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Financial Literacy and Behavioural Biases: A Study of Retail Investors

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Abstract

Financial literacy has become one of the most important determinants of rational investment behaviour in modern financial markets. Despite increased access to financial information, retail investors continue to exhibit behavioural biases that often influence investment decisions and portfolio performance. This study investigates the influence of financial literacy on four major behavioural biases, namely Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion, among Indian retail investors. Primary data were collected from 228 retail investors using a structured questionnaire based on a five-point Likert scale. The proposed conceptual model was analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS 4. Reliability and validity of the measurement model were assessed through Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE) and HTMT ratio. The structural model was evaluated using bootstrapping with 5,000 resamples. The findings indicate that Financial Literacy exerts a statistically significant influence on all four behavioural biases examined in the study. The strongest positive effect was observed on Overconfidence Bias, followed by Loss Aversion, Anchoring Bias, and Herd Behaviour. The study contributes to behavioural finance literature by demonstrating that financial literacy is closely associated with behavioural tendencies of retail investors and provides useful implications for policymakers, financial educators, investment advisors, and regulators in designing effective investor education programmes.

Keywords: Financial Literacy, Behavioural Biases, Retail Investors, Behavioural Finance, Investment Behaviour, PLS-SEM

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1. Introduction

The investment landscape has undergone substantial transformation in recent years due to the rapid expansion of financial markets, technological innovation, and the growing availability of digital investment platforms. Retail investors now have access to a broad range of financial products, including equity shares, mutual funds, exchange-traded funds (ETFs), bonds, insurance products, and other market-linked instruments. While these developments have created greater investment opportunities, they have also increased the complexity of financial decision-making. As a result, the ability of investors to understand financial information and evaluate investment alternatives has become increasingly important for achieving sound investment outcomes. Financial literacy is widely recognized as a key factor influencing the quality of financial decisions. It encompasses not only knowledge of financial concepts but also the ability to interpret financial information, assess risks, compare investment alternatives, and make informed choices. Individuals with higher levels of financial literacy are generally better equipped to manage personal finances, diversify investment portfolios, and pursue long-term financial objectives. Previous research has consistently reported that financially literate individuals demonstrate more effective saving behaviour, retirement planning, wealth accumulation, and investment management than those with limited financial knowledge.

Despite the importance of financial knowledge, investment decisions are not always made rationally. Traditional finance assumes that investors process information objectively and seek to maximize expected utility. However, practical evidence suggests that investment decisions are frequently shaped by cognitive limitations, emotions, and psychological influences. Behavioural finance emerged to explain these deviations from rational decision-making by integrating insights from psychology and economics. This perspective argues that investors are often influenced by systematic behavioural biases that affect the way financial information is interpreted and investment choices are made. Among the behavioural biases most frequently discussed in investment literature are Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion. Anchoring Bias refers to the tendency of investors to rely heavily on initial information or reference points when making investment decisions. Herd Behaviour occurs when individuals imitate the actions of other investors rather than conducting independent analysis. Overconfidence Bias reflects an investor's tendency to overestimate personal knowledge, forecasting ability, and

decision-making skills. Loss Aversion, a central concept of behavioural finance, explains why investors generally experience the pain of financial losses more intensely than the satisfaction associated with equivalent gains.

These behavioural tendencies are particularly relevant in emerging economies such as India, where participation by retail investors in equity and mutual fund markets has increased substantially in recent years. Government agencies, financial institutions, and regulatory bodies have introduced various financial literacy initiatives to improve investor awareness. Nevertheless, behavioural biases continue to influence investment decisions, suggesting that financial knowledge alone may not be sufficient to eliminate irrational decision-making. Understanding how financial literacy interacts with these behavioural tendencies has therefore become an important area of academic inquiry. Though many studies have examined the relationship between financial literacy and investment behaviour, the majority of previous research has focused on financial literacy as a determinant of investment participation, savings behaviour, portfolio diversification, and financial well-being. Similarly, behavioural finance studies have extensively investigated individual behavioural biases independently. However, limited empirical evidence is available regarding the simultaneous influence of financial literacy on multiple behavioural biases among retail investors, particularly in the Indian context.

Furthermore, most existing studies have employed conventional statistical techniques such as multiple regression, correlation analysis, and exploratory factor analysis, which are inadequate for simultaneously examining complex relationships among latent variables. Very few studies have utilized Partial Least Squares Structural Equation Modelling (PLS-SEM), which provides a more comprehensive framework for analysing measurement reliability, construct validity, and structural relationships. Against this background, the present study addresses these gaps by empirically examining the influence of Financial Literacy on four major behavioural biases—Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion—using data collected from 228 Indian retail investors and analyzed through SmartPLS 4. By developing an integrated PLS-SEM framework to evaluate these relationships simultaneously, the study extends the behavioural finance literature and offers practical recommendations for policymakers, financial institutions, educators, and investment professionals seeking to design better awareness programmes and promote more informed, rational investment behaviour.

1.1 Research Objectives

The present study has been undertaken with the following objectives:

1. To examine the influence of Financial Literacy on behavioural biases among retail investors.
2. To analyze the influence of financial literacy on Anchoring Bias among retail investors.
3. To examine the impact of financial literacy on Herd Behaviour among retail investors.
4. To investigate the influence of financial literacy on Overconfidence Bias among retail investors.
5. To examine the relationship between financial literacy and Loss Aversion among retail investors.
6. To validate the proposed conceptual model using Partial Least Squares Structural Equation Modelling (PLS-SEM).

1.2 Theoretical Foundation

The present study is primarily grounded in Prospect Theory proposed by Kahneman and Tversky (1979), which explains that individuals do not always behave rationally while making financial decisions under conditions of uncertainty. According to the theory, investors evaluate potential gains and losses differently, leading to systematic deviations from rational decision-making. The theory further explains the existence of behavioural biases such as loss aversion, anchoring, and overconfidence.

In addition, the study is supported by Behavioural Finance Theory, which integrates principles of psychology with traditional finance to explain why investors often rely on heuristics, emotions, and cognitive shortcuts rather than objective financial information. Behavioural finance suggests that investor behaviour is influenced not only by financial knowledge but also by psychological characteristics that affect judgment and decision-making.

Financial Literacy Theory also provides the conceptual basis for the study by suggesting that individuals possessing higher levels of financial knowledge are better equipped to evaluate

investment opportunities, understand financial risks, and make informed investment decisions. Consequently, financial literacy is expected to influence the extent to which behavioural biases affect investment behaviour.

