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Behavioral biases and investment decision: A recent systematic literature review

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Abstract

This study aims to identify the significant biases that affect individual behavior and investors' decision-making by conducting a comprehensive review of the literature available in the public domain. Research papers from published journals were identified based on keywords related to behavioral biases and investment decision-making. This paper includes research articles from 1979, when Kahneman and Tversky first introduced the behavioral finance concept, to 2022, when the most recent research was introduced. After that, research papers were classified based on behavioral biases, sampling techniques, data sources, Area of study, sample size, and sampling unit. It also includes the analytical tools used in the reviewed literature. Most of the existing work has identified that investors are irrational. The linkage between demographic factors and behavioral biases was analyzed from the existing literature. The relation between identified biases and investment decisions was also established. To the best of the author's knowledge, no review paper is available considering recent studies in behavioral finance. This paper analyzes the apparent biases and their relation to investors' decisions and performance. This paper also identified the positive and negative impact of identified behavioral biases on investment decision-making which was not mentioned in the earlier studies.

Keywords: Investment decision making, behavioural biases, Indian stock exchange

Introduction

The classical economic theory implies rationality on the part of investors. The efficient market hypothesis (E.M.H.) also asserts that all new information is reflected in share prices and that the markets are efficient. Behavioral finance research, however, challenges these beliefs. According to behavioral finance theory, investors are irrational, and social, cognitive, and emotional variables impact their behavior. The media, family, and friends are examples of social factors. Cognitive variables include personal factors such as knowledge, expectations, and attitudes, whereas emotional factors include rage, trust, and fear. In addition, behavior finance provides ideas that explain how investors make decisions. Prospect theory is where Kahneman and Tversky (1979) ^[54] first discussed the behavioral characteristics of an investment. It was emphasized that the risk involved in investors' selection of various opportunities varies. The prospect theory explains why investors value profits more than losses. They favor specific outcomes over probable ones, causing people to be risk-averse when certain benefits are available and risk-seeking when losses are inevitable. Weber and Camerer (1992) ^[28] supported that investors attempt to sell winners while retaining losers. Further extending this theory, Kahneman and Tversky (1992) ^[126] established the cumulative prospect theory, which applies to uncertain and dangerous situations with multiple outcomes. They listed five factors influencing investor behavior: framing effects, nonlinear preferences, source reliance, risk-seeking, and loss aversion. The heuristic theory also explains that investors generally adhere to the rule of thumb. According to these beliefs, several biases influence investors' behavior: Overconfidence bias, representative bias, anchoring bias, mental accounting bias, regret aversion bias, loss aversion bias, herding bias, gambler's fallacy, and framing effect are all cognitive biases. In his book, "Thinking too fast and too slow," Kahneman explained the Dual-process theory, which contains systems one and two. System one is the brain's rapid, instinctive, and intuitive decision-making process, which relies on intuition. System two, on the other hand, is the brain's slower and more analytical approach.

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According to this, investors arrive at their conclusions after performing all the necessary computations - the bounded rationality hypothesis, developed by Herbert A. Simon, in 1955 ^[111], is another theory. According to this hypothesis, investors strive to satisfy rather than optimize because resources are limited.

The above theories describe that investors do not make rational decisions. So, this paper reviewed the papers available in behavioral finance and identified the essential biases that affect their behavior while making investment decisions. This paper also identified a relationship between demographic factors and behavioral biases. The identified biases are

1. **Overconfidence bias:** Kahneman and Tversky (1973) ^[124] proposed overconfidence as a common psychological bias. Investors overestimate their understanding of stocks and disregard the risk involved in investment decisions. Investors assume that they have sufficient information to make sound investment decisions.
2. **Disposition bias:** Shefrin and Statman (1985) ^[110] were the first to describe disposition bias, in which investors prefer to hold losses and sell winnings. Avoiding losses is significantly more important than pursuing rewards. In times of profit, investors become risk-averse and risk-seeking, respectively. The investors base their ultimate judgments not on perceived losses but on perceived gains.
3. **Representativeness bias:** It was developed by Kahneman and Tversky in 1973 ^[124]. It occurs when investors make judgments based on information they already possess. Whenever a new idea or piece of information emerges, investors incorporate it into their existing knowledge (Ritika and Kishore, 2020) ^[100]. Shefrin (2000) ^[109] defined representativeness heuristics as using stereotypes to create rapid yet illogical judgments.
4. Availability bias is a phenomenon in which individuals evaluate the probability of an occurrence based on its ease of recall (Ritika and Kishor, 2020) ^[100]. Therefore, investors estimate based on occurrences collected over a shorter period than those retrieved over a longer period (Kahneman and Tversky, 1973) ^[124].
5. **Herding bias:** This bias was introduced by Kahneman and Tversky in 1979 ^[54]. This bias happens when investors' investment decisions are influenced by their family, friends, or others. Herding is investors' tendency to imitate other investors' actions while ignoring their personal information and expectations (Nofsinger and Sias, 1999) ^[77].
6. According to Jain *et al.*, anchoring bias is a cognitive bias in which investors make judgments based on a reference point, historical occurrence, or trend (2021). Anchoring is the tendency of investors to give disproportionate weight to arbitrarily chosen anchors, leading to irrational investing decisions (Ritika and Kishor, 2020) ^[100]. Investors do not study facts from the outset, resulting in incorrect decisions.
7. **Loss aversion bias:** Kahneman and Tversky initially established the loss aversion bias in 1979. According to this bias, investors attempt to avoid losses and give greater weight to losses than gains (Tversky and Kahneman, 1992) ^[126]. This bias reveals that investors are risk-averse and would instead save than invest. They prefer to invest in securities with a predetermined rate of return, as opposed to riskier assets.

