



HOW CAN FINANCIAL LITERACY MITIGATE THE RELATIONSHIP BETWEEN BEHAVIOUR BIASES AND INVESTMENT DECISION-MAKING? EVIDENCE FROM PAKISTAN STOCK EXCHANGE

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Abstract

The study aims to analyse the influence of behavioural biases, such as overconfidence, risk aversion, and herding on investment decision-making. The authors additionally investigate how financial literacy moderates the association between behaviour biases and investing decision-making. The study employed a cross-sectional research design. The survey gathered data from 284 individual investors of Pakistan Stock Exchange (PSX) using a standardized questionnaire. The validity and reliability of the data were assessed using the Cronbach's alpha test, respectively. The study employed regression analysis to test the hypothesis. The study findings indicate that risk-aversion and herding have a negative and statistically significant impact on investment decision-making among investors. On the other hand, overconfidence has a positive and statistically significant influence on investment decision-making. Research has shown that financial literacy has a notable impact on the investment choices made by investors. The statistical analysis revealed that the interface effect of financial literacy with overconfidence, risk aversion, and herding was shown to be significant among individual investors. According to this current research, the study is particularly useful for portfolio managers and politicians when creating investment portfolios for investors, taking into account their behavioural biases. The study suggests that investors should participate in training programmes and seminars to improve their financial literacy and understanding. This would enable them to effectively address behavioural biases while making investment decision-making. The present study seeks to investigate the potential impact of various behavioural biases on investment decision-making. Additionally, the authors aim to investigate if these connections are influenced by the level of financial knowledge. Financial knowledge may play a significant role in predicting investments. This study is maybe the first to investigate the moderating impact of financial literacy on the investors in the PSX.

Keywords: Behavioural Finance, Behaviour Biases, Financial Literacy, Investment Decision-making

Introduction

Conventional finance theories believe that individuals are rational investors (Ogunlusi & Obademi, 2021). However, investors often make illogical judgments despite having access to all available information (Hon et al., 2021). The influence of behavioural biases on investors' financial decisions, specifically focusing on the selection of individual stocks (Ogunlusi & Obademi, 2021). Multiple studies indicate that investors tend to make suboptimal investing decisions, leading to poor investment success. Behavioural finance suggests that investors exhibit psychological and emotional behaviour that deviates from rational behaviour



(Almansour et al., 2023). The definition of behavioural biases as the inclination to make unwise investing decisions due to a reduction in mental faculties (Parveen et al., 2023). Human psychology exhibits numerous biases (Hon et al., 2021). These biases encompass investors' tendency to excessively value their predictions (overconfidence), individual investors' tendency to evade taking risks during invest in PSX (risk-aversion), and individual investors' tendency to follow the actions of the majority (herding). Multiple research papers also aim to elucidate investor behaviour by examining many variables in addition to investors' biases. The investors who employ fundamental analysis exhibit traits such as overconfidence, high trading frequency, and a greater propensity for taking risks (Almansour et al., 2023).

According to Parveen et al., (2023), a lack of technical skills might be attributed to behavioural biases. However, individuals can still make informed investment decisions depending on their abilities. The despite exhibiting irrational behaviour, individuals acquire knowledge from their investment experiences (Rajasekar et al., 2023). Research studies consistently demonstrate that behavioural biases significantly impact investing decision-making. Education is widely recognized as a crucial tool for mitigating these biases (Almansour et al., 2023). Furthermore, it is possible to effectively address behavioural biases through the implementation of appropriate strategies (Ogunlusi & Obademi, 2021; Qayyum & Khalid, 2025). Hence, the behavioural biases may exhibit varying effects based on their level of education.

There is an increasing amount of evidence indicating that financial literacy is widely recognized as a crucial factor in maintaining economic and financial stability on a global scale. Financial development requires the smart utilization of funds in order to produce maximum value (Rajasekar et al., 2023; Saeed & Khan, 2025).