1.3 Conceptual Framework

The conceptual framework of the present study proposes Financial Literacy as the independent construct influencing four behavioural biases, namely Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion. The proposed model assumes that variations in the level of financial literacy significantly affect the behavioural tendencies exhibited by retail investors while making investment decisions. The structural model consists of one exogenous latent construct (Financial Literacy) and four endogenous latent constructs (Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion). The relationships among these constructs were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS 4 software.

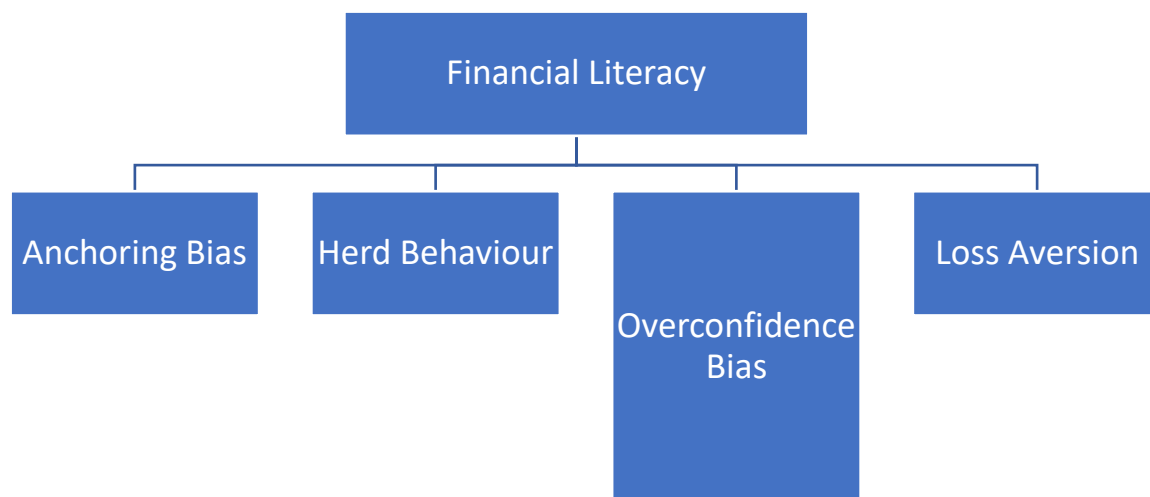


Figure 1 Proposed Conceptual Framework

Source: Author's Compilation

1.4 Research Hypotheses

Based on the review of literature and theoretical framework, the following hypotheses have been formulated. The hypotheses proposed in the present study are grounded in Behavioural Finance Theory, Prospect Theory, and Financial Literacy Theory. Existing literature suggests that financial literacy influences the way investors process financial information, perceive investment risks, and make investment decisions. Financially literate investors generally possess greater knowledge of financial products and market mechanisms; however, psychological biases may continue to affect their judgement under conditions of uncertainty. Therefore, financial literacy is expected to influence different behavioural biases exhibited by retail investors.

Previous studies indicate that financially literate investors are less dependent on irrelevant reference points while evaluating investment alternatives. Nevertheless, anchoring bias may continue to influence investment decisions because investors often rely on historical prices, previous returns, or initial market information. Tversky and Kahneman (1974) identified anchoring as one of the most influential cognitive heuristics affecting judgement under uncertainty. Based on these theoretical arguments, the following hypothesis is proposed:

H₁: *Financial Literacy has a significant influence on Anchoring Bias.*

Similarly, behavioural finance literature suggests that financial literacy affects investors' tendency to follow the actions of other market participants. Although financially knowledgeable investors are generally expected to make more independent decisions, herd behaviour may still emerge during periods of market uncertainty due to social influence and informational cascades (Banerjee, 1992; Bikhchandani et al., 1992). Therefore, the following hypothesis is formulated:

H₂: *Financial Literacy has a significant influence on Herd Behaviour.*

Financial literacy is also expected to influence investors' confidence while making investment decisions. Investors possessing greater financial knowledge often develop stronger confidence in their analytical abilities. However, excessive confidence may result in overestimation of investment skills and forecasting ability, thereby increasing overconfidence bias (Odean, 1998; Barber & Odean, 2001). Accordingly, the following hypothesis is proposed:

H3: *Financial Literacy has a significant influence on Overconfidence Bias.*

Prospect Theory explains that individuals evaluate financial gains and losses asymmetrically and generally experience the pain of losses more intensely than equivalent gains (Kahneman & Tversky, 1979). Financial literacy may improve investors' understanding of financial risk; however, emotional responses toward financial losses continue to influence investment behaviour. Therefore, the following hypothesis is proposed:

H4: *Financial Literacy has a significant influence on Loss Aversion.*

2. Review of Literature

Financial literacy is mainly recognized as an essential factor influencing individual's financial well-being and investment decision-making. It enables investors to understand financial concepts, interpret market information, evaluate available investment alternatives, and make informed financial choices. Investors possessing higher levels of financial literacy are generally more capable of diversifying their portfolios, managing financial risks, and achieving long-term financial goals. According to Lusardi and Mitchell (2014), financially literate individuals are more likely to participate in financial markets and accumulate wealth through informed investment decisions. Thus, financial literacy contributes not only to improved financial knowledge but also to more disciplined and responsible financial behaviour.

The traditional finance perspective assumes that investors act rationally and consistently seek to maximize expected utility. However, observations from real financial markets indicate that investment decisions are often affected by emotions, cognitive limitations, and psychological influences. Behavioural finance emerged to explain these deviations from rational behaviour by integrating principles of psychology with economic theory. A major contribution to this field was made by Kahneman and Tversky (1979), whose Prospect Theory demonstrated that individuals evaluate gains and losses differently when making decisions under conditions of uncertainty.

Behavioural biases represent systematic patterns of judgement that can influence investment decisions and often lead investors away from fully rational choices. These biases arise from cognitive shortcuts, emotional responses, and limitations in information processing. Barberis and Thaler (2003) argued that such behavioural tendencies help explain a variety of market anomalies that cannot be adequately interpreted through the assumptions of traditional finance.

Consequently, behavioural finance has become an important framework for understanding investor behaviour in modern financial markets.

Among the behavioural biases frequently examined in investment research, Anchoring Bias occupies an important position. This bias occurs when investors rely excessively on an initial piece of information or a particular reference point while making financial decisions. Even when new information becomes available, individuals often make only limited adjustments to their original judgement. Tversky and Kahneman (1974) explained that anchoring influences decision-making because people tend to place disproportionate importance on the first information they receive. In investment settings, such anchors may include historical prices, purchase prices, analysts' forecasts, or previous market trends.

