



JOURNAL OF ACCOUNTING AND BUSINESS EDUCATION

P-ISSN 2528-7281 E-ISSN 2528-729X

E-mail: jabe.journal@um.ac.id

<http://journal2.um.ac.id/index.php/jabe/>

Exploring Behavioral Biases in Investment Decisions: Insights from a CIMO-Based Systematic Literature Review

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DOI: <http://dx.doi.org/10.17977/jabe.v11i1.68152>

Abstract: This study aims to identify and analyze behavioral biases that influence investors in their financial decision-making. The research approach employs a Systematic Literature Review (SLR) using the CIMO-Logic framework (Context, Intervention, Mechanism, and Outcome). The scope of the study covers a 21-year period (2004–2024) to evaluate research trends, methodologies, and gaps, with 410 selected articles obtained from Publish or Perish, Google Scholar, and ScienceDirect. The findings indicate that behavioral finance is influenced by economic factors, individual psychology, market information, and social interactions. The results indicate that previous research has been dominated by topics such as herding, overconfidence, mood, and heuristics, while topics such as self-attribution, gender, the illusion of control, investor personality, information transparency, social media, and experimental behavior remain relatively limited. The contributions of this study support the continued development of the field of finance by providing empirical evidence on the behavioral factors influencing investment decision-making. Theoretically, this study builds upon previous research related to the psychological and behavioral aspects of investing in explaining investor behavior within the framework of modern financial theory. In practical terms, this study provides in-depth insights for investors, policymakers, regulatory authorities, and financial institutions in designing intervention measures, educational programs, and regulatory frameworks aimed at reducing behavioral biases and promoting more rational and efficient investment decision making.

Article History

Received:

7 August 2026

Revised:

14 September 2026

Accepted:

16 September 2026

Keywords

Behavioral finance, investment decision-making, investor behavior, behavioral biases, systematic literature review

Citation: Maharani, S. N., & Sari, S. N. (2026). Exploring Behavioral Biases in Investment Decisions: Insights from a CIMO-based Systematic Literature Review. *Journal of Accounting and Business Education*, 11 (1), 69-96

INTRODUCTION

For several decades, traditional financial theories have dominated the development of financial science and research, based on the well-established view that investors behave rationally. Fama, through the Efficient Market Hypothesis (EMH), asserts that rationality is reflected in stock prices, which incorporate all available market information (Fama, 1995). A number of classical theories serve as the main foundations for Fama's views, including the Arbitrage Pricing Theory (APT) by Stephen Ross (1976), the Capital Asset Pricing Model (CAPM) by Sharpe, Linter, and Black, the Option Pricing Theory

by Black and Scholes, and the Principles of Portfolio Management by Merton and Markowitz (Delcey, 2019). Adams & Roberts (2016), these theories make a significant contribution to strengthening and expanding our understanding of investor rationality in making sound investment decisions.

However, as markets evolve especially during specific events such as market bubbles and market crashes these traditional theories fail to explain the psychological phenomena that occur (Singh et al., 2021). Although traditional financial theory is based on the assumption of rationality, various pieces of empirical evidence show that individual decisions are often influenced by psychological, emotional, and social factors, leading to deviations from fully rational behavior. Emotional factors drive investors to behave and make decisions irrationally (Sapkota, 2023). One of the obstacles investors face is when they experience mental instability, which leads to behavioral biases that have a systemic impact on the investment decision-making process and its outcomes.

Behavioral finance is increasingly forcing classical theory to admit defeat in its inability to explain investors' irrational behavior. In line with this, since the 1990s, empirical research examining behavioral biases in investment decision-making has been conducted, and there has been a significant increase. Insights and knowledge for understanding behavior in the capital markets are constantly evolving. In a critical analysis of previous research, Joghee et al. (2020) questioned the validity and rational assumptions of the efficient market hypothesis. Chen et al. (2017) state that in certain situations, cognitive biases often influence decisions, which are therefore not always rational and systematic. In conditions of uncertainty, irrational decisions tend to recur and are difficult to stop (Brown, 2020; Gupta, 2018; Paule-Vianez et al., 2020; Statman, 2014).

Research aimed at explaining investor behavioral biases in financial markets is growing. Scientists who support behavioral finance draw on multidisciplinary cognitive theories from fields such as psychology, anthropology, and sociology to strengthen its theoretical foundation (Köseoglu, 2019; Ricciardi et al., 2000). Kahneman and Tversky introduced Prospect Theory as a heuristic concept that represents rapid, intuition-based decision-making. Unlike classical economic theory, which assumes rational decision-making, Prospect Theory emphasizes the influence of psychological factors on individual choices and serves as an important foundation for behavioral finance by integrating behavioral, psychological, and financial perspectives.

Jain et al. (2020) found that environmental uncertainty influences irrational investor behavior in India. This indicates that social and economic contexts influence decision-making patterns. Several studies have identified, summarized, and analyzed various behaviors commonly observed in the stock market, such as those by Costa et al. (2017), Kumar and Goyal (2015), and Paule-Vianez et al. (2020). However, the study has not yet comprehensively examined the types of behavioral biases that are most prevalent and consistently observed in the market. Meanwhile, research focusing on specific behavioral biases includes heuristic bias (Bokhari & Geltner, 2011; Corredor et al., 2014; Hao et al., 2016), Prospect Theory (Anderson et al., 2015; Seth & Chowdary, 2017), and herding bias (Arjoon et al., 2020; Dehghani & Sopian, 2014; Hudson et al., 2020; Indars et al., 2019; Krokida et al., 2020; Li et al., 2022; Vo & Phan, 2019; Zhang & Chen, 2017), the house money effect (Cárdenas et al., 2014; Chen et al., 2017; Jelschen & Schmidt, 2023), home bias (Atif Sattar et al., 2020; Gaar et al., 2022), and familiarity bias (De Vries et al., 2017; Lei & Mathers, 2024; Patel, 2023).

Valcanover et al. (2020) emphasize the importance of more innovative and effective methodological approaches for analyzing, evaluating, and shaping the future direction of research in the field of behavioral finance. In addition, there has been a growing interest in conducting research in this field since Kahneman and Tversky first introduced the concept of behavioral finance in Prospect Theory. Therefore, a research strategy is needed that is capable of producing structured, comprehensive, and relevant scientific advancements that will have an impact on the future development of behavioral finance research.

Therefore, this study identifies and analyzes various behavioral biases using a Systematic Literature Review (SLR) approach; it seeks to integrate and evaluate empirical evidence from previous studies to gain a more comprehensive understanding of the role of behavioral biases in investment decision-making. Findings from prior studies within the CIMO-Logic framework (Context, Intervention,

Mechanism, Outcome). This methodology is appropriate because it can synthesize trends to reveal existing knowledge gaps and formulate a future research agenda in the field of behavioral finance.