8. **Mental accounting bias:** Thaler first postulated it (1985). Mental accounting is a set of cognitive procedures humans use to organize, evaluate, and keep track of financial transactions (Thaler, 1999) ^[122]. Mental accounting presupposes individuals make "irrational" economic judgments due to how they structure their money and consumption systems. This prejudice impacts investors because they do not adhere to fungibility.
9. **Regret aversion bias:** This bias asserts that humans feel the sting of regret when they make mistakes, and to prevent this regret, they engage in irrational behavior. When people regret certain decisions, it has a more significant influence on their subsequent choices. Either they get inspired to take more chances or become resistant to taking risks.
10. **Self-attribution bias:** It is the tendency of individuals to attribute positive outcomes to their traits and adverse outcomes to bad luck or other factors. Individuals would take credit for successes and attribute failures to other causes. In ambiguous situations, attributions are typically affected by a person's needs and desires. Self-attribution bias consists of two components: self-enhancing bias, which refers to people's tendency to take an excessive amount of credit for their success, and self-protecting bias, which refers to people's irrational refusal to accept responsibility for failure.
11. **Confirmation bias:** Dickens described it (1978) ^[34]. This bias is a natural phenomenon that refers to the probability that individuals will only pay attention to thoughts that support their beliefs and ignore those that contradict them. This bias renders investors irrational since they make decisions based on the information at hand and refuse to accept new data.
12. Home bias occurs when investors solely examine domestic stocks when constructing their portfolios. They do not include international stocks in their portfolio because they believe overseas investments are risky. It, however, renders the investment irrational.
13. **Hindsight bias:** This bias is a psychological phenomenon that permits individuals to convince themselves, after an event, that they precisely predicted it beforehand. It can encourage investors to believe they can adequately forecast future events, resulting in irrational investment decisions.
14. **Framing bias:** Arises when investors make decisions depending on how the information is presented rather than the facts. Thus, investors can be persuaded by presenting identical information in either of the two methods.

Section 2 will list study methodologies. Section 3 summarizes the study's results. It examines investment and demographic biases. Section 4 concludes and discusses the study.

Research Objectives

1. Determine the most common forms of cognitive bias contributing to poor investment choices in the stock market.
2. Investigate the various research methods utilized in the numerous studies dealing with behavioral biases.
3. Utilizing a complete study, research to determine how various forms of biases influence the decisions made by investors.
4. Determine the extent to which behavioral biases are linked to investor demographic characteristics.

5. To give insightful information regarding behavioral finance's applicability and identify the significant research gap for further study.

Research Methods

The studies accessible in the public domain on behavioral biases and their relevance in investing decision-making have been reviewed using a complete literature review methodology. The keywords such as Investment behavior, behavioral biases, the Indian stock market, financial literacy, investor decision-making, overconfidence, disposition effect, herding bias, availability bias, loss aversion bias, anchoring bias, regret aversion bias, self-attribution bias, conservatism bias will be used to search the literature. We utilized databases such as Emerald, Sage, ELSEVIER, JSTOR, Science Direct, Google Scholar, and SSRN to locate the pertinent literature on behavioral biases and their impact on investors' decision-making. The literature presented information regarding the various biases of individual and institutional investors. We have chosen a temporal horizon from 1979 (the year Kahneman and Tversky developed prospect theory) until 2022. The literature comprises theory, empirical, and analytical studies until 2022. This study considered recent publications.

For the identification and selection of papers, the following criteria were applied:

- The paper was published in different journals and is available on the online database;
- The paper is published in English and has full content;
- Different paper types, including theoretical, analytical, literature review, working paper, and conference paper; and
- The search keyword appears in the title and abstract of the paper.

After extensive investigation based on the abovementioned criteria, 115 papers were chosen. This research attempts to prepare and review exhaustively literature on behavioral biases and their influence on investment decisions. Using Excel and Microsoft Word, the results were examined and tallied. The researchers employed various strategies to obtain results, including a study of the relevant literature and gathering primary data using various sampling techniques and collection methods.