Another commonly recognized behavioural tendency is Herd Behaviour, which refers to investors' inclination to follow the actions of others rather than relying solely on their own analysis. This behaviour is particularly common during periods of uncertainty, when individuals assume that other market participants possess superior information. Banerjee (1992) argued that herd behaviour arises because investors often perceive collective decisions as more reliable than their personal judgement. Such behaviour may contribute to speculative bubbles, increased market volatility, and inefficient investment decisions.

Overconfidence Bias is another important behavioural tendency that affects investment decision-making. Investors exhibiting this bias often place excessive confidence in their own knowledge, forecasting ability, and investment skills. As a result, they may underestimate risks, trade more frequently, and overestimate the likelihood of favourable outcomes. Odean (1998) observed that overconfident investors tend to engage in excessive trading, which can reduce overall investment performance because of higher transaction costs. Barber and Odean (2001) further demonstrated that excessive confidence frequently leads investors to underestimate market risks and overestimate expected returns.

Loss Aversion is one of the central concepts of Prospect Theory and explains why investors generally react more strongly to financial losses than to equivalent gains. Kahneman and Tversky (1979) argued that individuals perceive the pain associated with losses more intensely than the satisfaction derived from gains of a similar magnitude. Consequently, investors often hesitate to realise losses by retaining poorly performing investments while selling profitable investments

prematurely. Such behaviour may adversely affect portfolio performance and long-term wealth creation.

A number of empirical studies have explored the relationship between financial literacy and investor behaviour. Aren and Dinç Aydemir (2015) found that higher levels of financial literacy contribute to more rational investment decisions and reduce the likelihood of irrational financial behaviour. Likewise, van Rooij, Lusardi, and Alessie (2011) reported that financially literate individuals are more likely to participate in financial markets, plan effectively, and make informed investment decisions than those with lower levels of financial knowledge.

Financial literacy has also been associated with responsible financial management at the household level. Hilgert, Hogarth, and Beverly (2003) reported that financially knowledgeable individuals are more likely to adopt sound practices relating to budgeting, saving, debt management, and investment planning. Similarly, Huston (2010) emphasised that financial literacy extends beyond financial knowledge and includes the ability and confidence to apply that knowledge effectively in real-life financial situations. Remund (2010) further described financial literacy as a multidimensional concept that incorporates financial knowledge, skills, confidence, and informed decision-making.

The importance of financial education has also been highlighted in studies examining financial behaviour among young adults. Mandell and Klein (2009) observed that financial education programmes improve financial behaviour by strengthening individuals' ability to evaluate financial alternatives and avoid poor financial decisions. Likewise, Shim et al. (2010) demonstrated that parents, educational institutions, and work experience play an important role in shaping financial behaviour through the process of financial socialisation. Xiao and Porto (2017) further reported that financially literate individuals generally experience greater financial satisfaction because of improved financial capability and more disciplined financial behaviour.

Recent international studies have continued to emphasise the importance of financial literacy in strengthening individuals' financial capability and resilience. Hasler et al. (2022) noted that financially literate individuals are generally better prepared to manage financial risks, respond to unexpected economic challenges, and make sound financial decisions. Likewise, the OECD (2023) International Survey of Adult Financial Literacy highlighted that, despite continuous efforts to improve financial education across countries, considerable gaps in financial knowledge and

decision-making persist among different demographic groups. These findings reinforce the need for sustained financial education initiatives aimed at promoting informed investment behaviour.

Many empirical investigations have also examined the relationship between financial literacy and behavioural biases. Bongomin et al. (2017) concluded that financial literacy positively contributes to responsible financial behaviour and encourages more informed investment decisions. Similarly, Garg and Singh (2018) reported that individuals with higher levels of financial knowledge are generally less susceptible to cognitive biases while making financial choices. Nevertheless, existing evidence also suggests that financial literacy alone cannot completely eliminate irrational behaviour, as psychological and emotional factors continue to influence investor decision-making.

The increasing use of online trading platforms, digital financial services, and social media has significantly transformed the way individuals participate in financial markets. Although these technological developments have improved access to financial information and investment opportunities, they have also exposed investors to information overload, emotional reactions, and market uncertainty. Consequently, behavioural finance has become increasingly relevant in explaining why retail investors may still exhibit irrational behaviour despite having greater access to financial knowledge and market information.

3. Research Methodology

3.1 Research Philosophy

The present study is based on the **positivist research philosophy**, which assumes that knowledge can be generated through objective observation, empirical evidence, and statistical analysis. Positivism is widely adopted in quantitative research because it facilitates hypothesis testing and the establishment of causal relationships among variables (Saunders, Lewis, & Thornhill, 2019). Since this study empirically examines the influence of financial literacy on behavioural biases using statistical modelling, the positivist paradigm was considered the most appropriate philosophical foundation.

3.2 Research Approach

The study follows a **deductive research approach**, where hypotheses were formulated based on existing behavioural finance theories and subsequently tested using empirical data. According to

Saunders et al. (2019), the deductive approach begins with theory development and proceeds towards empirical verification through statistical analysis. The present research tests the proposed relationships between Financial Literacy and four behavioural biases using PLS-SEM.

3.3 Research Design

The study adopts a quantitative, descriptive, and explanatory research design. A quantitative design was selected because the study aims to measure latent constructs using numerical data and evaluate causal relationships through Structural Equation Modelling. The descriptive component explains the characteristics of retail investors, while the explanatory component examines the influence of Financial Literacy on behavioural biases.

3.4 Population of the Study

The target population comprised retail investors in India who actively invest in financial instruments such as equity shares, mutual funds, exchange-traded funds (ETFs), bonds, and other market-linked investment products. Retail investors were selected because they are more likely to exhibit behavioural biases while making investment decisions under uncertain market conditions.

3.5 Sampling Technique

The study employed the Convenience Sampling Technique, a non-probability sampling method commonly used in behavioural finance and social science research where respondents are selected based on accessibility and willingness to participate (Etikan, Musa, & Alkassim, 2016). This technique was considered appropriate because the study targeted active retail investors who voluntarily participated in the survey.

3.6 Sample Size

Primary data were collected from 228 retail investors through a structured questionnaire. The sample size satisfies the minimum requirements for Partial Least Squares Structural Equation Modelling (PLS-SEM). According to Hair, Hult, Ringle, and Sarstedt (2022), PLS-SEM is suitable for relatively small to moderate sample sizes, provided that the minimum sample requirement based on model complexity is fulfilled. The sample size of 228 was therefore considered adequate for estimating the proposed structural model.

3.7 Data Collection Method

The study is based on primary data collected through a structured online questionnaire developed using Google Forms. The questionnaire link was circulated among retail investors through email, WhatsApp groups, social media platforms, and professional networks. Participation was entirely voluntary, and respondents were informed that the information would be used exclusively for academic research purposes.