Thus, the main contribution of this study is to produce a comprehensive, holistic, and structured evidence-based conceptual and empirical map to clarify the evolution of behavioral finance and serve as a strategic reference for developing a global agenda for further research in the field of behavioral finance.

LITERATURE REVIEW

Developments in Behaviour Finance

Behavioral finance seeks to explain the patterns of reasoning and emotional processes of investors that influence investment decisions (Valcanover et al., 2020). This approach aims to explain the what, why, and how of finance and investment from the perspective of human complexity. However, the definition and validity of behavioral finance itself are still evolving and being refined. This evolutionary process stems from the fact that behavioral finance requires a multidisciplinary approach, drawing on fields such as psychology, anthropology, sociology, and even neuroscience (Ricciardi et al., 2000). Figure 1 illustrates the interdisciplinary relationships that integrate behavioral finance. While studying behavioral finance, conventional theories can still be applied; however, psychological and sociological aspects have become integral components and serve as catalysts in this field (Zhang & Zheng, 2015). Therefore, to fully understand behavioral finance, a foundational understanding of concepts in psychology, sociology, and finance is required.

Statman (2014) extensively compared behavioral finance and conventional finance, emphasizing that behavioral and psychological aspects mutually influence investors in interpreting risk when making investment decisions. According to Statman, psychology influences how individuals frame risk (i.e., how investors process and respond to information depends on how it is presented) and assess risk (the process of determining the appropriate level of risk). Shefrin (2009) describes behavioral finance as the result of the interaction between psychological and behavioral aspects in the field of finance. Shefrin explains that in certain situations, investors only realize their investment mistakes after other investors have made misjudgments. One investor's mistake can result in a gain or loss for another investor. Furthermore, (Barber & Odean, 2013) explain that investors systematically deviate from optimal valuation and decision-making. Behavioral finance enriches our understanding of economics by incorporating various aspects of human nature into financial models. (Olsen, 2008) introduced a new paradigm or school of thought to understand and predict systematic behavior so that investors can make more accurate and sound investment decisions.

Kahneman & Tversky (1979) developed Prospect Theory, which examines how investors manage risk and uncertainty. Investors do not consistently avoid risk; rather, they tend to avoid risk in the context of gains but are more willing to take risks when it comes to losses. Furthermore, Tversky and Kahneman explain what is known as the "framing effect," which refers to how investors perceive problems and perform mental calculations to solve them. The value function in Prospect Theory differs from Utility Theory in that, under Prospect Theory, wealth and well-being are not determined by the final total value but by the balance between losses and gains. Consequently, investors may make different decisions even when the final level of wealth is the same. A key aspect lies in the reference point from which gains and losses are evaluated. Generally, these reference points are measured relatively rather than absolutely.

Barber & Odean (2013) highlight two common investor errors: excessive trading and a tendency to hold onto losing investments disproportionately while selling profitable ones. Furthermore, Barber & Odean (2013) argue that systematic biases stem from human psychology; for instance, overconfidence causes the first bias, while a reluctance to experience regret triggers the second. Behavioral models have proven effective in explaining stock price anomalies related to overreaction, underreaction, momentum strategies, herd behavior, the firm-size effect, and the BV/MV ratio effect.. Barberis, Schleifer, and Vishny (1996) formulated a model of security price overreaction and underreaction to information when investors exhibit conservatism bias and the representative heuristic. Pikulina et al., (2017) explain that security price anomalies are caused by the cognitive bias of overconfident investors. (Daniel & Titman, 1999) explain the higher returns from momentum strategies over the past 35 years as a result of investors' overconfidence bias.

Chan (2003) found that large stock price movements not supported by news led to statistically abnormal price trend reversals during the following month.

Irrational behavior

Psychological studies have documented various patterns of decision-making behavior driven by emotions, also known as behavioral biases. These biases can influence decision-making and have a direct impact on returns and risk. They relate to how we process information to arrive at decisions and expected preferences. On the one hand, biases can be detrimental, but under certain conditions, they can be beneficial. However, in the context of investing, biases tend to have a negative impact; therefore, by studying these biases, investors can hopefully avoid making erroneous decisions.

Overconfidence is a form of irrational self-assurance driven by emotional impulses. Investors feel superior and overestimate their cognitive abilities in identifying investment opportunities. Excessive confidence leads a person to feel smarter than they actually are, causing them to disregard relevant predictions and information (Aini, N. & Lutfi, 2019). Pompian explains that overconfidence is a bias characterized by excessive confidence not grounded in intuition, judgment, or cognitive ability, which leads to investment errors (Sood et al., 2023).

Fear of regret is the tendency to feel pain or fear of experiencing regret for having made a mistake. Therefore, to avoid regret, investors change their behavior, which leads to irrational actions. This fear of regret is caused by cognitive dissonance a mental limitation experienced when one's beliefs are proven wrong (Gazel, 2015).

Richie & Josephson (2018) describe anchoring as evaluating the frequency or likelihood of an event based on past perceptions. When these perceptions emerge and are used as a benchmark, they lead to an overestimation of the event's likelihood. Anchoring and adjustment refer to investors' behavior of setting an absolute number in their minds as an anchor value for decision-making. These initial values are not necessarily relevant to the decisions made, resulting in suboptimal outcomes (Richie & Josephson, 2018).

METHODS

This study uses the CIMO-LOGIC method to conduct a comprehensive review of the existing literature in the field of behavioral finance published over the past two decades, from 2004 to 2024. The research questions were formulated based on the CIMO (Context, Intervention, Mechanism, Outcome) framework developed by Denyer and Tranfield (2009) as a guide for formulating questions for a systematic literature review. The CIMO framework enables the systematic identification of the research context, the interventions under study, the mechanisms underlying the relationships between variables, and the resulting outcomes. Furthermore, CIMO-Logic produces a propositional analytical structure that links research questions to various relevant forms of intervention, thereby enabling a more focused literature synthesis and supporting the development of future research agendas (Denyer et al., 2008).

In the context phase, this study focuses on the trends, research methods, and variables that have emerged in behavioral finance research during that period. Understanding these developments in the literature is essential for identifying patterns in existing research and providing insight into how the concept of investor behavioral bias evolves under various market conditions.

Furthermore, in the intervention aspect, this study explores various factors, conditions, and stimuli that can influence the emergence and persistence of behavioral biases in the investment decision-making process. These factors include psychological, emotional, and social aspects, as well as market conditions that can cause investors to deviate from the assumption of rationality in conventional finance theory. Therefore, this study aims to evaluate how these factors influence investor behavior and to what extent the resulting investment decisions deviate from the principle of economic rationality.

In the "mechanism" section, this study analyzes the mechanisms that explain how certain factors within the market context can trigger the emergence of investor behavioral biases. This analysis is conducted by identifying the limitations of previous research in terms of methodological approaches, research contexts, and the variables used. Identifying these limitations is necessary to uncover research gaps and determine opportunities for future research in behavioral finance.