Sampling Technique: Various sampling techniques have been used in research, such as Snowball Sampling, Stratified Sampling, random Sampling, Quota Sampling, convenience sampling, Judgmental Sampling, and Multistage sampling. Madaan and Singh (2019) ^[69]; Aigbovo and Ilaboya (2019) ^[5]; Bhosale (2020) ^[22]; Suresh (2021) ^[119]; Ogunlusi and Obadema (2021) ^[81]; Girish and Manavara (2015) ^[38]; Raut and Kumar (2018) ^[96]; and Mutlu and Ozer (2022) ^[73] all use convenience sampling in their studies (2021). Convenience sampling permits researchers to conveniently analyze the sample (Wali *et al.*, 2022) ^[131]. Quaicoe and Eleke-Aboagye (2021) argued that convenience sampling is utilized because it is relatively simple to implement and allows researchers to reach as many of the intended respondents as possible. Sharma and Prasad (2018) ^[105] also selected investors from Rajasthan using non-random convenience sampling. This method was utilized by Qasim *et al.* (2019) ^[89] since it facilitates access to respondents. Using snowball sampling, Jain *et al.* (2021) ^[50] collected data from individual equities investors to construct a consistent and valid scale for

measuring behavioral biases. In his research, Raut (2020) ^[94] employed convenience and snowball sampling. Kappal and Rastogi (2020) ^[56] used snowball sampling to choose female entrepreneurs to determine the factors influencing investment behavior. Aigbovo and Ilaboya (2019) ^[5] utilized the snowball technique by requesting the initial respondent to recommend an investor. Khan *et al.* (2021) ^[59], Ahmad *et al.* (2017) ^[4], Jamshidinavid *et al.* (2012) ^[12], Ates *et al.* (2016) ^[12], Kylar and Acar (2009) ^[62], Alrabadi *et al.* (2018) ^[8], and Hunguru *et al.* (2020) ^[45] have employed simple random sampling in their research. Whereas, Gilenko and Chernova (2021) ^[37], Akhtar and Das (2019) ^[6], Gavrilakis and Floros (2021) ^[36], and Kumari *et al.* (2020) ^[63] used stratified sampling (2019). Dasgupta and Singh (2019) ^[33] and Kengatharan and Kengatharan (2014) ^[60] utilized stratified sampling to enable the researcher to stratify the population according to predetermined criteria and then select a random or systematic sample from each stratum. This procedure assures that the sample has the same distribution as the population. Subramaniam and Velnampy (2017) ^[120] stratified the population using the Proportionate stratified random sample technique. Akhtar *et al.* (2018) ^[7] and Baker and Chui Yi (2016) ^[15] employed quota sampling (2015). Novianggie and Asandimitra (2019) ^[79]; Bhatia *et al.* (2021) ^[21]; Nouri and Ahmadi Kafeshani (2019) ^[78]; Ahmad and Shah (2020) ^[3]; and Usman and Ishaya (2018) ^[129] all employed purposeful sampling (2018). Utilized Purposive sampling because it is a simple technique based on study objectives-related criteria.

Sampling Unit

A Sample unit is an object that may be selected from a sampling frame with a known probability. A study of many papers on behavioral finance discovered that different sample units are utilized in these investigations. Individual investor or retail investor was used as the sampling unit in the studies by Ahmed and Noreen (2021) ^[2]; Dasgupta and Singh (2019) ^[33]; Rai *et al.* (2021) ^[93]; Wali *et al.* (2022) ^[131]; Baker *et al.* (2016) ^[15]; Siraji (2019) ^[115]; Hameed *et al.* (2018) ^[42]; Anwar *et al.* (2017) ^[10] and Rasool and Ullah (2020) ^[98]. Kumar and Nandan (2018) ^[104], Quaicoe and Eleke-Aboagye (2021) ^[90], and Ogunlusi and Obademi (2021) ^[81] consider bank customers and bank stock investors to be sample units (2019). Parhi and Pal (2022) ^[86] used H.N.I.'s stock investors with at least five years of experience as sampling units in their analysis. Mushinada and Veluri (2019) ^[72] also polled investors with at least five years of expertise. Bhosale (2020) ^[22] and Isidore R. and P. (2019) ^[47] sampled equity investors. In their research, Kaur and Kaushik (2016) investigated mutual fund investors and non-investors

Area of Research in existing studies: Most research was undertaken in industrialized nations such as the United States, Russia, Spain, Malaysia, Greece, China, and Germany. However, studies focus on developing or emerging nations such as India, Pakistan, Sri Lanka, Indonesia, etc. Song *et al.* (2020) ^[118], Ahmad *et al.* (2017) ^[4], Gonzalez-Igual *et al.* (2021) ^[39], Gilenko and Chernova (2021) ^[37], Buccioli *et al.* (2020) ^[25], Baker and Chui Yi (2019) ^[14], Bouteska and Regaieg, (2020) ^[23], Nguyen and Schubler (2012) ^[74], and Gavrilakis and Floros (2021) ^[36] studies have been conducted in emerging countries such as India and Pakistan. Suresh (2021) ^[119]; Parhi and Pal (2021) ^[86]; Kappal and Rastogi (2020) ^[56]; Raut (2020) ^[94]; Jain *et al.* (2021) ^[50]; Adil *et al.* (2022) ^[1]; Bhatia *et al.* (2021) ^[21]; Sajeev *et al.*, (2021) ^[103]; and Ritika and Kishor (2020) ^[100] are examples of current

