives and day-to-day decision-making, so it cannot be ignored in a study related to investment decisions. Although researchers have diverse results theoretically, it should have a significant impact. In this primary study, there is a fair option to reassess this variable in the context of investors in Pakistan. The findings of other research and the arguments of the theoretical base provide enough material to include herd behavior in this study, and hence, we proposed the following hypothesis:

H₃: *Herd behavior has a significant impact on investment decisions.*

2.4 | Mental Accounting and Investment Decisions

Thaler and organization ([1980](#)) gave the concept of the Two Pocket Theory or Mental Accounting Bias. According to the theory of behavioral bias, an investor treats each element of the portfolio separately. For example, investors categorize investments by income or capital gain instead of total return consideration. So, the investment is influenced by the investors' mental classification of asset classes. Researchers have provided models of mental accounting and seen its impact on the decision-making of persons; this includes their decision-making related to investments and have found it to be a significant factor ([Dadashi et al., 2023](#)). A study was conducted by [Lee et al. \(2013\)](#) to determine the effect of behavioral biases and gender on portfolio performance. This study showed that males have more mental accounting bias than females. According to the survey by [Chandra \(2008\)](#), mental accounting bias has a significant and positive impact on investment decisions. Another study was conducted by [Jain et al. \(2020\)](#) on the effect of behavioral biases on investment decisions; this study collected data from India's equity investors. The results showed that mental accounting significantly and positively affects investment decisions. Based on this empirical literature, we developed the following hypothesis:

H₄: *Mental accounting has a significant impact on investment decisions.*

In addition to the above, various researchers also checked the composite effect of these behavioral biases on investment decisions ([Banerji et al., 2023](#); [Pradhan, 2021](#); [Shukla et al., 2020](#)). The following hypothesis is formulated:

H₅: *Behavioral biases have a significant impact on investment decisions.*

2.5 | Mediating Role of Risk Perception

Researchers have studied risk perception as an exogenous variable and its impact on several other variables. At the same time, risk perception has also been taken as a mediator in relevant research papers ([Ahmad et al., 2020](#); [Ahmed et al., 2022](#); [Waheed et al., 2020](#)). In addition to supporting the literature, a logical link through the mediation of risk perception also exists. What risk is and how people perceive risk are two different things. At times, perceived risk is higher or lower than the actual risk in an investment, which leads to the inclusion of this variable as a mediator. This study is also supported by some other works recently done in this field ([Almansour et al., 2023](#); [Yadav & Chaudhary, 2022](#)). Risk perception is every investor's judgment about the risk involved in any investment ([Zhu & Deng, 2020](#)). Previous studies have proved the direct effect of risk perception on investment decisions ([Ainia & Lutfi, 2019](#); [Sitkin & Pablo, 1992](#)). The researchers found that different levels of risk have other effects on individual perceptions. This research examines the direct impact of behavioral biases on investment decisions and investigates the mediating role of risk perception between behavioral biases and investment decisions. The mediated role of risk perception is determined using the following hypotheses:

H₆: *Risk perception mediates the relationship between overconfidence and investment decisions.*

H₇: *Risk perception mediates the relationship between loss aversion and investment decisions.*

H₈: *Risk perception mediates the relationship between herd behavior and investment decisions.*

H₉: *Risk perception mediates the relationship between mental accounting and investment decisions.*

H₁₀: *Risk perception mediates the relationship between behavioral biases and investment decisions.*

2.6 | Moderating Role of Financial Literacy

Financial literacy has been the buzzword, and every struggling economy is focusing on increasing financial literacy to increase financial inclusion. Financial literacy increases the level of understanding of investors and hence is likely to overcome some of their behavioral biases. Its moderating effect between behavioral biases and investment decisions is also seen by researchers ([Adil et al., 2022](#); [Ghasarma et al., 2017](#)). There are other studies in which the role of financial literacy is checked. There is no doubt financial literacy helps investors better understand the markets and do a reasonably acceptable security analysis to make good decisions. The moderating role of financial literacy is seen much research works of the recent past ([Akhtar & Malik, 2023](#); [Fikriyah & Suhartini, 2023](#); [Khan et al., 2023](#)). Financial literacy is the personal skill of making knowledgeable and effective decisions about using and managing money. Takeda et al. ([2013](#)) found that individuals with a high financial literacy level are less overconfident. Fernandes et al. ([2014](#)) suggested that an investor can show less irrational behavior by improving financial literacy.