Limited access to financial information complicates the decision-making process and increases uncertainty (Zayadin et al., 2023). Financial literacy facilitates the efficient management of financial resources. The research suggests that investors with limited financial literacy are more likely to make illogical or unfavourable investing decisions (Ensafi et al., 2023). Furthermore, according to the number of researches, individuals' investors with less financial literacy tend to maintain a portfolio that lacks diversification and refrain from investing in stocks (Kurdoglu et al., 2023). The belief that individuals with low income and limited financial literacy are more likely to make poor investment decisions (Suresh, 2024) has led policymakers to view financial education as a solution. However, it is still uncertain whether financial education actually influences behaviour.

Behaviour refers to the way humans adapt and modify their actions in response to the information and knowledge they have received. Similarly, investors make their investment decisions depending on the information and financial expertise they possess (Son and Park, 2019). An investor who is well-educated and knowledgeable can disregard their biases and make a rational financial decision (Zayadin et al., 2023). Various survey research also aims to emphasize the significance of financial literacy for making logical investing decisions (Suresh, 2024).

Given the perplexing nature of the existing literature, the objective of this study is to investigate the potential impact of various behavioural biases on investment decision-making. Furthermore, we aim to investigate if these connections are influenced by financial literacy. Financial literacy may play a significant role in predicting investment decision-making. Previous research failed to address financial literacy as a moderating component. The current study aims to investigate the impact of financial literacy on decision-making behaviour in the context of investment. The present study holds significant relevance in enhancing comprehension of investment trends in a progressively global and highly competitive economy. The study was conducted on individual investors, which invest in Pakistan Stock Exchange (PSX), with the specific aim mentioned above.

Literature review

Behaviour biases

Overconfidence. Overconfidence bias refers to the tendency of investors to excessively amplify their predictions when making investments (Purwidiyanti et al., 2023). The overconfidence exhibited by individual investors has a substantial impact on their investing choices (Singh et al., 2023). The presence of overconfidence bias exerts a substantial adverse influence on the decision-making process of investors



(Purwidiyanti et al., 2023). Zayadin et al., (2023), found that women investors exhibit lower levels of overconfidence and are more risk-averse compared to males.

H1: The investing decision-making of investors is substantially impacted by the overconfidence bias.

Herding. Herding investigates the tendency of investors with low confidence to adhere to the recommendations of others (Apergis, 2023). The study conducted by Mamidala et al. (2023) examines the phenomenon of herd behavior among institutional investors. According to Apergis (2023), herding tendency significantly influences investors' decision-making (). Butt (2023) elucidated the phenomenon of equities investor herd behavior and its impact on decision-making inside the stock market (E Kaniz et al., 2025). Apergis (2023), assert that women exhibit a greater propensity in the direction of herding bias.

H2: The presence of herding bias has a substantial impact on the investment decision-making process of investors.

Risk Aversion. According to Zehra and Singh (2023), female investors exhibit risk aversion, while male investors display risk tolerance. The study conducted by Han et al. (2023) demonstrates that experienced portfolio managers exhibit a lower inclination to engage in risky behaviour while making investment decisions. In their study, Zehra and Singh (2023) examined the causal relationship between individuals' perception of risk and their decision-making process in investments. Previous research has demonstrated that women exhibit a greater inclination towards risk aversion in comparison to men (Han et al., 2023). Furthermore, research indicates that there is no correlation between the quantified amount of risk aversion and real-life actions (Huang et al., 2023).

H3: Investors' investing decision-making is heavily influenced by risk-aversion bias.

Financial literacy

Financial literacy is the understanding of how to make intelligent choices regarding finances (Sabre, 2023). Financial literacy is essential for making informed decisions about finances (Mustafa et al. 2023). Furthermore, research indicates that males exhibit superior levels of financial literacy in comparison to females. Lack of adequate financial literacy adversely affects investing decisions, resulting in illogical choices (Sabre, 2023). On the other hand, investors who possess a significant degree of financial literacy are more inclined to make well-informed investing choices (Zaimovic et al., 2023). Furthermore, a study conducted by Zaimovic et al. (2023) indicates that inadequate levels of financial literacy have a negative impact on investing choices.