3.8 Research Instrument

The questionnaire consisted of two sections. The first section collected respondents' demographic information, including age, gender, education, occupation, monthly income, investment experience, and preferred investment platform. The second section measured Financial Literacy and Behavioural Biases using multiple-item constructs. Responses were recorded on a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree, a scale widely recommended for behavioural and management research because of its simplicity and reliability (Likert, 1932).

The behavioural bias construct was operationalized through four dimensions:

- Anchoring Bias
- Herd Behaviour
- Overconfidence Bias
- Loss Aversion

Financial Literacy was measured using multiple indicators assessing respondents' understanding of risk-return relationships, diversification, financial products, and investment evaluation.

3.9 Measurement of Constructs

CONSTRUCT	INDICATORS RETAINED	SCALE	ADAPTED FROM
Financial Literacy	CT2, CT3, DK1, DK2, DK3, RRU1, RRU2, RRU3, RRU4	Five-point Likert Scale	Lusardi & Mitchell (2014); OECD (2005); van Rooij et al. (2011)

Anchoring Bias	AB1, AB2	Five-point Likert Scale	Tversky and Kahneman (1974); Waweru et al. (2008)
Herd Behaviour	HB1, HB2	Five-point Likert Scale	Banerjee (1992); Waweru et al. (2008)
Overconfidence Bias	OC1, OC2	Five-point Likert Scale	Odean (1998); Barber and Odean (2001)
Loss Aversion	LA1, LA2, LA3	Five-point Likert Scale	Kahneman and Tversky (1979); Shefrin and Statman (1985)

Source: Author's Compilation

The measurement items used in the questionnaire were adapted from well-established and widely accepted scales reported in behavioural finance and financial literacy literature. Minor modifications were made to improve the clarity, readability, and contextual relevance of the statements for Indian retail investors while preserving the conceptual meaning of the original constructs. All items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). During the assessment of the measurement model, four reverse-worded indicators (CT1, AB3, HB3, and OC3) were removed because they exhibited comparatively lower psychometric performance during the PLS-SEM analysis. Following the recommendations of Hair et al. (2022), these indicators were excluded to improve Composite Reliability, Average Variance Extracted (AVE), and overall construct validity. The remaining indicators adequately represented their respective latent constructs and were therefore retained for the final structural model.

3.10 Data Analysis Technique

The collected data were analysed using **Partial Least Squares Structural Equation Modelling (PLS-SEM)** through **SmartPLS 4**.

PLS-SEM was originally developed by **Herman Wold (1975, 1982)** as a variance-based structural equation modelling technique suitable for prediction-oriented research and complex latent variable

models. Compared with covariance-based SEM, PLS-SEM requires fewer distributional assumptions and performs effectively with moderate sample sizes and exploratory research designs (Hair et al., 2022). The data analysis was conducted in two stages:

1. **Measurement Model Assessment**, which included:

- Outer Loadings
- Cronbach's Alpha (Cronbach, 1951)
- Composite Reliability (Werts et al., 1974)
- Average Variance Extracted (Fornell&Larcker, 1981)
- Heterotrait–Monotrait Ratio (Henseler, Ringle, &Sarstedt, 2015)

2. **Structural Model Assessment**, which included:

- Path Coefficients
- Coefficient of Determination (R^2) (Chin, 1998)
- Effect Size (f^2) (Cohen, 1988)
- Bootstrapping with **5,000 resamples** (Hair et al., 2022) and Model Fit using Standardized Root Mean Square Residual (SRMR) (Hu &Bentler, 1999)

The significance of the proposed hypotheses was evaluated using standardized path coefficients (β), t-statistics, and p-values obtained through the bootstrapping procedure.

3.11 Ethical Considerations

Participation in the survey was entirely voluntary. Respondents were informed about the academic purpose of the research before completing the questionnaire. No personally identifiable information was collected, and all responses were treated with strict confidentiality. The collected data were used solely for research purposes, and respondents retained the right to discontinue participation at any stage of the survey.

4. Results

The collected data from 228 retail investors were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 4. Following the recommendations of Hair et al. (2022), the analysis was conducted in two stages. The first stage involved the assessment of the

measurement model, where indicator reliability, internal consistency reliability, convergent validity, and discriminant validity were examined. In the second stage, the structural model was evaluated through the coefficient of determination (R^2), path coefficients, and bootstrapping to test the proposed hypotheses.

4.1 Demographic Profile of Respondents

Table 1. Demographic Profile of Respondents (N = 228)

Variable	Category	Frequency	Percentage (%)
Gender	Male	132	57.9
	Female	96	42.1
Age Group	18–25 years	10	4.4
	26–35 years	173	75.9
	36–45 years	43	18.9
	Above 45 years	2	0.9
Education	Graduate	91	39.9
	Post Graduate	110	48.2
	Doctorate	22	9.6
	Others	5	2.3
Occupation	Student	69	30.3
	Private Sector	65	28.5
	Self-employed/Business	50	21.9
	Government Sector	22	9.6
	Professional	17	7.5
	Others	5	2.2
Monthly Income	Below ₹25,000	97	42.5
	₹25,000–₹50,000	59	25.9
	₹50,000–₹1,00,000	38	16.7
	₹1,00,000–₹2,00,000	23	10.1
	Above ₹2,00,000	10	4.4
	Others	1	0.4
Investment Experience	0–2 Years	123	53.9
	2–4 Years	50	21.9
	4–6 Years	29	12.7
	Above 6 Years	26	11.4

Source: Author's Compilation

Table 1 presents the demographic profile of the 228 retail investors who participated in the study. The majority of respondents were male (57.9%), while female respondents accounted for 42.1% of the sample. Most participants (75.9%) belonged to the 26–35 years age group, indicating that

young and early middle-aged investors constituted the dominant segment of the study. With respect to educational qualification, 48.2% of the respondents were postgraduates, followed by graduates (39.9%) and doctorate holders (9.6%), suggesting that the sample was relatively well educated.

Regarding occupation, students (30.3%) represented the largest group, followed by individuals employed in the private sector (28.5%) and self-employed or business professionals (21.9%). In terms of monthly income, the largest proportion of respondents (42.5%) reported an income below ₹25,000, whereas 25.9% earned between ₹25,000 and ₹50,000 per month. Finally, more than half of the respondents (53.9%) had between 0 and 2 years of investment experience, indicating that the sample primarily consisted of relatively new retail investors. Overall, the demographic profile reflects a diverse sample of retail investors with varying educational backgrounds, occupations, income levels, and investment experience.