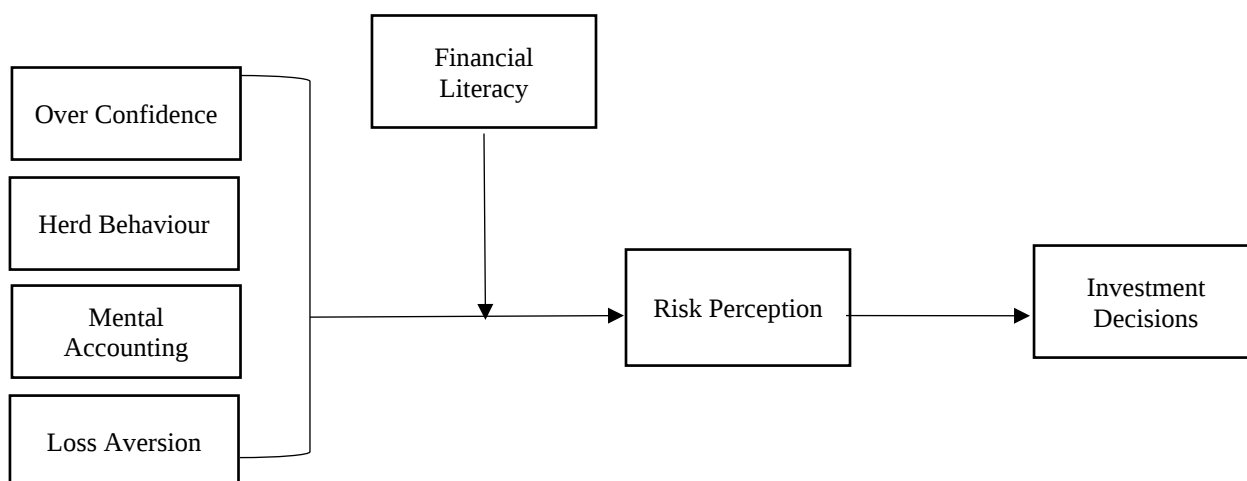
Baker et al. ([2019](#)) checked the impact of financial literacy on behavioral biases. The findings revealed that financial literacy is negatively linked to herd behavior, positively related to mental accounting, and overconfidence and loss aversion. Aren et al. ([2016](#)) showed that financial literacy affects investors' risk perception. Investors with a high level of financial literacy tend to invest after a complete analysis to avoid risk. It means the higher the financial literacy level, the lower the risk perception. The moderating effect of financial

literacy on risk perception is a missing part of the literature. The gap is filled by formulating the following hypothesis:

H₁₁: Financial literacy moderates the relationship between behavioral biases and risk perception.

Figure 1

Theoretical Model



3 | METHODOLOGY & DESIGN

This study uses a questionnaire to collect cross-sectional data from retail investors. The Convenience Sampling Technique was used. Data was collected using both physical and online distribution of the questionnaire due to the accessibility of respondents. The following Google link was created and shared with the respondents through emails and social media for online data collection: <https://forms.gle/piUGKruMDEDL3LrJ7> Online responses were collected as physical responses because of the ease of the respondents and the researchers. One hundred eighty questionnaires were physically distributed, and 143 were received. In addition, 238 online responses were also received and used, which makes it a total of 381 responses. Fourteen filled questionnaires were incomplete; hence, 367 responses were used in this study for analysis, which is a sufficient sample for a population of this size, with a 5% margin of error, 95% level of confidence, and 50% population variance. A questionnaire with 48 questions was adopted from the previous literature to collect data from the respondents. The Heterotrait-Monotrait-HTMT ratio of correlations was used to check the discriminant validity of the instrument. HTMT ratio of correlations is a statistical technique used in structural equation modeling, Ervin et al. (2019) to assess the discriminant validity of a measurement instrument. Discriminant validity is the extent to which constructs or variables theoretically distinct from one another are indeed distinct in practice. It works by specifying the measurement model, computing correlations between latent constructs, and applying the HTMT ratios for each pair of constructs. The formula of the HTMT ratio is:

$$\text{HTMT}_{ij} = \text{Corr}(X_i, X_j) / \sqrt{\text{AVE}_i * \text{AVE}_j}$$

Where $\text{Corr}(X_i, X_j)$ is the correlation between constructs i and j , AVE_i is the average variance extracted for construct i , representing the amount of variance in the observed variables that are explained by the construct,

and AVE_j is the average variance extracted for construct j. The threshold level is between 0.85 to 0.90. Smart-PLS software was used for analysis.