research undertaken in India (2020). In the subject of behavioral finance, Pakistani researchers include Parveen *et al.* (2021) [84]; Anwar *et al.* (2017) [10]; Hameed *et al.* (2018) [42]; Quddoos *et al.* (2020) [91]; Ahmad and Shah (2020) [3]; Khan *et al.* (2020) [61]; Tabassum *et al.* (2021) [121]; Parveen and Siddiqui (2018) [85]; and Wali *et al.* (2022) [131]. In Sri Lanka, Kengatharan and Kengatharan (2014) [60], Subramaniam and Velnampy (2017) [120], Kumara *et al.* (2021) [101], and Siraji (2019) [115] conducted research. In Indonesia, Noviנגgie and Asandimitra (2019) [79], and Beatrice *et al.* (2021) [19] conducted their research. In Nigeria, Ogunlusi and Obademi (2021) [81], Usman and Ishaya (2018) [129], and Aigbovo and Ilaboya (2019) [5] did their research. Studies undertaken in Gulf countries such as Tehran, Iran, Amman, and Saudi Arabia include those by Jamshidinavid *et al.* (2012) [12], Alrabadi *et al.* (2018) [8], and Alquraan *et al.* (2016) [9], and Nouri and Ahmadi Kafeshani (2019) [78].

Analytical Tools

Multiple regression analysis, Pearson's Chi-square and Ordinal Regression Analysis, Logit regression method, Cronbach alpha, correlation, Smart-PLS, Z proportion test, Structure Equation Modelling, copula-based bivariate probit-regression approach, Exploratory factor analysis, and hierarchical regression analysis, ANOVA, are utilized by various studies. Kumara *et al.* (2021) [101], Alquraan *et al.* (2016) [9], Song *et al.* (2020) [118], Ahmad *et al.* (2017) [4], Buccioli *et al.* (2020) [25], Goyal *et al.* (2021) [40], Rahman and Gan (2020) [92], Baker *et al.* (2021) [13], Ates *et al.* (2016) [12], Madaan and Singh (2019) [69], Hayat and Anwar (2016) [44], (2012), Baker and Chui Yi (2016) [15] discovered the impact on investment decision-making through multiple regression analysis. Kumar and Nandan (2018) [96], Akhtar *et al.* (2018) [7], and Adil *et al.* (2022) [1] all made use of hierarchical regression analysis (2021). Utilized generalized structured component analysis (GSCA) and multi-group analysis (M.G.A.). Gupta and Shrivastava (2021) [41] utilized multi-group analysis to investigate the moderation effect. Mahina *et al.* (2017) [76] employed multivariate regression analysis in their investigation. Gilenko and Chernova (2021) [37] implemented a copula-based bivariate probit-regression method in their research.

Various studies such as Rai *et al.* (2021) [93], Akhtar and Das (2019) [16]; Baker *et al.* (2019) [14], Siraji (2019) [115]; Lebdaoui *et al.* (2021) [68], Suresh (2021) [119], Jain *et al.* (2021) [50] employed structured equation modeling. According to Baker *et al.* (2016) [15], Mushinada and Veluri (2019) [72], and Jamshidinavid *et al.* (2012) [12], S.E.M. is a combination of factor analysis and multiple regression analysis to quantify the link between measured variables and latent construct. Dasgupta and Singh (2019) [33] used structural equation modeling (S.E.M.) to examine the unidimensionality of the constructs and the antecedents of investor sentiment. In addition, they asserted that this methodology is suitable for exploratory and confirmatory research, making it suitable for examining newly discovered theories and models. The S.E.M. method can explain direct, indirect, and cumulative effects. In addition, Rai *et al.* (2021) [93] and Akhtar and Das (2019) [6] described the utility of employing S.E.M. by claiming that it is the best suitable method for simultaneously evaluating a sequence of autonomous, multiple regression equations. Establishing the relationship between measurement and structural models may also evaluate complicated behavioral correlations (Mushinada and Veluri, 2019) [72].

Results

Over-confidence bias

Alrabadi *et al.* (2018) [8], Soni and Desai (2019) [117], Rehan and Umer (2017) [99], Qasim *et al.* (2019) [89], Sharma (2019) [106], Girish and Sanningammanavara (2015) [38], Alquraan *et al.* (2016) [9], Raut *et al.* (2018) [9], and Baker *et al.* (2019) [14] acknowledge that this bias has a significant impact on investment decision-making. Moreover, investment performance is impacted by this bias discovered by Quddoos *et al.* (2020) [91], Parveen and Siddiqui (2018) [85], Kengatharan and Kengatharan (2014) [60], Siraji (2019) [115], and Ullah (2019) [127] in their studies. When a person is overconfident, he makes poor and inappropriate decisions. In other words, Chen *et al.* (2007) [29] found that individuals make poor choices. Females are less overconfident than men, according to Barber and Odean (2001) [17], Ates *et al.* (2016) [12], Hsu *et al.* (2021) [46], Baker *et al.* (2016) [45], and Nouri and AhmadiKafeshani (2019) [78]. Males prefer to invest in stock market-related products, while females favor safer, fixed-income investments (Singla and Hiray, 2019) [114]. Adil *et al.* (2022) [1] also reinforced this by claiming that males' overconfidence has a positive and statistically significant association with their investment behavior, whereas no such relationship was discovered for females. According to Gonzalez-Igual *et al.* (2021) [39], females are confident, which contradicts this notion. In contrast, Bashir *et al.* (2013) [35], Kansal and Singh (2018) [55], and Beatrice *et al.* (2021) [19] found no correlation between gender and overconfidence.