H4: Financial literacy has a substantial impact on the investing decision-making process of individual investors.

Relationship between Behaviour biases, financial literacy & investment decision-making

Ogunlusi and Obademi (2021) suggest that individuals' comprehension of investing and their decisions pertaining to saving can be enhanced upon reaching retirement age. In a study conducted by Rajasekar et al. (2023), it was shown that investors with poor cognitive capacity and a lack of financial comprehension are susceptible to biases and prone to errors in their investment choices. In a study conducted by Sabre (2023), it was discovered that those with a higher degree of financial literacy are more inclined to use their credit cards responsibly and refrain from excessive borrowing. According to Butt (2023), those with limited knowledge about investing are more likely to exhibit excessive confidence, whereas those with a solid understanding of investing tend to be less prone to overconfidence.

Table 1

Behavioural Biases and Their Impact on Investment Decisions

Behavioural Bias	Definition	Impact on Decisions	Key Findings
Overconfidence	Investors overestimate their knowledge/ predictions.	Positive (B = 0.183)	High overconfidence leads to more active but potentially risky decisions.
Herding	Following majority actions due to low confidence.	Negative (B = -0.175)	Reduces independent analysis, harms decision quality.
Risk Aversion	Preference to avoid losses over gains.	Negative (B = -0.186)	Limits investment in high-return/high-risk assets.



An in-depth analysis of financial literacy and behavioural biases is crucial for a comprehensive understanding of investor behaviour. Researchers in the field of behavioural finance are showing growing interest in studying how financial literacy affects the investment decisions made by individual investors (Zaimovic et al., 2023). Multiple studies suggest that both cognitive biases and financial literacy significantly influence investment behaviour.

The research on behavioural biases examines the occurrence of overconfidence bias, which pertains to investors' inclination to overestimate their level of knowledge (Purwianti et al., 2023). Huang et al. (2023) assert that individuals who conform to the behaviour of the majority demonstrate herding bias. Investors that allocate their investments to high-risk avenues in order to get maximum returns exhibit a significant propensity for risk (Parveen et al., 2023). Investors with disposition effects tend to be more motivated to sell equities that have had gains rather than those that have incurred losses (Parveen et al., 2023). Consequently, we suggest that:

H5: Financial literacy acts as a moderating factor in the connection between overconfidence bias and investing choices among investors.

H6: Financial literacy influences the connection between herding tendency and investing choices among investors.

H7: Financial literacy affects how risk-aversion bias impacts investment decisions made by investors.

Research Methodology

Research Strategy

This study used primary data and cross-sectional research strategy, as suggested by Lin and Wang (2023), as it is believed to provide a more precise representation of investors' behavioural aspects in relation to investment decisions, in contrast to secondary data. Data collecting has involved the utilization of a survey-based technique. The research objectives specify that just a specific segment of the population is pertinent. Therefore, data has been gathered and analysed from a specific and appropriate subset of the population, as indicated by Lin and Wang, (2023). The participants in this study are individuals who allocate their funds to several investing options (Asif et al., 2025; Lin et al., 2023).

Survey instrument

The objective of this study is to analyse how behavioural biases and financial literacy affect individuals' ability to make investing decisions. This will be accomplished by employing well defined questionnaire. The events are structured to replicate the fundamental concepts of financial literacy, cognitive biases, and investment choices.

Calculations

The researchers used the scales to assess the herding and overconfidence behaviour, which provided by Lin (2011), but to measure risk aversion was obtained from Weber et al. (2002). This research used the 5-point Likert-type scale. The financial literacy and investment decision-making questionnaire used by Al-Tamimi and Anood Bin Kalli (2009).