4 | RESULTS and ANALYSIS

In addition, composite Reliability (CR), Average Variance Extracted (AVE), and factor loadings were also checked. The results are shown in Table 1.

Table 1

Outer Loading, CR, and AVE

Construct	Outer loading	CR	AVE
Financial Literacy		0.933	0.701
FL1	0.706		
FL2	0.825		
FL3	0.846		
FL4	0.899		
FL5	0.898		
Herd Behavior		0.94	0.663
HB1	0.782		
HB2	0.743		
HB3	0.771		
HB4	0.853		
HB5	0.875		
HB6	0.706		
HB7	0.907		
HB8	0.856		
Loss Aversion		0.91	0.67
LA1	0.786		
LA2	0.865		
LA3	0.835		
LA4	0.829		
LA5	0.772		
Mental Accounting		0.913	0.678
MA1	0.848		
MA2	0.856		
MA3	0.848		
MA4	0.813		
MA5	0.748		
Overconfidence		0.899	0.599
OC1	0.624		
OC2	0.855		
OC3	0.81		
OC4	0.754		
OC5	0.808		
OC6	0.771		
Risk Perception		0.813	0.568
RP1	0.699		
RP2	0.664		
RP3	0.719		
RP4	0.746		
RP5	0.769		

Investment Decision		0.959	0.627
ID1	0.76		
ID2	0.795		
ID3	0.806		
ID4	0.826		
ID5	0.81		
ID6	0.862		
ID7	0.875		
ID8	0.834		
ID9	0.78		
ID10	0.719		
ID11	0.81		
ID12	0.689		
ID13	0.813		
ID14	0.681		

The minimum values of the factor loading, CR, and AVE are 0.60, 0.70, and 0.50, respectively ([Khurshid et al., 2021](#)). The results show that the instrument fulfills the minimum criteria. There was one item of overconfidence with factor loading less than four, which was removed. The Heterotrait-Monotrait-HTMT ratio of correlations was used to check the discriminant validity of the instrument. The criterion of HTMT is that its value should be less than 0.90, which shows that discriminant validity is established between the reflective constructs. Discriminant validity shows that variables do not reflect any other instrument variable.

Table 2

Discriminant Validity Through HTMT

	1	2	3	4	5	6	7
Financial Literacy	0.837						
Herd behavior	0.824	0.814					
Investment Decision	0.671	0.721	0.792				
Loss aversion	0.536	0.616	0.646	0.818			
Mental Accounting	0.360	0.461	0.360	0.528	0.823		
Overconfidence	0.546	0.604	0.651	0.599	0.597	0.774	
Risk Perception	0.590	0.651	0.772	0.723	0.380	0.589	0.684

The table shows that all the values are less than 0.9. So, the discriminant validity of the instrument is also proved.

4.1 | Assessment of Structural Model

In this section, the relationship between independent and dependent variables is checked. PLS-SEM checks the significance of the relationship between variables. Researchers also studied the indirect effect to check the mediating effect.

Table 3

Results of Coefficient of Determination

	R-Square	R-Square Adjusted
Investment Decision	0.72	0.715
Risk Perception	0.613	0.609

To check the predictive accuracy of the model, R^2 is calculated. The results of R^2 indicate the effect of independent variables on the dependent variable. The findings showed that 72% and 61% of the change in decision-making and risk perception is due to the independent variables of the current research.