Representativeness bias

After anchoring bias, Waweru *et al.* (2014) [132] and Baker *et al.* (2018) [136] discovered that the most influential heuristic factor on investor decisions is representativeness. Several studies such as Chen *et al.* (2007) [29]; Alrabadi *et al.* (2018) [8]; Rehan and Umer (2017) [99]; Sharma (2019) [106]; Waweru *et al.* (2014) [132]; Girish and Sanningammanavara (2015) [38]; Kumara *et al.* (2021) [101]; Raut *et al.* (2018) [96]; Khan *et al.* (2020) [61]; Baker *et al.* (2018) [136] have identified a significant influence of representative bias on investment decision. Additionally, representative bias affects investment performance (Siraji, 2019) [115]. Rasool and Ullah (2020) [98] discovered that investors' decisions are influenced by representativeness, gambler's fallacy, and anchoring biases. In contrast, Aigbovo and Ilaboya (2019) [5] discovered that representational bias has a negligible effect on investment behavior. Short-term investors are more representative than long-term investors (Lakshmi *et al.*, 2013) [67]. Baker *et al.* (2018) [136] state that older investors are less susceptible to representativeness bias. Less affluent populations are more susceptible to representative bias (Renu Isidore and Christie, 2019) [47]. In contrast to their female colleagues, male entrepreneurs make decisions using the representativeness heuristic (Nouri and AhmadiKafeshani, 2019, Choudhary *et al.*, 2021) [78, 31].

Anchoring bias

Investors' decisions are significantly affected by anchoring bias according to the research done by Singh (2018) [113]; Soni and Desai (2019) [117]; Rehan and Umer (2017) [99]; Sharma (2019) [106]; Waweru *et al.* (2014) [132]; Girish and Sanningammanavara (2015) [38]; Kumara *et al.* (2021) [101]. It means they make decisions based on some reference point. Anchoring bias positively affects the trade performance of investors, supported by Quddoos *et al.* (2020) [91], Parveen and Siddiqui (2018) [85], Kengatharan and Kengatharan (2014)

^[60] and Siraji (2019) ^[115]. Personality traits are related to anchoring bias, like neuroticism is positively associated with anchoring bias (Baker *et al.*, 2021) ^[13]. Experienced investors behave differently in anchoring bias (Raut and Kumar, 2018) ^[96]. Experienced investors are more susceptible to overconfidence, self-attribution, hindsight, cognitive dissonance, conservatism, framing, and anchoring biases than novice investors (Ates *et al.*, 2016) ^[12]. Anchoring is the primary heuristic influencing investors (Waweru *et al.*, 2014) ^[132].

Availability bias

According to Alrabadi *et al.* (2018) ^[8] and Khan *et al.* (2021) ^[59], availability bias has a considerable influence on investment behavior (2020). An individual investor investing performance is also affected by this prejudice (Siraji, 2019) ^[115] ^[115]. Ritika and Kishor (2020) ^[100] discovered that availability bias significantly indicates cognitive biases. Alrabadi *et al.* (2018) ^[8] found that familiarity bias, representative bias, availability bias, overconfidence bias, and herding bias substantially impact investing success. Bhosale (2020) ^[22] discovered that decision-making is impacted by overconfidence, anchoring, illusion of control, availability, recency bias, mental accounting, loss aversion, herd behaviour, and cognitive dissonance.

Availability bias influences household investors' investment behavior (Subramaniam and Velnampy, 2017) ^[120]. According to Hunguru *et al.* (2020) ^[45], availability bias significantly affects investment behavior. Anchoring, representativeness, and availability bias are the primary heuristic variables that influence investors, according to Waweru *et al.* (2014) ^[132]. discovered that availability bias greatly influences investment decisions, followed by overconfidence and conservatism. It also impacts investors' willingness to take risks. Availability bias boosts investors' risk-taking while making investing decisions.

Disposition bias

Several investigations, including (Chen *et al.* 2007; Sharma, 2019; Girish and Sanningammanavara, 2015; Parveen *et al.*, 2021) ^[29, 106, 38, 84], discovered that disposition bias has a considerable impact on investment behavior. Aigbovo and Ilaboyo (2019) ^[5] discovered that disposition bias had a negligible effect on investment behavior. Parveen and Siddiqui (2018) ^[85] and Ullah (2019) ^[127] discovered a favourable association between disposition bias and investing performance in their study. According to Jamshidinavid *et al.* (2012) ^[12], neuroticism and conscientiousness are positively associated with disposition bias. Novianggie and Asandimitra (2019) ^[79] discovered that disposition bias has little effect on investment selections since investors do not directly sell their products. Additionally, demographic characteristics are proven to influence disposition bias. Beatrice *et al.* (2021) ^[19] discovered that disposition bias is correlated favorably with age and negatively with income and investment experience. According to this study by Adil *et al.* (2021) ^[137], gender does not correlate with disposition bias. Education was also adversely associated with disposition bias (Baker *et al.*, 2018) ^[136].