Finally, the “outcomes” section focuses on how previous research explains the consequences or results of behavioral biases on the investment decision-making process in the capital market. Based on the previous findings, this study aims to formulate the direction of future research by identifying areas that still require further exploration, whether related to theoretical development, the use of more comprehensive research methods, or the testing of new factors that can explain investor behavior in greater depth.

Locating Studies

A literature search strategy using the Publish or Perish software to obtain valid and relevant references (Kania et al., 2022). To support the research, searches were also conducted on Google Scholar and ScienceDirect to ensure the most comprehensive coverage (Harzing & Alakangas, 2016). To ensure an efficient and systematic literature search process, this study employed Boolean string searching, which utilizes Boolean operators to identify relevant articles more effectively than traditional manual searching methods (Aliyu, 2017). Keywords used to narrow the scope of the article: behavioral finance AND investor behavior AND (“market” OR “stock market”) AND (“efficient market hypothesis” OR “EMH”).

Study Selection and Evaluation

Denyer and Tranfield (2009) emphasize the importance of conducting a systematic and objective selection process based on explicit criteria. Not all articles identified in the initial search were reviewed in depth; rather, they had to undergo an inclusion and exclusion process based on the criteria in Table 1, as follows:

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
- The criteria for previous articles are based on the Scopus index - Previous research articles published between 2004 and 2024. - Research articles on financial behavior in financial decision-making.	- Articles not indexed in Scopus - Articles not related to financial behavior that have already been considered. - The article does not discuss financial behavior from 2004 to 2024. - There are duplicate publications

The identification, screening, and evaluation of studies were conducted systematically following the review protocol outlined below:

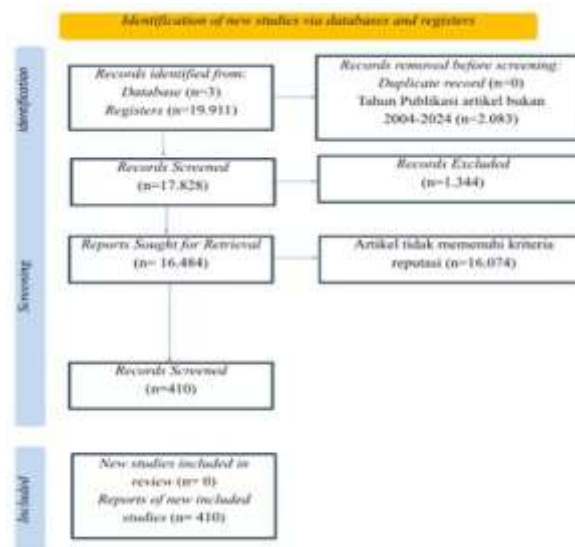


Figure 1. Study Collection and Screening Flowchart

A search on Publish or Perish, Google Scholar, and ScienceDirect yielded 19,911 articles. Of these articles, 2,083 were published outside the 2004–2024 period, leaving 17,828 articles. After screening the 17,828 articles according to the exclusion criteria, 1,433 were excluded, resulting in 16,395 articles. Moreover, 16,074 articles were excluded because they were published in journals ranked below the minimum Scopus quartile threshold (Q4). Consequently, 410 articles met all inclusion criteria and were selected for further analysis. Table 2 presents the journals from which these articles were sourced:

Table 2. Names of Journals Included in the Study

Names of Journals	Number of Publication
Knowledge-BasedSystems	1
Kybernetes	1
Asian Journal of Business and Accounting	1
International Journal of Economics and Financial Issues	7
Accounting Forum	1
Advances in Accounting	1
Afro-Asian Journal Finance and Accounting	1
Journal of Economic Psychology	3
International Journal Business and Emerging Markets	1
International Journal of Educational Development	1
Emerging Markets Review	1
Data Science and Management	1
Habitat International	1
Applied Energy	1
Dst.	
Total	410

Analysis and Synthesis

This stage aims to break down each research article into its main components and analyze the connections between the articles based on their themes, contexts, and research findings. The goal is to identify the conceptual relationships between the various sections of each research article so that the findings can be presented in a systematic and comprehensive manner. To analyze the relationships between keywords and research network mapping, we used NVivo Version 12 for thematic coding of the article content and VOSviewer. The integration of NVivo coding results with VOSviewer visualizations enables researchers to conduct an in depth analysis of thematic patterns and research trends. Table 3 outlines the characteristics of each article that met the study's criteria:

Table 3. Results of the Selection of Articles That Meet the Research Criteria

Code	Author, year	Title	Journal, Publisher	Methodology	Research Variables
P1	Rehman W U, Saltik O, dkk (2024)	Viral decisions: unmasking the impact of COVID-19 info and behavioral quirks on investment Choices	Humanities and Social Communication s	Quantitative	COVID-19; Behavioral Biases; Market Hypothesis; Herding Behavior; Karachi.

Furthermore, this cluster indicates that behavioral finance research emphasizes automated learning, demonstrates a cross-cultural and contextual approach to finance, and produces behavioral analysis results aimed at developing more accurate investment strategies. Cluster 3 (Dark Blue): The dominant keywords are “stock return,” “overreaction,” and “GARCH model.”

This cluster indicates that previous research has focused on market volatility and anomalies (detecting volatility patterns, measuring market uncertainty, and testing for truly efficient markets), high-frequency and algorithmic trading, behavioral biases, market reactions to external information, and the evaluation of predictive models. Cluster 4 (Yellow): Dominant keywords, namely (“anchoring,” “anomaly,” “ANOVA,” “availability,” “behavioral biases,” etc.) these studies focus on investors' cognitive and emotional biases, the anomalies observed in emerging stock markets and local or regional contexts, and the implications of behavioral biases for market efficiency and investment decision-making.

Cluster 5 (Dark Purple): Dominant keywords, namely (“accounting narratives,” “annual report narratives,” “austerity,” “bank management,” etc.) which describe accounting narratives that influence annual reports, earnings calls, and disclosures; the technology and text analytics used to analyze corporate reports; psychology and emotions in finance; regulation and disclosure quality; as well as ethics and social dimensions. Cluster 6 (Light Blue): The dominant keywords namely, “ambiguity aversion,” “anchoring bias,” “Chinese stock markets,” “cryptocurrencies”) reflect several studies in behavioral finance that focus on investor psychological biases, information asymmetry, uncertainty in emerging markets (cryptocurrencies or bubbles), market reactions to news, and the role of regulation and broker reputation. Cluster 7 (Orange): The dominant keywords namely, “abnormal return,” “accounting information,” and “analytics” indicate that sentiment, information quality, and investor attention influence volatility, abnormal returns, and trading behavior in the stock market. Cluster 8 (Brown): The dominant keywords “agent-based method,” “cellular automata,” “cellular automaton” reflect a focus on financial markets and behavioral finance, which are studied and analyzed as complex adaptive systems using various methods, such as agent-based modeling. Cluster 9 (Light Purple): The dominant keywords namely, “affect heuristic,” “anchoring effect,” “anger,” and “animal spirits” describe behavioral macroeconomics and behavioral asset pricing, which focus on the role of emotions, expectations, and decision-making errors in finance. Cluster 10 (Brownish-Red): The dominant keywords namely, “ADF test,” “arbitrage modeling,” “autocorrelation,” and “Brazilian market” reflect a focus on past price patterns, investor excesses, and macroeconomic variables (emissions trading/money supply) that shape arbitrage opportunities in emerging markets.