Table 4

Path Coefficients

	Path Coefficient	T-Statistics (O/STDEV)	P-Values
Herd Behavior -> Investment Decision	0.314	3.047	0.002
Herd Behavior -> Risk Perception	0.217	5.832	0.000
Loss Aversion -> Investment Decision	0.067	1.086	0.278
Loss Aversion -> Risk Perception	0.496	8.407	0.000
Mental Accounting -> Investment Decision	-0.130	2.598	0.01
Mental Accounting -> Risk Perception	-0.127	2.979	0.003
Overconfidence -> Investment Decision	0.251	4.159	0.000
Overconfidence -> Risk Perception	0.187	3.322	0.001
Behavioral Biases -> Investment Decision	0.394	8.695	0.000
Behavioral Biases -> Risk Perception	0.651	14.152	0.000
Risk Perception -> Investment Decision	0.483	10.287	0.000
Moderating Effect Behavior Biases -> Risk Perception	-0.151	2.287	0.023

Table 4 shows the PLS-SEM results by calculating each path's relationship. The results show that all independent variables have a significant relationship with the dependent variable. Furthermore, the results confirm that the behavioral factors of retail investors - mental accounting, herd behavior, overconfidence, and all the behavioral biases as a composite variable - significantly impact the dependent variable, investment decision-making. Finally, the results show that H_1 , H_3 , H_4 , and H_5 are accepted, whereas H_2 is rejected. Results also show that all behavioral factors have a significant positive relationship with risk perception's mediating variable. Financial literacy also moderated the relationship between behavioral biases and risk perception. So, H_{11} is also accepted.

Table 5

Mediation Verification

	Indirect Effect	Direct Effect	Mediation
Mental Accounting -> Risk Perception -> Investment Decision	-0.061***	-0.130***	Partial
Overconfidence -> Risk perception -> Investment Decision	0.077***	0.251***	Partial
Loss Aversion -> Risk Perception -> Investment Decision	0.239***	0.067	Full
Herd Behavior -> Risk Perception -> Investment Decision	0.090***	0.314***	Partial
Behavioral Biases -> Risk Perception -> Investment Decision	0.314***	0.394***	Partial

*** Highly Significant at the 0.01 level of Significance.

Table 5 shows that risk perception mediates the relationship between independent and dependent variables. Mediation is full in the case of mental accounting, and partial mediation exists between all other variables and decision-making. So H_6 , H_7 , H_8 , H_9 , and H_{10} are also accepted.

5 | DISCUSSION

The study aims to check the impact of overconfidence, herd behavior, loss aversion, and mental accounting on investment decisions, with risk perception as a mediator and financial literacy as a moderator. By comparing traditional and behavioral finance theories, we conclude that investors decide after evaluating all the options in traditional finance. However, according to the arguments of behavioral finance, an investor cannot assess all the available options. Instead, an investor decides based on other factors, such as experience, judgments, and social trends. So, some other factors were identified by behavioral finance that have an impact on investment decisions. The results showed that behavioral biases impact investment decisions, and herd behavior has the most significant effect. Previous studies also support the result ([Khurshid et al., 2021](#); [Madaan & Singh, 2019](#); [Qasim et al., 2019](#); [Rasool & Ullah, 2020](#); [Sattar et al., 2020](#)). It is also found that loss aversion has no significant impact on investment decisions, and the result of this study is supported by previous research ([Ainia & Lutfi, 2019](#)); further, mixed findings of researchers regarding the impact of loss aversion are in the literature ([Kumar & Babu, 2018](#)); considering the findings of Kumar and Babu (2018), we may consider the results of this study consistent with the literature. Similarly, mental accounting has a significant negative impact on investment decisions, and this finding is also supported by the work done by previous researchers ([Aziz & Khan, 2016](#)). The significant relationship between overconfidence and investment decisions was also proved by the findings of various researchers ([Jain et al., 2020](#); [Khurshid et al., 2021](#); [Madaan & Singh, 2019](#); [Qasim et al., 2019](#)). As per the results of this research, risk perception mediates the relationship between behavioral biases and investment decisions. The same was the finding of other researchers ([Ahmad & Shah, 2022](#); [Ishfaq et al., 2017](#); [Lim et al., 2018](#); [Riaz & Hunjra, 2015](#)).