Loss Aversion bias

Researchers such as (Mahina *et al.*, 2017; Sharma, 2019; Alquraan *et al.*, 2016; Jain *et al.*, 2020) ^[76, 106, 9, 51] have discovered a correlation between loss aversion bias and investment behavior. Hunguru *et al.* (2020) ^[45] reinforced this

by noting that loss aversion bias, regret aversion bias and herding influence investors' decision-making on the Z.S.E. Bouteska and Regaieg (2020) ^[23] discovered a negative relationship between loss aversion bias and investment performance. Kengatharan and Kengatharan (2014) ^[60] and Nur Ainia and Lutfi (2019) ^[80] discovered that loss aversion does not influence investors' decisions. Quddoos *et al.* (2020) ^[91] determined that loss aversion bias did not affect investment performance. It was hypothesized that the machine could not mitigate the effect of loss aversion bias. Bhatia *et al.* (2021) ^[21] discovered that Robo- advice services amplify the effect of loss-aversion bias. Demographic considerations also influence loss aversion. Found that income has a negative effect on loss aversion bias, representativeness, availability, and mental accounting bias. Since financial literacy is adversely associated with loss aversion bias (Rasool and Ullah), financial literacy can minimize loss aversion bias (2019).

Herding bias

It affects the investment decision and indicates that respondents follow the advice of brokers or friends when making an investment decision, as evidenced by Singh (2018) ^[55] and Novianggie and Asandimitra (2019) ^[79]. Several researchers, including Singh (2018) ^[55], Alrabadi *et al.* (2018) ^[8], Soni and Desai (2019) ^[117], Qasim *et al.* (2019) ^[89], Raut *et al.* (2018) ^[96], Quaicoe and Eleke-Aboagye (2021) ^[90], Jain *et al.* (2021) ^[50], and Gavrilakis and Floros (2021) ^[36], have discovered a significant correlation between herding bias and investment decisions. Ullah (2019) ^[127] has found a correlation between herding bias and investment performance. Alquraan *et al.* (2016) ^[9], Baker and Chui Yi (2019) ^[14], and Tabassum *et al.* (2021) ^[121] discovered no correlation between herding and investing decisions. Suresh (2021) ^[119] observed that investment decision-making is influenced by the herd mentality generated by information processing, the bandwagon effect, and social groups. Gavrilakis and Floros (2021) ^[36] discovered that herding behavior has a negative impact on portfolio construction and performance. Quddoos *et al.* (2020) ^[91] discovered no correlation between herding and investing performance. Ahmed and Noreen (2021) ^[2] determined that the herding effect, heuristics, and market characteristics influence investment behavior positively and considerably.

Mental Accounting Bias

According to the study by Khan *et al.* (2021) ^[59], mental accounting bias influences the behavior of institutional investors. Mental accounting bias was significantly related to investment behavior, as supported by research by Singh (2018) ^[55] and Sharma (2019) ^[106]. Baker *et al.* (2018) ^[136] concluded that mental accounting, representativeness, and overconfidence are the most apparent biases. Rehan and Umer (2017) ^[99] discovered a negligible correlation between mental accounting and investment behavior. Wali *et al.* (2022) ^[131] discovered that psychological biases, including overconfidence, anchoring, herding, and mental accounting bias, influence investors' judgments in Peshawar and Islamabad. According to Waweru *et al.* (2014) ^[132], among the prospect theory, regret aversion and mental accounting are the most influential determinants of Kenyan investor behavior. Baker *et al.* (2021) ^[13] identified the relationship between mental accounting and personality traits and discovered that mental accounting is significantly associated with neuroticism, extroversion, and openness. Beatrice *et al.*

(2021) ^[19] discovered the relationship between demographic variables and mental accounting bias. It was discovered that there is a positive correlation between income and education and that gender has no effect on this bias. Education has a detrimental impact on mental accounting bias, according to Ozen and Ersoy (2019) ^[83].

Discussions

The field of behavioral finance encourages research into the effects of psychological factors on the financial behavior of the individual investor. Through the current study, we have contributed to the body of knowledge by reviewing recent studies conducted to identify the essential biases and their impact on the psychological biases of individual investors with varying demographic and socioeconomic features. The studies from 1973 to 2022 have been considered for this purpose. Recent studies have been considered the majority of the time. Detailed analyses of several studies have been conducted.

Overconfidence, representativeness, anchoring, availability, loss aversion, disposition, regret aversion, mental accounting, herding, conservatism, familiarity, confirmation, hindsight, home bias, and risk perception have all been discovered by previous research. These aspects have been researched extensively in the available literature. However, name-based biases, personality traits, gambler fallacy, adjustment bias, self-control bias, Self-monitoring bias, Status quo bias, Cognitive dissonance, and risk aversion biases have received the least attention.

The application of behavioral finance influenced investment decision-making. This exhaustive analysis has found that investors do not make rational decisions, and psychological biases influence their behavior. Numerous scholars have studied various biases and discovered a correlation between prejudices and investment behavior. The majority of studies have been conducted on overconfidence, representative, anchoring biases, disposition effect, and Loss aversion bias, according to the research. These biases significantly influence investment behavior. Diverse research indicated that demographic factors also influence investors' behavioral biases, with education, income, and experience negatively affecting overconfidence bias. Numerous researches indicate that women are less overconfident and more risk-averse than men. The influence of biases impairs investors' rational behavior. Investors' financial literacy can mitigate the impact of psychological biases. In addition, the moderation effect of financial literacy demonstrates that financial knowledge might mitigate the influence of these biases on investment behavior. Therefore, investors should receive sufficient training to decrease the influence of these biases.