Cluster 11 (Light Green): The dominant keywords “Asian stock markets,” “available-for-sale securities,” and “banking industry” describe how market psychology, earnings management, and technical trading create biases and opportunities in Asian stock markets, as well as how to use quantitative methods (fuzzy logic/bootstrap) to test behavioral finance phenomena. Cluster 12 (Navy Blue): The dominant keywords namely, “Asian futures markets,” “C32,” “corn price volatility,” and “efficient market” reflect the mapping of futures market dynamics centered on Asian markets, with a focus on price volatility, sentiment, and market efficiency. This indicates that investor behavioral anomalies and inaccurate information influence investment decision-making. Cluster 13 (Golden Yellow): The dominant keywords namely, “agent-based modeling,” “artificial stock market,” “bifurcation and chaos” reflect previous research that focused on stock market behavior as a complex adaptive system and utilized agent-based simulation models, as well as machine learning and high-volatility analysis. Cluster 14 Heather Purple: The dominant keywords namely, “adaptive market hypothesis,” “calendar anomalies,” “cognitive and emotional biases”) examine whether global capital markets are efficient by testing various market anomalies, investor biases, and volatility fluctuations, and by comparing the Efficient Market Hypothesis (EMH) and the Adaptive Market Hypothesis (AMH). Cluster 15 (Turquoise): The dominant keywords namely, “air quality level,” “anomalies,” and “arbitrage pricing theory” describe environmental, psychological, social, and public policy factors that influence trading behavior, investor sentiment, and price formation in the stock market.

Cluster 16 Sunrise Orange: the dominant keywords are (“asymmetric behavior,” “behavior,” “cross-quantilogram,” “CSAD”) describe the dynamics of collective investor behavior, asymmetric reactions to information, market sentiment, and seasonal effects on stock returns using modern quantitative methods (wavelet, quantile regression, state-space).

Cluster 17 Brown to Gray Tones: the dominant keywords are (“ABIC,” “Bayesian three-layer perceptron,” “Karachi Stock Exchange (KSE)”) describe the dynamics of extreme volatility, investor behavior, and trading biases at the Karachi Stock Exchange (KSE) using a machine learning approach (Bayesian Neural Network), advanced time series analysis, and neuroeconomics.

Cluster 18 (Light Pink): The dominant keywords namely, “Bayesian model,” “billionaire investor George Soros,” and “Bohm-Vigier stochastic model” describe unconventional theoretical and experimental approaches to financial market behavior including probabilistic quantum models, behavioral heuristics, and market economic philosophies to explain excessive volatility, market imbalances, and prediction anomalies. Cluster 19-50 (Gray): The dominant keywords “behavioral effects,” “behavioral factor,” and “boom and bust” describe the impact of behavior, economic narratives, and social norms on market reactions, valuation formation, and boom-bust cycles, particularly in the property and real estate sectors.

The coding results identified 14 behavioral trends that are most frequently studied: self-attribution, gender, herding, heuristics, the illusion of control, irrationality, the Hippocrates personality model, information transparency, social media, self-confidence, experimental behavior, moral attitudes, mood, and cognitive biases. The coding results are presented in the following Figure 4.2.

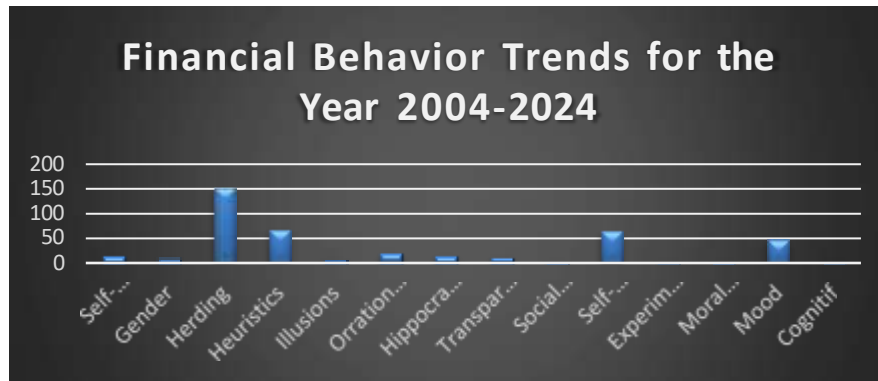


Figure 3 Analysis of Trends in Financial Behavior Based on a Literature Review

Figure 3, This study presents trends in behavioral finance research from 2004 to 2024, in which 153 articles discuss herding behavior. Additionally, 257 articles examine the influence of self-attribution, gender, heuristics, the illusion of control, irrationality, the Hippocrates personality model, information transparency, social media, self-confidence, experimental behavior, moral attitudes, mood, and cognitive biases on investment decision-making.

Figure 4 shows the trends in previous research on behavioral finance over a 21-year period. The color of each circle indicates the average publication year of documents using that keyword. First, the blue-purple color indicates older topics (2004–2010) in behavioral finance studies related to financial crises, price dynamics, rationality, GARCH, and accounting practices. Behavioral finance studies focused on the global financial crisis (e.g., 2008), price volatility, and classical statistical models (GARCH).

Second, the color green indicates emerging topics (2012–2017), namely investor behavioral biases such as overconfidence bias, stock returns, decision-making, and bounded rationality that influence decision-making. Second, the color green indicates emerging topics (2012–2017), namely investor behavioral biases such as overconfidence bias, stock returns, decision-making, and bounded rationality that influence decision-making.