6 | CONCLUSION

Retail investors' behavior on investment decisions is under-researched, and researchers may need to examine different biases and their impact on investment decisions in-depth. The current study is a contribution to the literature in this regard. The study explores the effects of four behavioral biases, herd behavior, mental accounting, loss aversion, and overconfidence, and checks its composite effect. Behavioral biases and risk perception also determine the moderating impact of financial literacy. The study revealed that behavioral biases significantly affect the endogenous variable: the decision-making of retail investors. It also explains that herd behavior is the most critical variable influencing retail investors' decision-making. This study also explored the indirect impact of exogenous variables on endogenous variables through the mediation of investors' risk perception. The results verified that the investor's financial literacy partially moderates the relationships. The relationship between behavioral biases and risk perception in the light of financial literacy is also proved. We hope that the findings of this study will aid in furthering the understanding of retail investors' behavioral biases and influencing forces for investment decisions by expanding the bounds of existing behavioral finance knowledge.

6.1 | Limitation and Future Research Directions

The current study has a significant contribution to the literature on behavioral finance but, at the same time, has some limitations. Firstly, we observed four behavioral biases, whereas there are many other biases for retail investors. Secondly, the role of perceived return as mediation may also be checked in future studies. Thirdly, the financial and psychological factors may also be investigated separately and compositely. Usually, retail investors' behavior is unpredictable. Therefore, qualitative techniques may also be used in future studies. Finally, a mixed-method approach could also be explored to thoroughly understand investment decisions and the impact of investors' behavior, which may also fill quantitative research's loopholes. Future studies may also investigate institutional investment decisions based on a mixed-method approach and get better insight into the investment decision behavior of institutions. Lastly, the time-series data collection method could be used as the current study is cross-sectional.

Acknowledgment: We are thankful to the editors and anonymous reviewers for their constructive suggestions.

Author Contributions: Conceptualization, A.A.K.; methodology, S.K. and A.A.K.; software, S.K.; formal analysis, S.K.; validation, A.A.K.; investigation, A.A.K.; data curation, I.R. and M.H.; writing—original draft preparation, I.R. and M.H.; writing—review and editing, A.A.K. All authors have read and agreed to the published version of the manuscript.

Declaration of Conflicting Interest: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Licenses and Copyright: This is an open access article, free of all copyright, and fulfils the DOAJ definition of open access. This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Funding: The author(s) received no financial support for the research, authorship, and/or publication of this article.

Data Availability Statement: Data that supports the findings of this study are available on request from the corresponding author.

Disclaimer/Publisher's Note: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of publisher "AGASR" and/or the editor(s). The Publisher AGASR and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

REFERENCE

Uncategorized References

- Adil, M., Singh, Y., & Ansari, M. S. (2022). How financial literacy moderate the association between behavior biases and investment decisions? *Asian Journal of Accounting Research*, 7(1), 17-30.
- Ahmad, M., & Shah, S. Z. A. (2022). Overconfidence heuristic-driven bias in investment decision-making and performance: mediating effects of risk perception and moderating effects of financial literacy. *Journal of Economic and Administrative Sciences*, 38(1), 60-60.
- Ahmad, M., Shah, S. Z. A. J. J. o. E., & Sciences, A. (2020). Overconfidence heuristic-driven bias in investment decision-making and performance: mediating effects of risk perception and moderating effects of financial literacy. 38(1), 60-90.
- Ahmed, Z., Rasool, S., Saleem, Q., Khan, M. A., & Kanwal, S. J. S. O. (2022). Mediating role of risk perception