Theoretical implication

Traditional and finance theories imply that investors behave rationally and make calculated investments. However, a complete literature analysis reveals that numerous researchers have discovered the influence of behavioral biases on investment behavior, which supports the implications of behavioral finance theories such as the Prospect theory and heuristics. In prospect theory, investors weigh losses more heavily than gains. According to prospect theory, investors are risk-averse. Numerous studies, including Phan *et al.* (2021) ^[88], Aigbovo and Ilaboya (2019) ^[5], and Cao *et al.* (2021) ^[26], have discovered a correlation between prospect theory and investment behavior. Ahmed and Noreen (2021) ^[2] also discovered that the results are consistent with prospect

theory. In contrast, several researchers, including Novianggie and Asandimitra (2019) ^[79], Ahmad and Shah (2020) ^[3], and Ogunlusi and Obademi (2021) ^[81], discovered a negative relationship between prospect theory and investment behavior.

Additionally, the heuristic theory is an integral component of behavioral finance theories. In this hypothesis, investors use the 'Rule of Thumb' or shortcut methods to make investing decisions. However, the outcomes are not accurate. It consists of a variety of biases, including overconfidence bias, representative bias, anchoring bias, and availability bias. Numerous researchers (Waweru *et al.*, 2014; Cao *et al.*, 2021; Gavrilakis and Floros, 2021) ^[132, 26, 36] have discovered a positive correlation between heuristic theory and performance (Waweru *et al.*, 2014; Cao *et al.* 2021) ^[26, 36]. In contrast, Ogunlusi and Obademi (2021) ^[81] discovered a negative connection between investment behavior and social capital. Consequently, this study investigated how the prospect and heuristic theory influence the investment behavior of investors.

Practical Implications

Since most of these studies were conducted between 2015 and 2021, policymakers can determine which biases have significantly impacted investor behavior in recent years. The policymakers can formulate policies that can assist in removing investors' perceived prejudices. Brokers can also utilize this study to determine which biases influence investor behavior. They can adequately advise their clients so investors do not make irrational decisions. This study can also assist investors in analyzing their behavior independently. They can also identify profitable securities and purchase additional securities. The conclusions of this research are necessary for investment institutions who wish to provide more trustworthy advice and have extensive knowledge of investor profiles and financial market developments. This research evaluation can also aid future researchers in understanding how various biases influence investor behavior. It can add to their research because it provides a comprehensive evaluation of the most recent research in behavioral finance. It has compiled various studies and biases about investment behavior, which may be helpful for future research.

Research gap for future studies

There have been numerous studies conducted on the topic of behavioral finance. However, a unique weakness was identified that should be addressed in future research. First, investor behavior is influenced by more than three or four biases. Many biases influence investor behavior. However, the majority of studies have only considered a few common biases, such as overconfidence, representativeness, anchoring bias, disposition bias, and the herding effect, and very few studies have considered confirmation bias, name-based biases, alphabetical order, regret aversion, hindsight bias, and home bias. Therefore, future studies should consider all of these biases to produce more credible results. In affluent nations, numerous studies on behavioral biases have been undertaken. Research has also been conducted in developing nations such as India, Pakistan, and Sri Lanka in recent years. However, no studies considering both emerging and developed nations have been undertaken. Both types of nations have distinct populations, so their impact on investing behavior will vary. Therefore, future research can investigate two types of countries. Thirdly, few research has been conducted to

determine the moderating effect of financial knowledge on the relationship between behavioral biases and investment decisions. Therefore, additional studies can be conducted to

determine whether or not financial literacy mitigates the influence of behavioral biases.

Table 1: Positive and Negative relations found with investment behavior in different studies