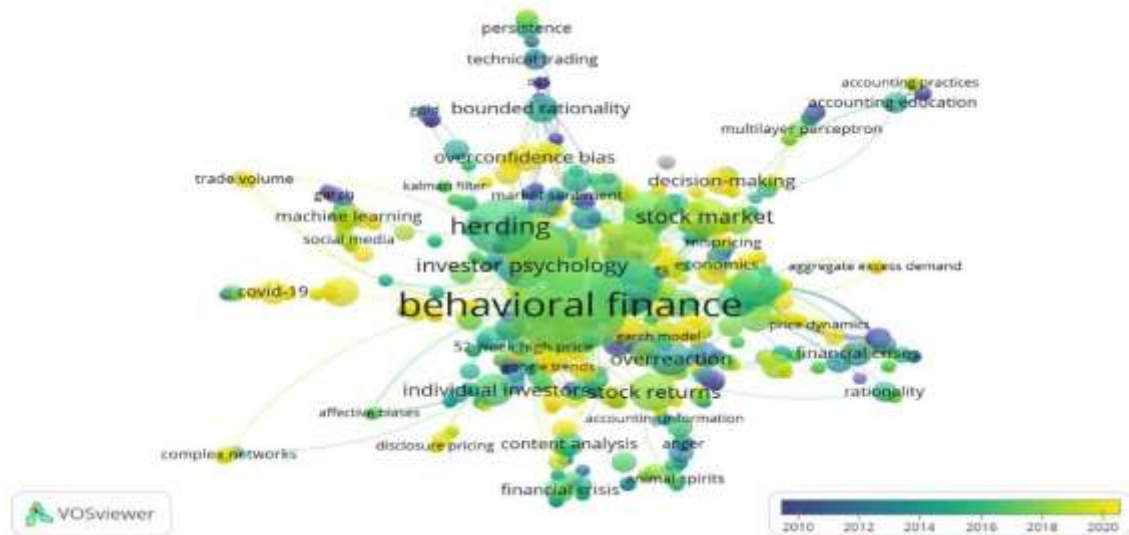


Figure 4 Results of the Vos Viewers Visualization Overlay

One widely used method is Structural Equation Modeling (SEM) (Effendi, 2023; Pandey & Jessica, 2019a; P.H. & Uchil, 2020). Other methods include GARCH (Generalized Autoregressive Conditional Heteroscedasticity), NCR (Nominal Comparative Ranking), laboratory and field experiments (Ilomäki, 2012), surveys and questionnaires, and data analysis (Big Data, Study Event). The use of big data remained rare during that 21-year period.



Figure 5 Density Visualization Results from Vos Viewers

Next, Figure 5 shows the trend levels of the tested variables, where the main trend variables highlighted in yellow are investor psychology, overconfidence bias, herding behavior, stock returns, decision-making, and bounded rationality. Variables with moderate trends are colored green: market sentiment, mispricing, affective biases, animal spirits, and content analysis. Variables with new or specific trends are colored dark blue: COVID-19, machine learning, social media, and complex networks. The trends of these variables continue to evolve to this day. The variables identified here offer opportunities for future research.

Uncovering the Triggers of Investor Behavioral Biases: A Synthesis of Two Decades of Behavioral Finance Research

Herding

Herding behavior is defined as the tendency of investors to make investment decisions by following the actions of many other investors without considering their own information and analysis. This behavior reflects irrational decision-making, as investors assume that the collective judgment of other market participants provides a more reliable basis for investment choices (Mertzanis & Allam, 2018). Herding is the tendency to follow others to avoid negative judgments regarding failed decisions or to reduce the burden of losses when similar problems occur (Yuniningsih & Santoso, 2021). This is caused by excessive fear. In addition, the herding phenomenon shows that investors act irrationally by following the opinions of others (Al-mansour, 2020), going with the flow, and disregarding or ignoring personal information in their decision-making (Jabeen et al., 2022) (Komalasari, 2016). Herding was commonly observed during crises caused by pandemics (COVID-19 and SARS) (Chang et al., 2020). Intense market pressures limit the time available to investors to gather and evaluate reliable information, thereby prompting them to mimic the investment decisions of others. Information asymmetry is a driving factor behind this mimicking behavior, particularly during periods of liquidity crisis (Javaira & Hassan, 2015).

Furthermore, previous research during this period highlighted the significant role of herding behavior in shaping investors' decision-making and market participation Quaicoe & Eleke (2021); Lao & Singh (2011); (Hon et al., 2015), (Bhaduri & Mahapatra, 2013), (Ah Mand & Sifat, 2021), Mertzanis & Allam (2018), and (P.H. & Uchil, 2020). An interesting finding from the study by Fenzl & Pelzmann (2012) is that herding behavior arises from social and psychological contagion processes in financial markets that spread through both direct and indirect contact. Therefore, herding behavior does not occur suddenly, and market participants may inadvertently be influenced by others in their behavior. Herding is said to be a major factor influencing market decision-making. This motivates investors to take on excessive risk and leads to excessive volatility in the market (Arjoon & Bhatnagar, 2017) (Fenzl & Pelzmann, 2012), (Chauhan et al., 2020), (Reddy et al., 2024), and has the power to disrupt market equilibrium and undermine market efficiency (Mishra & Mishra, 2023) (Bekiros, 2015).

Overconfidence

Overconfidence means that investors have an exaggerated sense of their knowledge, analytical abilities, and investment judgment. This bias may lead investors to underestimate uncertainty and risk, resulting in overly optimistic and assertive investment decisions that are not always supported by comprehensive evaluations of market conditions and stock price movements (Zia et al., 2017; Shanmuganathan, 2020). Overconfidence is a calibration error because there is a mismatch between the level of confidence and the actual level of accuracy, and it is one of the biases that is easier to address compared to other behaviors (Menkhoff & Nikiforow, 2009). (Prosad et al., 2015) assert that an investor's main problem lies within themselves, so that internal psychological factors become the primary obstacle for investors. Therefore, overconfidence as a manifestation of the disposition effect in an individual's behaviour can be prevented and treated. Overconfidence is influenced by emotional expectations regarding stock returns (Prosad et al., 2015); investors tend to underestimate stock price risks, and their desire to trade begins to escalate uncontrollably (Inaishi et al., 2010). Overconfidence arises when engaging in trading after a period of consistent profits (Kourtidis et al., 2010; Alsabban & Alarfaj, 2020). Overconfidence is influenced by micro- and macro-level conditions (Rzeszutek et al., 2020). Thus, sound investment decisions are fundamentally psychological in nature and are significantly influenced by investors in shaping their beliefs (Fong, 2021), (Kumari & Sar, 2017), (Kukacka & Barunik, 2013), (Xia & Madni, 2024), (Jiang & Li, 2020), (Hafez, 2021).

Heuristics

The findings of Ogunlusi and Obademi (2021) indicate that heuristic biases significantly influence individual investment decisions. Shah et al. (2018) explain that investors adopt a heuristic approach when faced with complex decision-making environments. Investors tend to believe that a company's current performance accurately reflects its overall condition, which will continue into the future (Parveen et al., 2020).