4.2 Measurement Model Assessment

The measurement model was assessed to determine whether the retained indicators adequately represented their respective latent constructs in terms of reliability and validity. Following the guidelines proposed by Hair et al. (2022), indicator reliability was assessed through outer loadings, internal consistency reliability through Cronbach's Alpha and Composite Reliability, convergent validity through Average Variance Extracted (AVE), and discriminant validity through the Heterotrait–Monotrait Ratio (HTMT).

4.2.1 Indicator Reliability (Outer Loadings)

Indicator reliability was assessed using standardized outer loadings obtained from the PLS Algorithm. According to Hair et al. (2022), standardized loadings above 0.70 indicate satisfactory indicator reliability, while indicators with loadings between 0.40 and 0.70 may be retained if the construct demonstrates acceptable Composite Reliability and AVE. During the measurement model assessment, four reverse-worded indicators (CT1, AB3, HB3, and OC3) were removed because they adversely affected the psychometric properties of the measurement model. Following the refinement of the measurement model, all retained indicators exhibited satisfactory standardized outer loadings, confirming acceptable indicator reliability.

Table 2. Outer Loadings of Measurement Items

Construct	Indicator	Outer Loading
Financial Literacy	CT2	0.668
	CT3	0.699
	DK1	0.751
	DK2	0.793
	DK3	0.742
	RRU1	0.772
	RRU2	0.79
	RRU3	0.77
Anchoring Bias	RRU4	0.734
	AB1	0.913
Herd Behaviour	AB2	0.841
	HB1	0.951
Overconfidence Bias	HB2	0.754
	OC1	0.894
Loss Aversion	OC2	0.87
	LA1	0.793
	LA2	0.825
	LA3	0.833

Source: Author's Compilation

Table 2 Indicates that the retained indicators exhibited satisfactory standardized loadings. Most indicators exceeded the recommended threshold of 0.70, while CT2 (0.668) and CT3 (0.699) were marginally below the ideal threshold but were retained because the Financial Literacy construct demonstrated satisfactory Composite Reliability (0.919) and AVE (0.559). These findings confirm adequate indicator reliability for all retained constructs.

4.2.2 Internal Consistency Reliability and Convergent Validity

The internal consistency reliability of the measurement model was evaluated using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Cronbach's Alpha was proposed by Cronbach (1951) to assess the internal consistency of measurement items. Composite Reliability, recommended by Werts, Linn, and Jöreskog (1974), is considered a more appropriate reliability measure in PLS-SEM because it does not assume equal indicator loadings.

Convergent validity was assessed using Average Variance Extracted (AVE) proposed by Fornell and Larcker (1981). According to Hair et al. (2022), Cronbach's Alpha and Composite Reliability values above 0.70 indicate satisfactory internal consistency, whereas AVE values greater than 0.50 confirm adequate convergent validity.

Table 3. Internal Consistency Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Anchoring Bias	0.707	0.87	0.77
Financial Literacy	0.901	0.919	0.559
Herd Behaviour	0.679	0.846	0.736
Loss Aversion	0.752	0.858	0.668
Overconfidence Bias	0.716	0.875	0.778

Source: Author's Compilation

Table 3 demonstrates that all constructs satisfy the recommended reliability and convergent validity criteria. The Composite Reliability values range from 0.846 to 0.919, exceeding the recommended threshold of 0.70, thereby confirming satisfactory internal consistency. Similarly, the AVE values range from 0.559 to 0.778, indicating that each construct explains more than 50% of the variance of its respective indicators and therefore possesses adequate convergent validity. Although the Cronbach's Alpha value for Herd Behaviour (0.679) is marginally below the conventional threshold of 0.70, it exceeds the minimum acceptable level of 0.60 recommended for exploratory research (Hair et al., 2022). Moreover, the construct demonstrates strong Composite Reliability (0.846) and AVE (0.736), confirming that Herd Behaviour remains a reliable and valid construct within the proposed measurement model. Overall, the measurement model exhibits satisfactory internal consistency and convergent validity.

4.2.3 Discriminant Validity

Discriminant validity refers to the extent to which a construct is empirically distinct from other constructs included in the model. In this study, discriminant validity was assessed using the Heterotrait–Monotrait Ratio (HTMT) proposed by Henseler, Ringle, and Sarstedt (2015). According to these authors, HTMT values below 0.85 indicate satisfactory discriminant validity, while values below 0.90 may also be considered acceptable depending on the research context.

Table 4. Heterotrait–Monotrait Ratio (HTMT)

Constructs	AB	FL	HB	LA	OC
Anchoring Bias	—				
Financial Literacy	0.524	—			
Herd Behaviour	0.749	0.282	—		
Loss Aversion	0.804	0.562	0.662	—	
Overconfidence Bias	0.651	0.686	0.671	0.549	—

Source: Author's Compilation

The HTMT values presented in Table 4 range from 0.282 to 0.804, all of which are below the conservative threshold of 0.85 suggested by Henseler et al. (2015). The highest HTMT value (0.804) was observed between Anchoring Bias and Loss Aversion, which still satisfies the recommended criterion. These findings confirm that all latent constructs are empirically distinct from one another and establish satisfactory discriminant validity for the proposed measurement model.

4.3 Structural Model Assessment

Once the reliability and validity of the measurement model had been established, the structural model was evaluated to examine the hypothesised relationships between Financial Literacy and the four behavioural biases. The structural model assessment followed the recommendations of Hair et al. (2022) and included the evaluation of the coefficient of determination (R^2), effect size (f^2), model fit (SRMR), and hypothesis testing using the bootstrapping procedure with 5,000 subsamples.