Biases	+/-	References
Anchoring	+	Wali <i>et al.</i> (2022) ^[131] ; Madaan and Singh (2019) ^[69] ; Parveen and Siddiqui (2018) ^[85] ; Rehan and Umer (2017) ^[99] ; Usman and Ishaya (2018) ^[129] ; Sharma and Prasad (2018) ^[105] ; Hunguru <i>et al.</i> (2020) ^[45] ; Kumara <i>et al.</i> (2021) ^[101] ; Raut <i>et al.</i> (2018) ^[96] ; Suresh (2021) ^[119] .
	-	Ogunlusi and Obademi (2021) ^[81]
Mental accounting	+	Wali <i>et al.</i> (2022) ^[131] ; Hunguru <i>et al.</i> (2020) ^[45] ; Suresh (2021) ^[119]
	-	Rehan and Umer (2017) ^[99] ; Sharma and Prasad (2018) ^[105] .
Overconfidence	+	Wali <i>et al.</i> (2022) ^[131] ; Madaan and Singh (2019) ^[109] ; Nur Ainia and Lutfi (2019) ^[80] ; Rehan and Umer (2017) ^[99] ; Subramaniam and Velnampy (2017) ^[120] ; Usman and Ishaya (2018) ^[129] ; Qasim <i>et al.</i> (2019) ^[89] ; Hunguru <i>et al.</i> (2020) ^[45] ; Novianggie and Asandimitra (2019) ^[79] ; Alquraan <i>et al.</i> (2016) ^[9] ; Kumara <i>et al.</i> (2021) ^[101] ; Bhatia <i>et al.</i> (2021) ^[21] ; Raut <i>et al.</i> (2018) ^[96] ; Suresh (2021) ^[119] .
	-	Hayat and Anwar (2016) ^[44] ; Parveen and Siddiqui (2018) ^[85] ; Zacharakis and Shepherd (2001) ^[134] ; Aigbovo and Ilaboya (2019) ^[5] ; Sharma and Prasad (2018) ^[105] ; Mouna and Jarboui (2015) ^[71] ; Ahmad and Shah (2020) ^[3] ; Hameed <i>et al.</i> (2018) ^[42] ; Anwar <i>et al.</i> (2017) ^[10] ; Parveen <i>et al.</i> (2021) ^[84] .
Herding	+	Wali <i>et al.</i> (2022) ^[131] ; Madaan and Singh (2019) ^[69] ; Hayat and Anwar (2016) ^[44] ; Qasim <i>et al.</i> (2019) ^[89] ; Hunguru <i>et al.</i> (2020) ^[45] ; Novianggie and Asandimitra (2019) ^[79] ; Alquraan <i>et al.</i> (2016) ^[9] ; Raut <i>et al.</i> (2018) ^[96] .
	-	Subramaniam and Velnampy (2017) ^[120] ; Sharma and Prasad (2018) ^[105] ; Sajeev <i>et al.</i> (2021) ^[103] ; Adil <i>et al.</i> (2021) ^[137] ; Gavrilakis and Floros (2021) ^[36]
Disposition	+	Parveen and Siddiqui (2018) ^[35] ; Usman and Ishaya (2018) ^[129] ; Aigbovo and Ilaboya (2019) ^[5]
	-	Hayat and Anwar (2016) ^[44] ; Parveen <i>et al.</i> (2021) ^[84]
Representative	+	Rehan and Umer (2017) ^[99] ; Subramaniam and Velnampy (2017) ^[120] ; Usman and Ishaya (2018) ^[129] ; Aigbovo and Ilaboya (2019) ^[5] ; Hunguru <i>et al.</i> (2020) ^[45] ; Cuandra & Tan (2021) ^[32] ; Novianggie and Asandimitra (2019) ^[79] ; Kumara <i>et al.</i> (2021) ^[101] ; Raut <i>et al.</i> (2018) ^[96] ; Khan <i>et al.</i> (2020) ^[61] ; Suresh (2021) ^[119] .
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Gambler's fallacy	+	Hunguru <i>et al.</i> (2020) ^[45] .
	-	-----
Confirmation	+	Sharma and Prasad (2018) ^[105] ; Hameed <i>et al.</i> (2018) ^[42] ; Suresh (2021) ^[119] .
	-	-----
Self-attribution	+	-----
	-	Aigbovo and Ilaboya (2019) ^[5]
Loss aversion	+	Mahina <i>et al.</i> (2017) ^[76] ; Hunguru <i>et al.</i> (2020) ^[45] ; Alquraan <i>et al.</i> (2016) ^[9] ; Bhatia <i>et al.</i> (2021) ^[21] ; Khan (2017) ^[138] ; Subramaniam and Velnampy (2017) ^[120] .
	-	Sharma and Prasad (2018) ^[105] ; Nur Ainia and Lutfi (2019) ^[80] .
Hindsight bias	+	-----
	-	Aigbovo and Ilaboya (2019) ^[5] .
Regret aversion	+	Rehan and Umer (2017) ^[99] ; Aigbovo and Ilaboya (2019) ^[5] ; Hunguru <i>et al.</i> (2020) ^[45] ; Suresh G. (2021) ^[119] .
	-	-----
Framing	+	Usman and Ishaya (2018) ^[129]
	-	-----
Risk aversion	+	Rehan and Umer (2017) ^[99] ; Subramaniam and Velnampy (2017) ^[120] ; Sajeev <i>et al.</i> (2021) ^[103] ; Adil <i>et al.</i> (2021) ^[137] .
	-	-----
Availability bias	+	Rehan and Umer (2017) ^[99] ; Subramaniam and Velnampy (2017) ^[120] ; Cuandra & Tan (2021) ^[32] ; Hunguru <i>et al.</i> (2020) ^[45] ; Kumara <i>et al.</i> (2021) ^[101] ; Khan <i>et al.</i> (2020) ^[61]
	-	Mouna and Jarboui (2015) ^[71] ; Khan (2017) ^[138] ; Anwar <i>et al.</i> (2017) ^[10]
Familiarity	+	-----
	-	Mouna and Jarboui (2015) ^[71] ; Khan (2017) ^[138] ; Anwar <i>et al.</i> (2017) ^[10]
Risk perception	+	Novianggie and Asandimitra (2019) ^[79] ; Ahmad and Shah (2020) ^[3]
	-	Nur Ainia and Lutfi (2019) ^[80] ; Alquraan <i>et al.</i> (2016) ^[9]
Conservatism	+	-----
	-	Baker and Chui Yi (2015)
Risk tolerance	+	Nur Ainia and Lutfi (2019) ^[80]
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Source: The Author Analysis

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