Therefore, heuristic investors overreact to prominent and similar information about the company from the past (Boussaidi, 2013a). A study by Parveen et al. (2020) found that overconfidence influences heuristic behavior and investment decision-making. However, Shah et al. (2018) demonstrated that heuristic biases have a negative impact on investment decisions in the PSX stock market. Haroon Rasheed et al. (2021) and Charles & Cassidy (2015) found that Agreeableness, Extraversion, Conscientiousness, Openness, and Neuroticism have a significant effect on heuristic behavior. Meanwhile, novice investors tend to rely on dominant outcome heuristics, while experienced investors tend to make ill-considered investment decisions or fail to carefully weigh various factors (Kumaran, 2013). Other empirical findings support the existence of heuristic behavior among investors and contribute to market inconsistencies. Thus, heuristics are a cause of stock market anomalies (Ilomäki, 2012) (Brahmana et al., 2012) (Abdin et al., 2017) (Lam et al., 2012) (Shah et al., 2018). However, heuristic bias does not always lead to negative outcomes. In other words, bias sometimes helps investors choose the best course of action and make fewer costly mistakes (Pandey & Jessica, 2019).

Transparency of Information

Gaps in information availability may result in inconsistencies between underlying conditions and reported values. Consequently, investors tend to prioritize the timeliness of information and its anticipated market impact over assessments of its accuracy (Oberlechner & Hocking, 2004). The available information is at a low equilibrium point, and there is inequality in people's access to information (Lightfoot & Wisniewski, 2014) (Bossan et al., 2015). This statement is supported by (Naveed et al., 2020), who assert that stock market investments involve a high degree of uncertainty relative to the risks involved, thus requiring transparency (see also (Deshmukh et al., 2008), (Shantha Gowri & Ram, 2019), Zhang et al., (2022), and (Afik & Lahav, 2015). Investor behavior depends on the level of information dissemination, the content of the information, the impact of the information, internal and external factors, and the investor's circumstances under specific conditions (Shantha Gowri & Ram, 2019). Firms should recognize the mismatch between corporate information disclosure and investors' information needs and ensure that environmental and social factors are adequately integrated into their disclosure frameworks. This situation has led investors to gain insight into the usefulness of information and its role in predicting future business prospects (Naveed et al., 2020) (Jan et al., 2022) (Jaiyeoba & Haron, 2016). Investors tend to refrain from seeking additional information when initially exposed to negative news, whereas they are more likely to pursue further information following positive news (Gong et al., 2019). This behavior suggests a preference for avoiding ambiguity and managing cognitive discomfort associated with unfavorable information. Consequently, researchers argue that investors exhibit lower sensitivity to information uncertainty after receiving negative news than after receiving positive news.

The findings of Jan et al. (2022) indicate that the information available determines the extent to which psychological biases influence investors' decision-making processes during the COVID-19 pandemic. In addition, Tauni et al. (2017) reported that psychological processes may lead investors to behave irrationally and prevent them from fully incorporating market information into their decisions. This tendency is also influenced by individual personality traits, which shape how investors process and interpret available information (Jagric et al., 2010).

Mood

Various studies show that an investor's emotions influence decision-making (Audrino et al., 2020). Specifically, negative moods are associated with pessimistic assessments and more conservative decisions, while positive moods tend to generate optimism and more favorable evaluations in investment decision-making processes (Kashif et al., 2020). This factor is caused by the interaction between emotions and cognitive judgments that occurs during the decision-making process (Coşkun, 2023). Investors' moods are often influenced by the opinions of others (Li et al., 2019).

Bhatti. R. K., (2022) explains that mental and emotional processes significantly influence investors' mood and motivation. Goodell et al. (2023) explain that there are two types of emotional triggers that affect investor sentiment: external events (such as political developments, sports, disasters, and others) that trigger primary emotions (anger, fear, and joy), and internal events or secondary emotions (optimism, frustration, envy, and others).

Self Attribution

Attribution bias is a behavioral tendency in which investors credit successful investment outcomes to internal factors such as skill or competence, while externalizing responsibility for unsuccessful outcomes by attributing them to situational or environmental factors (Mushinada, 2020).

Attribution bias tends to mislead investors in objectively evaluating alternatives, causing them to become trapped in overconfidence (Nguyen et al., 2023). Self-serving attribution reflects an effort to be taken seriously that influences the audience's perception or a desperate attempt to maintain a desired self-image (Mittal, 2022). A study by Mushinada (2020), involving 384 investors in the Indian stock market, used Structural Equation Modeling (SEM) to examine the relationship between self-attribution bias, overconfidence bias, and rational investment decision-making. The analysis was framed within the context of the Adaptive Market Hypothesis (AMH), thereby emphasizing the significant role of behavioral biases in shaping investor behavior. The results of the study show that investors' inability to evaluate alternatives objectively causes them to fall prey to behavioral biases, particularly self-attribution bias and overconfidence. Investors tend to adjust their strategies and focus on fundamental aspects of investing when facing losses. This means that investors act irrationally and this affects their decision-making process, while they continue to try to adapt to market changes, as explained in the AMH concept.

Gender

Studies have found that gender can influence the psychology of investment decision-making. A study by Kumar & Goyal (2016) shows that men tend to be more influenced by rational decision-making than women. Male investors seek information from various sources, such as newspapers, magazines, and other relevant websites, and as a result, they tend to be more rational (Lin & Lu, 2015). Furthermore, men are more confident than women when processing limited and private information (Filbeck et al., 2017). A study by Ozyeyi et al. (2022) explains that men have higher risk tolerance scores than women.

Research shows that gender can influence the psychological aspects of investment decision-making. Kumar and Goyal (2016) found that male investors tend to be more influenced by rational decision-making than female investors. These findings suggest that gender differences are not only related to demographic characteristics but also to how investors acquire, evaluate, and use information in the decision-making process. Male investors tend to place greater emphasis on analyzing information and making objective assessments before determining their investment choices.

This tendency is supported by Lin and Lu (2015), who explain that male investors are more active in seeking information from various sources, such as newspapers, magazines, and relevant websites. This broader information-seeking behavior suggests that male investors tend to conduct a more in-depth evaluation of investment alternatives. However, high engagement in information seeking does not always result in more optimal decisions, as it can increase the likelihood of psychological biases if investors become overly confident in their own analytical abilities. In addition to information-seeking behavior, self-confidence is also a key factor distinguishing investment behavior by gender. Filbeck et al. (2017) found that male investors exhibit higher levels of self-confidence when processing limited and private information. High levels of self-confidence can help investors make decisions more quickly when facing market uncertainty. However, under certain conditions, excessive self-confidence can increase the risk of overconfidence bias, such as a tendency to overtrade or ignore investment risks.

Ozyeyi et al. (2022) demonstrated that male investors have a higher risk tolerance than female investors. This finding suggests that gender differences are also related to how investors perceive risk and potential returns. Investors with higher risk tolerance tend to be more willing to choose investment instruments with higher volatility because they expect higher returns.