4.3.1 Coefficient of Determination (R^2)

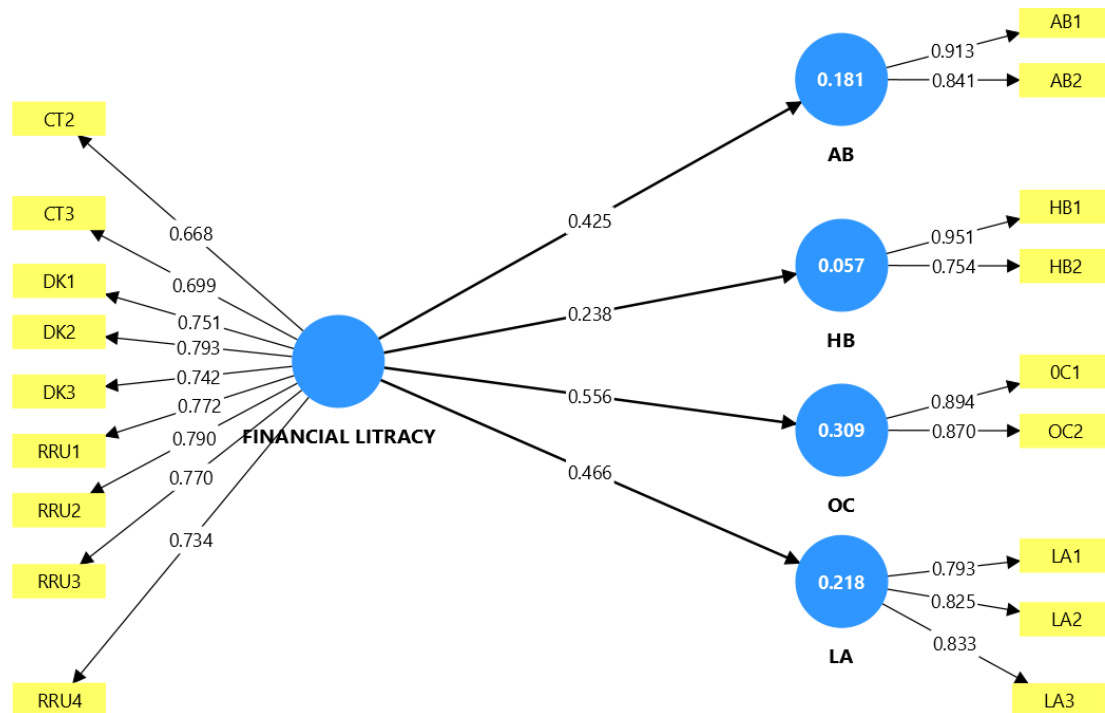
The coefficient of determination (R^2) measures the predictive power of the exogenous construct in explaining the variance of endogenous constructs. According to Chin (1998), R^2 values of 0.67, 0.33, and 0.19 can be interpreted as substantial, moderate, and weak, respectively. However, Hair et al. (2022) state that acceptable R^2 values vary depending on the research discipline, and relatively lower values are common in behavioural and social science research because human behaviour is influenced by multiple external factors.

Table 5. Coefficient of Determination (R^2)

Endogenous Construct	R^2	Interpretation
Anchoring Bias	0.181	Weak
Herd Behaviour	0.057	Weak
Loss Aversion	0.218	Weak
Overconfidence Bias	0.309	Moderate

Source: Author's Compilation

The results presented in Table 5 indicate that Financial Literacy explains 18.1% of the variance in Anchoring Bias, 5.7% of the variance in Herd Behaviour, 21.8% of the variance in Loss Aversion, and 30.9% of the variance in Overconfidence Bias. Among the endogenous constructs included in the model, Overconfidence Bias recorded the highest explanatory power, whereas Herd Behaviour exhibited the lowest proportion of explained variance. Although the R^2 values range from weak to moderate, such results are considered acceptable in behavioural finance research, where investor behaviour is influenced by numerous psychological, social, and economic factors beyond financial literacy alone.

**Figure 2. Final PLS-SEM Structural Model Showing Standardized Outer Loadings, Path Coefficients, and R^2 Values**

Source: Author's Compilation

Above figure presents the final PLS-SEM structural model after the refinement of the measurement model. The figure illustrates the standardized outer loadings of the retained indicators, the structural relationships between Financial Literacy and the four behavioural biases, and the coefficient of determination (R^2) for each endogenous construct. The results indicate that Financial Literacy positively influences all four behavioural biases. The strongest structural relationship is observed with Overconfidence Bias ($\beta = 0.556$), followed by Loss Aversion ($\beta = 0.466$), Anchoring Bias ($\beta = 0.425$), and Herd Behaviour ($\beta = 0.238$). The model further indicates that Financial Literacy explains 30.9% of the variance in Overconfidence Bias, 21.8% in Loss Aversion, 18.1% in Anchoring Bias, and 5.7% in Herd Behaviour.

4.3.2 Effect Size (f^2)

The effect size (f^2) assesses the contribution of an exogenous construct to the R^2 value of an endogenous construct. According to Cohen (1988), 0.02, 0.15, and 0.35 represent small, medium, and large effect sizes, respectively.

Table 6. Effect Size (f^2)

Structural Relationship	f^2	Effect Size
Financial Literacy → Anchoring Bias	0.22	Medium
Financial Literacy → Herd Behaviour	0.06	Small
Financial Literacy → Loss Aversion	0.278	Medium
Financial Literacy → Overconfidence Bias	0.447	Large

Source: Author's Compilation

Table 6 Shows that Financial Literacy has a large effect on Overconfidence Bias ($f^2 = 0.447$), indicating that financial knowledge substantially contributes to explaining variations in investors' overconfidence. The influence of Financial Literacy on Anchoring Bias ($f^2 = 0.220$) and Loss Aversion ($f^2 = 0.278$) is classified as medium, whereas its impact on Herd Behaviour ($f^2 = 0.060$) is relatively small. These findings suggest that Financial Literacy affects different behavioural biases to varying degrees, with the strongest influence observed for Overconfidence Bias.

4.3.3 Model Fit Assessment

Model fit was assessed using the Standardized Root Mean Square Residual (SRMR) proposed by Hu and Bentler (1999). According to Hair et al. (2022), an SRMR value below 0.08 indicates a

good model fit, whereas values below 0.10 may still be considered acceptable in variance-based structural equation modelling.

Table 7. Model Fit Indices

Model Fit Index	Value	Interpretation
SRMR (Saturated Model)	0.069	Good Fit
SRMR (Estimated Model)	0.122	Marginally Above Recommended Threshold

Source: Author's Compilation

The Saturated Model SRMR value of 0.069 indicates a satisfactory overall model fit according to the recommended threshold proposed by Hu and Bentler (1999). Although the Estimated Model SRMR value (0.122) is slightly above the preferred cut-off, the overall measurement and structural model satisfy the reliability, validity, and predictive assessment criteria. Therefore, the proposed model is considered appropriate for hypothesis testing.

4.3.4 Hypothesis Testing Using Bootstrapping

The significance of the proposed structural relationships was examined using the bootstrapping procedure available in SmartPLS 4. Bootstrapping is a non-parametric resampling technique originally proposed by Efron (1979) and widely recommended in PLS-SEM for testing the significance of structural relationships (Hair et al., 2022). In the present study, 5,000 bootstrap subsamples were generated to estimate standard errors, t-statistics, and p-values for each hypothesized relationship. According to Hair et al. (2022), a structural relationship is considered statistically significant when the t-value exceeds 1.96 and the p-value is less than 0.05 at the 5% significance level.