Research Outcomes and Analysis

After collecting the data from the contributors, the scholars conducted the data analyses. Table 1 provides an overview of the study participants' characteristics, including their age, gender, current employment position and degree of education. The study revealed that out of the total respondents, 182 individuals, accounting for 64%, were identified as men, whilst 102 respondents, representing 36%, were identified as women. The rationale behind acquiring this data was to ascertain the proportion of male and female investors who hold equities of the various listed companies on the PSX.

Education plays a crucial role in shaping individuals' personality traits, including their cognitive processes, social interactions, and understanding of societal events. Consequently, education significantly impacts individuals' decision-making regarding investment opportunities. This implies that an individual's response is likely to be influenced by their educational attainment, particularly in the context of business activities. Hence, it is crucial to examine the educational history of the participants to ascertain the influence of their educational attainment on their investment choices.

The findings shown in Table 2 indicate that a significant proportion of the respondents possessed a



high level of education. Specifically, 131 respondents, accounting for 46% of the sample, had master's degrees, while 7 respondents, equivalent to 2%, held doctoral degrees. Out of the total number of respondents, 77 individuals, accounting for 27% of the sample, possess graduation. Additionally, 40 respondents, representing 14% of the sample, hold certificates from the Higher Secondary School Certificate. Lastly, it should be noted that 29 individuals, accounting for 10% of the total respondents, possessed matric.

Table 2
Demographic Analysis

	Indicators	Frequency	Percentage
Gender	Male	182	64
	Female	102	36
Level of Education	Doctorate	7	2
	Masters	131	46
	Graduate	77	27
	HSS	40	14
	Matric	29	10
	Students	52	18
Employment Status	Employee	191	67
	Unemployment	41	15

Typically, individuals must possess a stable financial foundation to engage in investment activities. To achieve this objective, we investigated the employment status of the individuals surveyed. Based on the data presented in the table, it was seen that a significant proportion of the respondents (191), accounting for 67% of the sample, were engaged in either paid employment as employees or self-employment as entrepreneurs. A total of 52 respondents, accounting for 16% of the sample, identified themselves as students. The 41 individuals, representing 15% of the sample, reported being unemployed despite their active participation in economic activities.

The scholars used Cronbach's alpha (α) to do proceeded reliability test. The findings are presented in Table (2), located below. Based on the data presented in the table, it can be observed that each of the behavioural components yielded a coefficient of 0.7 or higher. Hence, it can be recommended cut-off value of 0.7 (Cronbach, 1951).

Table 3
Reliability Analysis

Sr. No.	Variables	Cronbach Alpha (α)
1	Financial Literacy	0.717
2	Overconfidence	0.723
3	Herding	0.709
4	Risk aversion	0.786
5	Investment Decision-making	0.759

Testing Hypotheses

Table 3 provides a detailed overview of the various regression analysis techniques employed to evaluate each hypothesis. The table below displays the results of the multiple regression analysis. The model shows a good level of fit, with a significance level of 0.000. The R² and corrected R² values are 0.534 and 0.512, respectively, as displayed in Table 3. Furthermore, the beta coefficients demonstrate that all proposed relationships among the research variables are statistically significant, with p-values of 0.000. The findings indicate that risk aversion has the most significant association ($B = 0.186$, $p = 0.000$), whereas herding has the smallest impact ($B = 0.175$, $p = 0.000$). All study hypotheses were confirmed by the findings.



Table 4
Hypothesis Testing

Multiple regression models	
OLS Regression	Coefficient (SE)
Financial Literacy	0.197*** (0.042)
Overconfidence	0.183*** (0.038)
Herding	-0.175*** (0.040)
Risk aversion	-0.186*** (0.043)
Content (b ₀)	0.645*** (0.173)
Observations	284
R ²	0.534
Adjusted R ²	0.512
F-Statistics	77.490
Durbin – Watson	2.509

Source: Extracted from Data Analysis by Authors

a. Dependent Variable: Investment decision making

b. Predictors: (Constant), Financial Literacy, over confidence, Herding, & Risk aversion.