Conversely, investors with lower risk tolerance tend to choose more conservative investment alternatives. These findings indicate that the influence of gender on investment decisions stems not only from analytical ability but also from a combination of information-seeking behavior, self-confidence, and risk preferences. Thus, differences in investment behavior between men and women can be understood as the result of the interaction between cognitive and psychological factors that shape how investors process information and cope with uncertainty in financial markets.

Investor Personality/Hippocrates

Hippocrates personality types are unique and each has its own distinct characteristics that cannot be compared to one another. According to Chin (2021), individuals with high levels of Neuroticism, Openness, and Agreeableness tend to exhibit emotional instability, are more receptive to new information, and are more likely to adjust their trading decisions in response to ongoing market dynamics. Meanwhile, investors with high Extraversion and Conscientiousness were not significantly affected by the COVID-19 pandemic. Research by Tauni et al. (2018) found that the traits of Openness, Agreeableness, and Conscientiousness can increase trading frequency and have a positive effect on decision-making. Conversely, Extraversion and Neuroticism reduce trading frequency and lead to irrational behavior. (Leitch & Sherif, 2017) recommend that media outlets supplement their information channels with comprehensive analytical coverage to maintain the quality of investment decisions.

Social Media

Social media plays a key role in shaping investors' perceptions of risk, market sentiment, and emotional states (Li et al., 2014). The information available and the opinions constantly shared on social media platforms can encourage investors to mimic or follow the dominant investment trends in the market. News on social media has a significant impact on the psychological aspects of stock market volatility (Liang et al., 2020). Research (Thagaram et al., 2023) indicates that social media is the most significant indicator influencing investment decisions. Singh (2021), through a bibliometric analysis, highlights social media as the most dominant and emerging theme in behavioral finance research. Consistently, Agarwal et al. (2019) and Bodaghi & Oliveira (2024) report that investors predominantly rely on platforms such as Google, Twitter, and online stock discussion forums as key sources of investment-related information.

Several studies provide evidence that fake news disseminated through social media significantly affects stock returns. Arcuri et al. (2023) found that false information containing negative sentiment tends to lead to a decline in stock returns over the short term. In contrast, positive and neutral fake news do not exhibit a significant or consistent impact on stock returns (Yang et al., 2019; Aloosh & Ouzan, 2020). These findings suggest that markets react more strongly to bad news, as reflected in heightened volatility. (Sakariyahu et al., 2023; Caporale et al., 2016). Conversely, an increasing flow of positive news on social media may lead investors to be willing to pay higher prices for the same stocks (Yuanyuan et al., 2023).

Limitations of Previous Studies

Of the 410 research articles reviewed between 2004 and 2024, 357 focused on self-confidence, mood, herding, and heuristics. Meanwhile, 53 articles addressed self-attribution, gender, illusions, the Hippocratic personality, information transparency, experimental behavior, and social media. First, a study on self-An attribution analysis by Mittal (2022) shows that most investors in India exhibit self-attribution bias. The limitations of this study stem from the use of aggregate data, which restricts the ability to capture and analyze actual investor behavior at both the portfolio and individual levels. Research on self-attribution remains scarce, particularly studies involving experiments designed with input from multidisciplinary experts. Mushinada (2020) also examined self-attribution in the Indian stock market. The limited sample size is a limitation of this study, which focused solely on retail investors. Additionally, the observation period was short, making it impossible to identify events that occurred after the crisis. The self-attribution study by Kubilay & Bayrakdaroglu (2016) has limitations in its use of cross-sectoral personality measures and self-report instruments, which are prone to reporting errors and limit the ability to draw conclusions for decision-making. Furthermore, the study did not include real transaction data, making it difficult to assess whether the survey results reflect actual actions, such as trading frequency or portfolio rebalancing.

Second, gender, which refers to the influence of gender on investor behavior. It is necessary to comprehensively understand how gender affects investors' perceptions and behavior, particularly its impact on various types of investor groups. Previous studies have shown that female brokers are more focused on female clients than on male clients, although male investors tend to accept advice if their advisor is a woman. On the other hand, Tauni et al. (2018) find that male financial advisors are perceived as more trustworthy, leading investors to be more willing to follow their recommendations compared to female brokers, even though the advice provided by male brokers is associated with higher levels of risk. A limitation of this study is that it does not clarify which factor the influence of female or male brokers is most dominant in investment decision-making. A further limitation is that the majority of existing research is based on short-term literature reviews, which may not sufficiently capture or highlight cross-country contextual differences (Ozgreen & Akturk, 2022).

Third, investors with a high degree of the illusion of control tend to make quick and bold investment decisions more frequently. Tauni et al. (2018) show that the illusion-of-control bias in financial behavior affects both securities investors and real-asset investors. Limitations of previous research include the fact that the illusion of control has not been extensively studied, and there is a lack of longitudinal approaches to observe changes in perceptions of the illusion over time. Additionally, there is a lack of analysis regarding the differing effects of the illusion of control on investors across various asset classes and levels of investor experience.

Fourth, Hippocrates emphasizes the role of personality in individual decision-making processes. Chin (2021) examines the relationship between personality traits and trading behavior during crisis periods, particularly in developing countries. Lai (2019) and Tauni et al. (2017) examined the influence of personality (extraversion, neuroticism, and openness) on risk and investment decisions. However, in-depth research on how investors' psychological characteristics specifically personality traits that influence financial behavior in specific and varied ways (e.g., the Big Five Personality Traits) has not yet been widely conducted, and research.

Fifth, the transparency of publicly available information helps in predicting future investment prospects. The results of the article's analysis show that most studies only provide a general overview of the availability or transparency of information but have not addressed the quality of the information in terms of accuracy, transparency, and relevance. Most research on information transparency merely compares information in terms of quantity (Jan et al., 2022; Zhang et al., 2022; Tauni et al., 2017). No studies have yet shown the existence of simultaneous effects or moderating effects in the relationship between psychological biases and information transparency that trigger irrational behavior.

Sixth, there are still few studies examining experimental behavior in investment decision-making. No studies have been found in the research database that test moderation or mediation variables related to experimental behavior. Another limitation is the insufficient use of theory, which results in an inability to fully capture the complexity of the phenomenon under study. For example, Darmayanti et al. (2022) relied exclusively on prospect theory in their study. This opens up new avenues for research using other theories to compare the explanatory power of various behavioral theories in explaining investor decisions.

Future Research Directions

Some topics that have been rarely studied and for which further research is needed include self-attribution, gender, the illusion of control, the Hippocratic personality, information openness, experimental behavior, and social media. The limitations identified open up opportunities for future researchers. First, research on self-attribution is limited by the scarcity of studies using experimental methods and surveys specifically designed to address psychological aspects, particularly those focused on the Indian market and existing aggregate data. Future studies are encouraged to utilize longitudinal research designs to capture the dynamic nature of self-attribution, integrate psychology based experimental and survey methodologies to assess individual-level effects, conduct cross country comparisons between developed and developing economies, and examine the implications of self-attribution for portfolio management strategies and investors' risk tolerance.