- between behavioral biases and investor's investment decisions. 12(2), 21582440221097394.
- Ainia, N. S. N., & Lutfi, L. (2019). The influence of risk perception, risk tolerance, overconfidence, and loss aversion towards investment decision making. *Journal of Economics, Business, and Accountancy Ventura*, 21(3), 401 - 413.
- Ainia, N. S. N., Lutfi, L. J. J. o. E., Business,, & Ventura, A. (2019). The influence of risk perception, risk tolerance, overconfidence, and loss aversion towards investment decision making. 21(3), 401-413.
- Akhtar, M., & Malik, M. U. (2023). Personality traits and investor risk behavior: Moderating role of financial literacy. *Managerial Finance*, 49(5), 884-905.
- Almansour, B. Y., Elkrghli, S., & Almansour, A. Y. (2023). Behavioral finance factors and investment decisions: A mediating role of risk perception. *Cogent of Economics and Finance*, 11(2), 2239032.
- Aren, S., Zengin, A. N. J. P.-S., & Sciences, B. (2016). Influence of financial literacy and risk perception on choice of investment. 235, 656-663.
- Arora, M., & Kumari, S. J. I. J. o. A. P. (2015). Risk taking in financial decisions as a function of age, gender: mediating role of loss aversion and regret. 5(4), 83-89.
- Aziz, B., & Khan, M. A. (2016). Behavioral factors influencing individual investor's investment decision and performance, Evidence from Pakistan Stock Exchange. *International Journal of Research in Finance and Marketing*, 6(7), 74-86.
- Baker, H. K., Kumar, S., Goyal, N., & Gaur, V. J. M. F. (2019). How financial literacy and demographic variables relate to behavioral biases. 45(1), 124-146.
- Banerji, J., Kundu, K., Alam, P. A. J. B. P., & Research. (2023). The impact of behavioral biases on individuals' financial choices under uncertainty: An empirical approach. 11(3), 401-424.
- Bao, H., & Li, S. H. (2020). Investor overconfidence and trading activity in the Asia Pacific REIT markets. *Journal of Risk and Financial Management*, 13(10).
- Barber, B. M., & Odean, T. J. T. q. j. o. e. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. 116(1), 261-292.
- Barberis, N., Jin, L. J., & Wang, B. J. T. J. o. F. (2021). Prospect theory and stock market anomalies. 76(5), 2639-2687.
- Chandra, A. (2008). Decision making in the stock market: Incorporating psychology with finance. National Conference on Forecasting Financial Markets of India,
- Chauhdry, N. S., Ghufuran, B., & Khakwani, M. S. (2021). Impact of behavioral biases and decision analysis methods on investment performance in individual investors at PSX. *Journal of Accounting and Finance in Emerging Economies*, 7(4), 1003-1017.
- Combrink, S., & Lew, C. (2020). Potential underdog bias, overconfidence and risk propensity in investor decision-making behavior. *Journal of Behavioral Finance*, 21(4), 337-351.
- Dadashi, M., Pakmaram, A., Rezaei, N., & Abdi, R. (2023). Providing a behavioral model of mental accounting decision-making based on psychological components through data theory and meta-composition. *International Journal of Nonlinear Analysis and Applications*, 14(1), 393-408.
- Edmiston, K. D., & Gillett-Fisher, M. C. (2006). Financial Education at the Workplace.
- Erwin, S., Rahmat, S. T. Y., Angga, N. D., Semerdanta, P. J. R. J. o. A., & Sciences, S.-E. (2019). Transformational leadership style and work life balance: The effect on employee satisfaction through employee engagement. 91(7), 310-318.
- Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383-417.
- Fernandes, D., Lynch Jr, J. G., & Netemeyer, R. G. J. M. s. (2014). Financial literacy, financial education, and downstream financial behaviors. 60(8), 1861-1883.
- Fikriyah, T. M., & Suhartini, D. (2023). Analysis of factors that influence investment decisions with financial literacy as moderating variable. *Indonesian Journal of Business Analytics*, 3(4), 1363-1376.
- Ghasarma, R., Putri, L., & Adam, M. (2017). Financial literacy: Strategies and concepts in understanding the financial planning with Self-efficacy thoery and Goal-setting theory of motivation approach. *International Journal of Economics and Financial Issues*, 7(4), 182-188.
- Huang, T.-C., & Wang, K.-Y. (2017). Investors' fear and herding behavior: Evidence from the Taiwan Stock Market. *Emerging Markets Finance and Trade*, 53(10), 2259-2278.
- Hussain, S., Rasheed, A., & Ali, M. A. J. N. R. J. (2021). Impact of Overconfidence Bias on Investor's Investment Decisions: the moderating role of Religiosity. 33-42.
- Ishfaq, M., Maqbool, Z., Akram, S., Tariq, S., & Khurshid, M. K. (2017). Mediating role of risk perception between cognitive biases and risky investment decision: empirical evidence from Pakistan's equity market. *Journal of Managerial Sciences*, 11(3), 265-278.
- Ivanitsky, V. P., & Tatyannikov, V. A. (2019). Rational and irretaional approaches to investors' transactions in financial markets. *Journal of New Economy*, 20(5), 61-74.
- Jain, J., Walia, N., & Gupta, S. (2020). Evaluation of behavioral biases affecting investment decision making of individual equity investors by fuzzy analytic hierarchy process. *Review of Behavioral Finance*, 12(3), 297-314.
- Jain, J., Walia, N., & Gupta, S. J. R. o. B. F. (2020). Evaluation of behavioral biases affecting investment decision making of individual equity investors by fuzzy analytic hierarchy process. 12(3), 297-314.
- Jiang, J., & Li, H. (2020). A new measure for market efficiency and its application. *Finance Research Letters*, 34, 101235.