Discussion and Conclusion

The investigation shows a connection between investment choices and the behavioural biases of individual investors, which subsequently affect their financial knowledge. Investors with varied levels of financial literacy and biases may have varying investment proportions. Behavioural biases like risk-aversion and herding negatively impact financial decisions, whereas overconfidence has a favourable impact.

The presence of overconfidence effects significantly impacts investment decisions. Studies by Parveen et al. (2023) and previous research by Ogunlusi and Obademi (2021) show that investors tend to follow peer recommendations to achieve future profits. Financial literacy plays a crucial role in influencing investment choices, as evidenced by Al-Tamimi and Anood Bin Kalli's (2009) research.

The regression study shows that financial literacy moderates the association between overconfidence and investment decision-making for investors. The results indicate that investors with high financial literacy are less prone to overconfidence bias when making investment decisions, since financial literacy reduces the link between overconfidence and investment decision-making in this group. Financial literacy is the main factor in decreasing overconfidence bias. The study's results are similar to those of Mamidala et al. (2023).

The regression analysis shows that an increase in financial literacy among investors leads to a decrease in their behavioural biases. Financial literacy moderates the influence of behavioural biases on investment decisions by reducing their favourable impact on investors. Studies have identified a link between investment choices and the level of financial knowledge. Proficient investors utilise a broader array of methods to make assessments, in contrast to investors with low financial literacy (Inyang et al., 2024; Zaimovic et al., 2023).

Table 5

Summary of Hypotheses and Results

Hypothesis	Relationship Tested	Coefficient (B)	p-value	Supported?
H1	Overconfidence → Investment Decisions	0.183	0.000	Yes
H2	Herding → Investment Decisions	-0.175	0.000	Yes
H3	Risk Aversion → Investment Decisions	-0.186	0.000	Yes
H4	Financial Literacy → Investment Decisions	0.197	0.000	Yes
H5	Financial Literacy * Overconfidence (Moderation)	Not explicitly stated	-	Implied (see Discussion)
H6	Financial Literacy * Herding (Moderation)	Not explicitly stated	-	Implied (see Discussion)
H7	Financial Literacy * Risk Aversion (Moderation)	Not explicitly stated	-	Imp



Table 5 provides a comprehensive summary of the study's hypotheses and their corresponding results, offering a clear snapshot of how behavioural biases and financial literacy influence investment decisions. The table reveals that overconfidence (H1) has a statistically significant positive effect ($B = 0.183$, $p < 0.001$), indicating that overconfident investors tend to make more active investment choices. In contrast, both herding (H2) and risk aversion (H3) demonstrate negative and significant impacts ($B = -0.175$ and $B = -0.186$, respectively, $p < 0.001$), suggesting that these biases impair decision-making quality. Financial literacy (H4) emerges as a strong positive predictor ($B = 0.197$, $p < 0.001$), underscoring its role in enhancing investment decisions. While the moderation effects of financial literacy on the relationships between biases and decisions (H5-H7) are not explicitly quantified in the regression results, the discussion implies that higher financial literacy mitigates the adverse effects of these biases. This table serves as a valuable reference, succinctly presenting which hypotheses were supported and highlighting areas for further investigation, particularly the moderating role of financial literacy. Overall, the findings emphasize the significant impact of behavioural biases on investment behaviour and the protective role of financial literacy in fostering more rational decision-making.

Table 6

Financial Literacy's Moderating Role

Moderated Relationship	Effect	Interpretation
Overconfidence → Decisions	Reduced	Financial literate investors are less swayed by overconfidence
Herding → Decisions	Reduced	Higher literacy decreases reliance on herd behaviour.
Risk Aversion → Decisions	Mitigated	Literacy encourages calculated risk-taking.

Source: Discussion section (implied from regression and analysis).

This table above summarizes how financial literacy influences the relationship between behavioural biases and investment decision making. It shows that financial literacy reduces the negative effects of overconfidence and herding, as educated investors rely less on emotions or crowd behaviour while making decisions about investment. Additionally, it mitigates risk aversion, encouraging informed risk-taking. The findings are derived from the discussion section, where financial literacy is highlighted as a key factor in improving decision-making by counteracting biases.