The results obtained from the bootstrapping procedure demonstrate that all four proposed hypotheses are statistically supported. The strongest relationship was observed between Financial Literacy and Overconfidence Bias ($\beta = 0.556$, $t = 11.364$, $p < 0.001$), indicating that changes in financial literacy are most strongly associated with variations in investors' overconfidence. This finding suggests that financially knowledgeable investors tend to exhibit greater confidence while making investment decisions. Although higher financial literacy improves investors' understanding of financial products and market mechanisms, it may simultaneously increase

confidence in personal judgement, occasionally leading to overestimation of one's investment abilities.

Table 8. Bootstrapping Results and Hypothesis Testing

Hypothesis	Structural Relationship	Path Coefficient (β)	t-value	p-value	Decision
H1	Financial Literacy $\rightarrow$ Anchoring Bias	0.425	6.514	0	Supported
H2	Financial Literacy $\rightarrow$ Herd Behaviour	0.238	3.493	0	Supported
H3	Financial Literacy $\rightarrow$ Overconfidence Bias	0.556	11.364	0	Supported
H4	Financial Literacy $\rightarrow$ Loss Aversion	0.466	7.553	0	Supported

Source: Author's Compilation

The relationship between Financial Literacy and Loss Aversion ($\beta = 0.466$, $t = 7.553$, $p < 0.001$) was also statistically significant. The result indicates that financial literacy significantly influences investors' responses toward potential financial losses. Investors possessing greater financial knowledge are generally better able to evaluate investment risks; however, psychological sensitivity toward losses continues to influence investment behaviour.

Similarly, Financial Literacy significantly influenced Anchoring Bias ($\beta = 0.425$, $t = 6.514$, $p < 0.001$). The findings suggest that financially literate investors still rely on reference points such as previous prices, historical returns, or initial information while making investment decisions. Although financial literacy improves analytical capability, anchoring remains an important cognitive bias affecting investment judgement.

The weakest but statistically significant relationship was observed between Financial Literacy and Herd Behaviour ($\beta = 0.238$, $t = 3.493$, $p < 0.001$). This indicates that financial literacy has comparatively less influence on investors' tendency to follow the actions of other market participants. Herd Behaviour is often driven by market sentiment, uncertainty, peer influence, and emotional reactions, which may not be completely eliminated through financial knowledge alone. Overall, the bootstrapping analysis confirms that all four hypotheses (H1–H4) are supported,

demonstrating that Financial Literacy significantly influences Anchoring Bias, Herd Behaviour, Loss Aversion, and Overconfidence Bias among Indian retail investors.

4.4 Discussion of Findings

The structural model provides clear empirical evidence that Financial Literacy is significantly associated with all four behavioural biases examined in the present study. The findings support the proposed conceptual framework and indicate that financial knowledge plays an important role in shaping investors' behavioural tendencies. At the same time, the results demonstrate that financial literacy does not entirely eliminate irrational decision-making, as psychological, emotional, and social influences continue to affect investment behaviour. These findings reinforce the view that investor behaviour cannot be explained solely through traditional finance assumptions and highlight the relevance of behavioural finance in understanding investment decisions.

Among the relationships examined, the strongest effect was observed between Financial Literacy and Overconfidence Bias ($\beta = 0.556$, $t = 11.364$, $p < 0.001$). This suggests that investors with greater financial knowledge often develop stronger confidence in their own analytical ability and investment judgement. Although increased financial literacy improves the understanding of financial markets and investment products, it may also encourage investors to overestimate their forecasting skills and decision-making capability. This finding is consistent with the observations of Odean (1998) and Barber and Odean (2001), who reported that knowledgeable investors often trade more actively because of increased confidence, which may not always improve investment performance.

The analysis also revealed a significant relationship between Financial Literacy and Loss Aversion ($\beta = 0.466$, $t = 7.553$, $p < 0.001$). While financially literate investors are generally better equipped to evaluate investment risks, emotional reactions to financial losses continue to influence their decisions. This finding is consistent with Prospect Theory proposed by Kahneman and Tversky (1979), which explains that individuals typically perceive losses more intensely than gains of an equal magnitude. Consequently, even investors with sound financial knowledge may hesitate to realise losses when making investment decisions.

A statistically significant relationship was also identified between Financial Literacy and Anchoring Bias ($\beta = 0.425$, $t = 6.514$, $p < 0.001$). The findings indicate that investors frequently

rely on reference points such as historical prices, previous returns, or purchase values despite possessing adequate financial knowledge. This behaviour supports the heuristic perspective presented by Tversky and Kahneman (1974), which argues that individuals often depend on cognitive shortcuts when making decisions in uncertain situations. Accordingly, financial literacy appears to improve analytical capability without completely removing the influence of anchoring.

Compared with the other behavioural biases, the relationship between Financial Literacy and Herd Behaviour was relatively weaker but remained statistically significant ($\beta = 0.238$, $t = 3.493$, $p < 0.001$). This finding suggests that the tendency to follow the actions of other investors is influenced not only by financial knowledge but also by market sentiment, peer influence, social interactions, and uncertainty. Similar observations have been reported by Banerjee (1992) and Bikhchandani, Hirshleifer, and Welch (1992), who argued that investors often imitate collective market behaviour because they perceive it to reflect superior information.

Taken together, the findings demonstrate that Financial Literacy contributes significantly to explaining behavioural biases among retail investors; however, it does not entirely eliminate irrational investment behaviour. Psychological characteristics, emotions, and external market influences continue to shape investment decisions even when investors possess adequate financial knowledge. These findings suggest that investor education initiatives should extend beyond financial concepts and incorporate behavioural finance principles to help individuals recognise and manage the cognitive and emotional biases that affect their investment decisions.

5. Conclusion

The present study examined the influence of Financial Literacy on four major behavioural biases—Anchoring Bias, Herd Behaviour, Loss Aversion, and Overconfidence Bias—among Indian retail investors. Using primary data collected from 228 respondents and analysed through Partial Least Squares Structural Equation Modelling (PLS-SEM), the study provides empirical evidence that financial literacy is significantly associated with behavioural tendencies observed during investment decision-making.

The assessment of the measurement model confirmed that the proposed constructs satisfied the required standards of reliability and validity through Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE), and the Heterotrait–Monotrait (HTMT) ratio. The

structural model further demonstrated statistically significant relationships between Financial Literacy and each of the four behavioural biases included in the conceptual framework. Among these relationships, the strongest effect was observed for Overconfidence Bias, followed by Loss Aversion, Anchoring Bias, and Herd Behaviour.