- Kahneman, D., & Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen.
- Kapoor, S., & Prosad, J. M. (2017). Behavioural finance: A review. *Procedia Computer Science*, 122, 50-54.
- Kelikume, I., Olaniyi, E., & Iyohab, F. A. (2020). Efficient market hypothesis in the presence of market imperfections: Evidence from selected stock markets in Africa. *International Journal of Management, Economics and Social Sciences*, 9(1), 37-57.
- Kengatharan, L., Kengatharan, N. J. A. J. o. F., & Accounting. (2014). The influence of behavioral factors in making investment decisions and performance: Study on investors of Colombo Stock Exchange, Sri Lanka. 6(1), 1.
- Khan, M. Z. U. J. M., & Administration. (2017). Impact of availability bias and loss aversion bias on investment decision making, moderating role of risk perception. 1(1), 17-28.
- Khan, S. K., Hassan, N. U., & Islam, J. (2023). Unlocking the investment puzzle: The influence of behavioral biases and moderating role of financial literacy. *Journal of Social Research Development*, 4(2), 433-444.
- Khurshid, S., Ahmed, A., & Irrum, L. (2021). An examination of behavioral factors affecting the retail investor's investment desiosion: The moderating role of Covid 19. *Journal of Islamic Countries Society of Statistical Sciences*, 7(1), 105-120.
- Kostin, K. B., Runge, P., & Adams, R. J. S. M. (2021). Investment strategies in pandemic situations: An analysis and comparison of prospective returns between developed and emerging markets. 26(1), 34-52.
- Kumar, A. A., & Babu, M. (2018). Effect of loss aversion bias on investment decision: A study. *Journal of Emerging Technologies and Innovative Research*, 5(11), 71-76.
- Kumar, S., & Goyal, N. J. Q. R. i. F. M. (2016). Evidence on rationality and behavioural biases in investment decision making. 8(4), 270-287.
- Lee, K., Miller, S., Velasquez, N., Wann, C. J. T. I. J. o. B., & Research, F. (2013). The effect of investor bias and gender on portfolio performance and risk. 7(1), 1-16.
- Lim, T. S., Maila, R., Karim, M. R. A., Ulum, Z. K. A. B., Jaidi, J., & Noordina, R. (2018). A serial mediation model of financial knowledge on the intention to invest: The central role of risk perception and attitude. *Journal of Behavioral and Experimental Finance*, 20, 74-79.
- Lin, H.-W. (2011). Elucidating rational investment decisions and behavioral biases: Evidence from the Taiwanese stock market. *African Journal of Business Management*, 5(5), 1630-1641.
- Madaan, G., & Singh, S. (2019). An analysis of behavioral biases in investment decision-making. *International Journal of Financial Research*, 10(4), 55-67.
- Madaan, G., & Singh, S. J. I. J. o. F. R. (2019). An analysis of behavioral biases in investment decision-making. 10(4), 55-67.
- Mahina, J. N., Muturi, W. M., Memba, F. S. J. I. J. o. A., Finance, & Management, R. (2017). Influence of Loss Aversion Bias on Investments at The Rwanda Stock Exchange. 2(5), 131-137.
- McCarthy, D., Mikkola, K., & Thomas, T. J. J. o. M. E. (2020). Utilitarianism with and without expected utility. 87, 77-113.
- Metawa, N., Hassan, M. K., Metawa, S., & Safa, M. F. (2019). Impact of behavioral factors on investors' financial decisions: Case of the Egyptian Stock Market. *International Journal of Islamic and Middle Eastern Finance and Management*, 12(1), 30-55.
- Neuman, Y., & Cohen, Y. (2023). Unveiling herd behavior in financial markets. *Journal of Statistical Mechanicns: Theory and Experiment*, 2023(8), 083407.
- Niroomand, F., Metghalchi, M., Hajilee, M. J. J. o. e., & finance. (2020). Efficient market hypothesis: a ruinous implication for Portugese stock market. 44, 749-763.
- Nti, I. K., Adekoya, F. F., & Weyori, B. A. (2020). A systematic review of fundamental and technical analysis of stock market predictions. *Artificial Intelligence Review*, 53(4), 3007-3057.
- Pradhan, A. J. J. o. A. M. (2021). Quantitative model for impact of behavioral biases on asset allocation decisions: a case study of investors in UAE. 22, 573-580.
- Qasim, M., Hussain, R., Mehboob, I., & Arshad, M. J. A. (2019). Impact of herding behavior and overconfidence bias on investors' decision-making in Pakistan. 5(2), 81-90.
- Qasim, M., Hussain, R. Y., Mehboob, I., & Arshad, M. (2019). Impact of herding behavior and overconfidence bias on investors' decision-making in Pakistan. *Accounting*, 5(2), 81-90.
- Rasool, N., & Ullah, S. (2020). Financial literacy and behavioural biases of individual investors: Emperical evidence of Pakistan Stock Exchange. *Journal of Economics, Finance and Administrative Science*, 25(50), 261-278.
- Riaz, L., & Hunjra, A. I. (2015). Relationship between psychological factors and investment decision making: The mediating role of risk perception. *Pakistan Journal of Commerce and Social Sciences*, 9(3), 968-981.
- Sattar, M. A., Toseef, M., & Sattar, M. F. (2020). Behavioral finance biases in investment decision making. *International Journal of Accounting, Finance, and Risk Management*, 5(2), 69-75.
- Sattar, M. A., Toseef, M., & Sattar, M. F. (2020). Behavioral finance biases in investment decision making. *International Journal of Accounting, Finance and Risk Management*, 5(2), 69-75.
- Shukla, A., Rushdi, D. N. J., & Katiyar, D. R. C. J. I. J. o. M. (2020). Impact of behavioral biases on investment decisions 'a systematic review'. 11(4).