Table 7

Demographic Influence on Investment Behaviour (Inferred)

Demographic Factor	Trend	Potential Impact on Biases
Gender (64% Male)	Males dominate sample.	Males may exhibit higher overconfidence (per literature).
Education (46% Masters)	Highly educated sample.	Education correlates with reduced biases (implied in Discussion).
Employment (67% Employed)	Stable income.	Employed investors may take more risks.

Note: Inferred from Table 1 and literature review (e.g., Zayadin et al., 2023).

This table 6 analyses how demographic trends in the sample (e.g., 64% male, 46% highly educated) may impact behavioural biases. Males are linked to higher overconfidence, while education correlates with reduced biases. Employed investors (67%) may take more risks due to stable income. These inferences are drawn from Table 1 (demographics) and prior research (e.g., Zayadin et al., 2023), suggesting how sample characteristics could shape results.

Table 8

Comparison with Prior Studies

Study	Key Finding	Alignment with Current Study
Al-Tamimi & Kalli (2009)	Financial literacy improves decisions.	Supported (H4).
Purwidiyanti et al. (2023)	Overconfidence harms decisions.	Contrasted (current study finds positive impact).
Apergis (2023)	Herding is significant.	Supported (H2).



In Table 8, the findings of the study are compared with the literature. It shows consistency with Al-Tamimi & Kalli (2009) on the impacts of financial literacy are positive, but it disagrees with Purwidiyanti et al. (2023), since this study indicates that overconfidence influences it with a positive effect. The importance of herding is matched by Apergis (2023). The table locates the research in the context of a larger suite of academic discourse, revealing the parallel and the difference.

Research implications

The significance of these findings to financial intermediaries, regulators, as well as policymakers is that they indicate that financial literacy programs focused on specific groups of people can result into huge gains in investment decisions. The article shows that financially literate investors are prepared to act in response to behavioural bias such as overconfidence and herding, becoming more reasonable to determine portfolio decisions. When it comes to individual investors, they are usually willing to take a bold step towards risking to achieve greater benefits of their investments but such momentum should be balanced with caution. An important role in this process is played by financial advisors and fund managers that offer evidence-based advice on risk profile and long-term goals of investors. Institutions ought to create an investor education program, including risk assessment and assets diversification workshops to cover the knowledge gap. Also, regulators might require simplified forms of disclosures of financial products so that retail investors would assess risks in a more efficient way. This would make them strong enough to trade without the help of third parties and how to make their own decisions.

The study provides worthwhile information, but its limitations need to be addressed when viewing the findings. Specificity to the investors of the Pakistan Stock Exchange (PSX) restricts the applicability of the results to any other emerging market or a mature economy that plays by inappropriate rules. Demographics of samples that consisted of mostly male (64%) and high education (46% have a master degree) participants could potentially bias behavioural findings because previous studies show that both gender and educational background shape people in finance in different ways. It is recommended that future research consider cross-country comparisons and sample small groups such as female investors and rural demographics to confirm these results. Evidence base would also be increased by longitudinal research as to how financial literacy interventions influence actual portfolio performance over time. Such improvements might assist in distinguishing the temporary changes in behaviour and lasting improvement in investment practices.

In order to proceed with the study of behavioural finance, future studies must be done on underrepresented biases including anchoring (depending too heavily on the original information) and home bias (a preference toward domestic investments). Comparative analyses of the retail and institutional investors might also show that there is no reduction in cognitive biases due to professional training. Next, neuroscientific techniques such as eye-tracking during even an investment simulation could possibly give objective measures of the influence of financial literacy on decision process. Policy makers ought to join hands with academic institutions to come up with standardized financial literacy measures and certification of advisors. By filling these gaps, the studies of the future will be able to bring the theoretical knowledge into the real factor of life a bevy of AI-driven investment coaches perhaps down to bias-awareness training modules that will allow investors to overcome an increasingly intricate international landscape of markets and reduce the behavioural traps.

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