The findings indicate that financial literacy plays a meaningful role in influencing investor behaviour; however, it does not completely remove the effects of psychological and emotional biases. Even financially knowledgeable investors may continue to rely on heuristics, social influence, and emotional judgement while making investment decisions under conditions of uncertainty. This highlights the importance of integrating behavioural finance concepts with conventional financial education to encourage more balanced and rational investment decisions. Overall, the study contributes to behavioural finance literature by providing evidence from the Indian retail investment context through the application of PLS-SEM. The findings offer useful insights for policymakers, financial educators, investment professionals, and regulatory authorities seeking to strengthen investor education initiatives and promote informed financial decision-making among retail investors.

5.1 Practical Implications

The findings of the present study provide several important practical implications for policymakers, regulatory authorities, financial institutions, investment professionals, educators, and retail investors. Therefore, financial literacy programmes should not be limited to explaining financial products, investment avenues, and risk-return concepts but should also incorporate behavioural finance education. Investor awareness programmes should educate participants about common behavioural biases such as Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion so that investors become more aware of the psychological factors affecting their investment decisions.

Second, regulatory authorities such as the Securities and Exchange Board of India (SEBI), the National Institute of Securities Markets (NISM), and the Association of Mutual Funds in India (AMFI) may utilise these findings while designing investor protection and financial education initiatives. Integrating behavioural finance concepts into existing investor awareness campaigns can help investors make more rational and informed financial decisions. Third,

brokerage firms, wealth management companies, financial advisors, and mutual fund distributors can use these findings to develop behavioural assessment tools that identify investors who are more susceptible to behavioural biases. Such assessments may facilitate personalized financial advice and improve portfolio management strategies according to individual behavioural characteristics.

Fourth, financial technology (FinTech) companies and digital investment platforms may incorporate behavioural nudges, personalized alerts, and decision-support systems into their applications to minimize irrational investment behaviour. Artificial intelligence-based investment platforms may also utilize behavioural insights to provide customized investment recommendations while reducing emotionally driven investment decisions. Fifth, universities, business schools, and professional training institutions should integrate behavioural finance concepts into finance, commerce, and management curricula. Financial education should extend beyond theoretical knowledge by helping students understand how psychological biases influence real-world investment decisions. Finally, retail investors themselves may benefit from recognizing their own behavioural tendencies before making investment decisions. Increased awareness of behavioural biases, combined with sound financial literacy, can promote disciplined investment behaviour, better portfolio diversification, improved risk management, and enhanced long-term financial well-being.

5.2 Theoretical Implications

The present study makes several important theoretical contributions to the fields of behavioural finance and financial literacy. First, it extends the application of Prospect Theory (Kahneman & Tversky, 1979) by empirically demonstrating that financial literacy significantly influences multiple behavioural biases among retail investors. While Prospect Theory primarily explains how individuals evaluate gains and losses under uncertainty, the findings of this study indicate that financial literacy also plays a meaningful role in shaping behavioural responses during investment decision-making. Second, the study contributes to behavioural finance literature by integrating four major behavioural biases—Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion—within a single structural model. Unlike many previous studies that have examined

these biases independently, the present research simultaneously evaluates their relationship with financial literacy, thereby providing a more comprehensive understanding of investor behaviour.

Third, the study enriches financial literacy literature by demonstrating that financial knowledge alone does not completely eliminate behavioural biases. Although financial literacy significantly influences investor behaviour, psychological, emotional, and social factors continue to affect investment decisions. This finding supports the growing argument that investor education should combine financial knowledge with behavioural awareness rather than focusing solely on financial concepts.

Fourth, the study contributes methodologically by applying Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4 to examine relationships among latent behavioural constructs. The successful validation of the proposed model confirms the suitability of variance-based structural equation modelling for behavioural finance research involving complex psychological variables. Finally, the study provides empirical evidence from the Indian retail investment context, where relatively limited research has simultaneously examined the influence of financial literacy on multiple behavioural biases using PLS-SEM. The findings therefore expand existing literature and provide a useful theoretical foundation for future studies investigating investor behaviour in emerging financial markets.

5.3 Limitations of the Study

Despite making significant theoretical and practical contributions, the present study has certain limitations that should be acknowledged while interpreting its findings. First, the study employed a convenience sampling technique, which may limit the generalizability of the findings to the broader population of Indian retail investors. Future studies may adopt probability-based sampling methods to obtain more representative samples. Second, the research is based on cross-sectional data collected at a single point in time. Consequently, the study captures investor behaviour under prevailing market conditions and does not examine changes in behavioural biases over time. Longitudinal studies may provide deeper insights into the dynamic nature of investor behaviour across different market cycles.

Third, the study relied on self-reported responses obtained through a structured questionnaire. Although confidentiality and anonymity were maintained to minimise response bias, self-reported data may still be influenced by social desirability bias and respondents' subjective perceptions. Fourth, the conceptual model includes only four behavioural biases—Anchoring Bias, Herd Behaviour, Overconfidence Bias, and Loss Aversion. Other important behavioural constructs such as confirmation bias, availability bias, disposition effect, optimism bias, regret aversion, and mental accounting were beyond the scope of the present research and may also influence investment decisions. Finally, the study was conducted within the Indian retail investment context. Therefore, cultural, economic, and regulatory differences may limit the applicability of the findings to other countries. Comparative cross-country studies may provide broader insights into behavioural finance across different financial systems.

5.4 Future Scope of the Study

The present study opens several avenues for future research in behavioural finance and financial literacy. Subsequent research may broaden the proposed framework by incorporating additional behavioural biases and contextual variables to provide a more comprehensive understanding of investor behaviour. Future studies may also examine the moderating or mediating effects of demographic variables such as age, gender, educational qualification, occupation, income, investment experience, and financial risk tolerance on the relationship between financial literacy and behavioural biases. Longitudinal studies may be conducted to investigate how behavioural biases evolve across different market conditions, including bull markets, bear markets, and periods of financial crisis. Such studies would provide deeper insights into the stability of investor behaviour over time. Comparative studies involving different countries, emerging and developed financial markets, or different categories of investors (retail, institutional, and high-net-worth investors) may further strengthen the generalizability of behavioural finance research.

Future research may also explore the influence of digital financial literacy, financial technology (FinTech), artificial intelligence-based investment advisory services (Robo-Advisors), social media, online investment communities, and algorithmic trading platforms on investor behaviour. As digital investment platforms continue to expand, understanding the interaction between technology, financial literacy, and behavioural biases will become increasingly important

for both researchers and policymakers. Finally, future studies may employ advanced analytical techniques such as Covariance-Based Structural Equation Modelling (CB-SEM), Multi-Group Analysis (MGA), Importance–Performance Map Analysis (IPMA), mediation analysis, moderation analysis, and Artificial Intelligence-based predictive models to obtain deeper insights into investor decision-making behaviour.

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