- Singh, J. E., Babshetti, V., & Shivaprasad, H. N. (2021). Efficient Market Hypothesis to behavioral finance: A review of rationality to irrationality. *Materials Today, Proceedings*.
- Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *Academy of Management Review*, 17(1), 9-39.
- Takeda, K., Takemura, T., & Kozu, T. J. T. R. o. S. S. (2013). Investment literacy and individual investor biases: survey evidence in the Japanese stock market. 7, 31-42.
- Thaler, R. J. J. o. e. b., & organization. (1980). Toward a positive theory of consumer choice. 1(1), 39-60.
- Thomas, B., & Subhashree, P. (2020). Factors that influence the financial literacy among engineering students. *Procedia Computer Science*, 172, 480-487.
- Ul Abidin, S. Z., Qureshi, F., Iqbal, J., & Sultana, S. J. B. I. R. (2022). Overconfidence bias and investment performance: A mediating effect of risk propensity. 22(4), 780-793.
- Waheed, H., Ahmed, Z., Saleem, Q., Din, S., Ahmed, B. J. I. J. o. I., Creativity, & Change. (2020). The mediating role of risk perception in the relationship between financial literacy and investment decision. 14(4), 112-131.
- Wang, H., Yan, J., & Yu, J. (2017). Reference-dependent preferences and the risk-return trade-off. *Journal of Financial Economics*, 123(2), 395-414.
- Woo, K. Y., Mai, C., McAleer, M., & Wong, W. K. (2020). Review on efficiency and anomalies in stock markets. *Economies*, 8(1), 20.
- Yadav, K., & Chaudhary, R. (2022). Impact of Heuristic-Driven biases on investment decision-making of individual investors: The mediating role of risk perception. *Orissa Journal of Commerce*, <https://doi.org/10.54063/ojc.v54043i54001>.
- Zaigham, G. H. K., Wang, X., & Ali, H. S. (2019). Causal relation between stock market performance and firm investment in China: Mediating role of information asymmetry. *SAGE Open*, 9(4), 2158244019885146.
- Zhu, H., & Deng, F. (2020). How to influence rural tourism intention by risk knowledge during COVID-19 containment in China: Mediating role of risk perception and attitude. *International Journal of Environment Research and Public Health*, 17(10), 3514.