Second, there are limitations in previous research regarding inconsistencies in the influence of female and male brokers on investment decision-making. Furthermore, there is a lack of gender-based research on financial behavior across countries and contextual variables. Future research could include cross-cultural or cross-national studies comparing the influence of gender on decision-making, focusing on the interaction between the gender of the investor and the gender of the broker. Additional research could explore the moderating effect of gender on other behavioral biases, the use of mixed methods to understand investors' gender perceptions, meta-analyses to ensure the accuracy of statistical results, and the development of qualitative methods.

Third, the illusion has limitations in quantitative studies and a lack of longitudinal and comparative approaches. Future research could develop analytical frameworks for comparing the illusion of control among experienced and novice investors, using quantitative methods or conducting laboratory experiments, and examine how the impact of this illusion varies across different asset classes (e.g., stocks, cryptocurrencies, real estate, and so on).

Fourth, the Hippocrates personality model has limitations in that studies have been conducted only in developing countries and have overlooked other personality approaches. Future research should examine the influence of personality in developed countries during specific periods (e.g., economic crises), integrate the Big Five model with classical personality theory, conduct personality tests to assess other financial biases, and examine the moderating role of personality in the relationship between information and decision-making.

Fifth, information transparency has limitations in that it focuses solely on the quantity of information, and there has been no research to date examining the moderating role of information transparency on behavioral biases. Future research should examine the quality of information (e.g., transparency, accuracy, and relevance) in relation to decision-making; test the role of information transparency as a moderator in the relationship between psychological biases and investor behavior; and conduct studies in developing countries (other than India and China).

Sixth, the experimental design has limitations due to the scarcity of moderating and mediating variables used in the study, as well as its reliance on a single theory (Prospect Theory). Future research could incorporate various theories depending on their suitability for the scope of the study (e.g., Mental Accounting, Theory of Planned Behavior, and Regret Theory), the need to develop conceptual frameworks for moderation and mediation in explaining investment decisions, and the testing of concepts related to emotions, cognition, and external context.

Seventh, social media research has limitations, as few studies have tested and utilized real-time data from social media platforms, and few studies have examined the specific influence of social media (e.g., news media, TikTok, Facebook, etc.) on investor decision-making. Future research could utilize big data and machine learning to analyze sentiment on social media (Twitter, Stockwits, and Reddit), develop a market sentiment index based on social media activity, and conduct comparative tests of investor reactions to stock market information from social media.

CONCLUSION

This study aims to systematically examine trends in investor behavioral finance in financial decision-making by analyzing 410 articles published between 2004 and 2024. Unlike previous studies, this research focuses on behavioral finance for investors and stakeholders (Valcanover et al., 2020). The development of behavioral finance over the past 30 years calls for more innovative research approaches to effectively identify future research directions. In addition, a comprehensive review of previous articles was conducted to summarize existing behavioral finance biases and provide a deeper understanding of behavioral finance trends among investors in the context of investment decision-making. A total of 153 articles discussed herd behavior, while 257 articles discussed self-attribution, gender, heuristics, the illusion of control, irrationality, the Hippocratic personality, information transparency, social media, self-confidence, experimental behavior, moral attitudes, cognitive biases, and mood as factors influencing investment decision-making. Psychological biases and social factors influence decision-making, particularly in financial behavior theory. Investors who act irrationally are often influenced by cognitive biases, emotions, personality, the information they receive, and their social environment. Previous research findings have shown that behavioral finance is influenced by economic factors, market information, individual psychology, and social interactions.

Behavioral finance research is still dominated by a few topics, namely overconfidence, mood, herding, and heuristics. Other topics, such as self-attribution, gender, the illusion of control, investor personality, information transparency, experimental behavior, and social media, have not yet been extensively studied. Furthermore, previous research has focused on emerging market stock markets using a quantitative cross-sectional approach. Few studies have utilized longitudinal analysis, big data, real-time social media data, or models that comprehensively integrate psychological and social factors with investor characteristics. This means that behavioral finance research offers opportunities for further development, particularly in areas of investor behavior that have been relatively under-researched. Future research should adopt longitudinal and experimental approaches, utilize big data and real-time social media sentiment analysis, develop multidimensional models, and expand the research context to include cross-country studies. Collectively, these efforts seek to deepen the understanding of behavioral finance, promote greater financial literacy, minimize the influence of behavioral biases, and establish a robust foundation for evidence-based policymaking in financial markets.

Theoretically, this study enriches the behavioral finance literature by offering a holistic perspective on the psychological, social, and informational determinants of investment decision-making. The research findings show that investors do not always act rationally as predicted by traditional financial theory, thereby highlighting the importance of behavioral finance in understanding financial market behavior. The practical implications of this study for investors, companies, regulators, and financial education institutions lie in understanding and managing behavioral biases that can influence decision-making. The research findings emphasize the importance of financial literacy, the provision of transparent and high quality information, the strengthening of stock market policies and oversight, the use of social media, sentiment analysis, and big data to understand investor behavior and support more effective financial decision-making.

The limitations of this study lie in several points. First, the literature search was restricted to ScienceDirect, Google Scholar, and Publish or Perish, which may have limited the scope of the reviewed studies. Future research should expand the data sources to include databases such as Scopus and Web of Science in order to achieve more comprehensive and reliable results. This study did not use Scopus and Web of Science as primary search databases due to institutional access limitations, limitations in systematic search compatibility, and a research focus that emphasizes conceptual synthesis over large-scale bibliometric analysis. However, to ensure the quality of the articles, this study still verified the journals' reputations through Scopus indexing and the Scimago Journal Rank (SJR). Thus, the articles included in the final synthesis were sourced from journals with adequate academic quality and reputation. Although this approach allows researchers to obtain articles relevant to their research focus, the use of a limited number of databases also has the potential to result in some relevant studies from other databases going unidentified. Therefore, future research is recommended to use broader databases, such as Scopus and Web of Science, to expand the scope of the literature and strengthen the generalizability of the research findings. Second, while bibliometric analysis and word cloud visualization provided valuable insights into publication trends and thematic patterns, they offered limited discussion of the underlying conceptual aspects of the research field. Future studies should consider longitudinal investigations, the inclusion of additional databases, a broader time horizon, and the use of diverse research methods such as mixed-methods, interviews, and experiments to provide deeper and more comprehensive insights.

Further research is recommended to explore topics in behavioral finance that have not yet been fully addressed, such as self-attribution, gender, the illusion of control, investor personality, information transparency, experimental behavior, and social media. Future studies should consider employing longitudinal and experimental research designs, together with big data analytics and sentiment analysis, to provide deeper insights into the complexities of investor financial behavior.

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