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Investor Behavior: The Roles of Green Finance Literacy, Herding, and Overconfidence through Risk Perception

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Abstract
Purpose: This study provides empirical evidence on the roles of green finance literacy and behavioral biases in shaping investors' behavior by considering the mediating role of risk perception.
Research Methodology: Primary data were collected from 157 Indonesian retail investors using purposive sampling. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.
Results: Green finance literacy positively affected investors' behavior and risk perception. Herding behavior influenced risk perception but had no direct effect on investors' behavior, while overconfidence positively affected investors' behavior but not risk perception. Risk perception positively influenced investors' behavior and mediated only the effect of green finance literacy.
Conclusions: Investors' behavior is jointly influenced by sustainable financial knowledge, behavioral biases, and risk evaluation. Risk perception serves as a key mechanism linking green finance literacy to investors' behavior.
Limitations: This study was limited to Indonesian retail investors and employed a cross-sectional research design.
Contributions: This study advances the behavioral finance and sustainable finance literature by providing new empirical evidence on the mediating role of risk perception in shaping investment decisions, thereby extending existing models beyond direct-effect relationships. The findings offer practical implications for developing investor education strategies and strengthening regulatory approaches in Indonesia.

Keywords: *Behavioral Biases, Green Finance Literacy, Investors' Behavior, Risk Perception*

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1. Introduction

The development of the financial sector has increasingly incorporated sustainability considerations into investment and financial decision-making. Sustainable finance has emerged as an important approach for integrating environmental and social considerations with conventional financial objectives(Kouwenberg & Zheng, 2023). This development has encouraged the expansion of financial instruments and investment activities that consider sustainability-related opportunities and risks. In Indonesia, this trend is reflected in the continuing development of sustainable finance policies and instruments, including green bonds and other green financial products. The development of the Indonesian green bond market also indicates increasing attention to sustainable financial instruments and their financial characteristics (Wahyuningsih et al., 2025). As sustainable financial products

become more accessible, investors are increasingly required to understand not only conventional financial considerations but also sustainability-related information and risks.

At the same time, the rapid growth of participation in financial markets has increased the importance of investors' financial knowledge and behavior. Greater access to financial products does not necessarily ensure that investors possess sufficient knowledge to make appropriate financial decisions. This issue becomes more relevant as investors encounter increasingly diverse financial products and information through digital platforms. Green finance literacy is therefore important because it extends financial knowledge to include an understanding of sustainable financial products, environmental considerations, and the risks and opportunities associated with green finance. Investors with adequate green finance literacy may be better positioned to interpret relevant information and incorporate sustainability considerations into their financial decisions.

The relationship between financial literacy and financial behavior also involves the intention to act. Risman (2024) argues that financial literacy contributes to the development of financial behavior because knowledge provides an important basis for understanding and evaluating financial alternatives. However, knowledge alone does not automatically determine behavior; the intention to use such knowledge in financial decision-making is also relevant. In this sense, green finance literacy may influence investors' financial behavior by strengthening their understanding of sustainable financial alternatives and supporting their intention to apply that knowledge when making financial decisions(Henseler, Ringle, & Sarstedt, 2015). Thus, examining green finance literacy provides an important perspective for understanding how financial knowledge may be translated into investors' actual financial behavior(Almansour, Elkrghli, & Almansour, 2023).

Financial behavior, however, is not determined by financial knowledge alone. Behavioral finance recognizes that investors may be influenced by psychological and social factors, including herding behavior and overconfidence. Herding occurs when investors tend to follow the actions or opinions of other market participants, whereas overconfidence reflects excessive confidence in one's own knowledge, judgment, or ability. These behavioral tendencies may become increasingly relevant in digital financial environments where investment information, opinions, and the activities of other investors can be accessed rapidly. Social interaction is widely regarded as an important source of herding behavior in financial decision-making, as individuals are exposed to the investment opinions, experiences, and decisions of others, which may in turn influence their own judgments(Filippini, Leippold, & Wekhof, 2024).

In addition to financial literacy and behavioral biases, investors' financial behavior may depend on how they perceive financial risk. Risk perception reflects investors' subjective assessment of uncertainty and potential consequences associated with financial decisions(Shanmugam, Chidambaram, & Parayitam, 2022). Financial knowledge may influence how investors recognize and evaluate such risks, while behavioral tendencies may also shape their interpretation of uncertainty. Nevertheless, the relationships among green finance literacy, herding behavior, overconfidence, risk perception, and investors' financial behavior have not been sufficiently integrated into a single empirical framework, particularly in the Indonesian capital market. Therefore, this study examines the effects of green finance literacy, herding behavior, and overconfidence on investors' financial behavior and investigates the mediating role of risk perception. By integrating financial knowledge, behavioral factors, and risk perception, this study seeks to explain more fully how these factors together shape investors' financial behavior in the Indonesian capital market.

2. Literature Review and Hypotheses Development

2.1 Behavioral Finance and Investors' Financial Behavior

Behavioral finance explains financial decision-making by recognizing that investors are influenced not only by economic considerations but also by psychological, emotional, and social factors. Unlike the assumption of fully rational decision-making, investors may exhibit biases and behavioral tendencies when processing information and responding to uncertainty. Prospect Theory of Kahneman and Tversky (1979) provides an important foundation by explaining how individuals evaluate gains

and losses under risk. In this perspective, investors' financial behavior may reflect psychological responses to perceived gains, losses, and uncertainty rather than objective financial considerations alone. Risman et al. (2021) similarly explain that behavioral finance emphasizes the influence of psychological factors and human behavior on financial decision-making.

Investors' financial behavior refers to the actions, attitudes, and habits involved in managing, planning, and responding to financial information and decisions. Within the capital market, financial behavior reflects how investors make decisions under conditions of uncertainty and is influenced by knowledge, emotions, social interaction, and behavioral biases (Risman, 2026). Financial behavior is therefore not necessarily the result of purely rational analysis, as investors may rely on simplified judgments, social influences, or confidence in their own abilities. Risman (2026) further emphasizes that financial behavior is intentional and planned, indicating that knowledge and psychological processes may contribute to the formation of financial actions.

Based the behavioral finance perspective, biases do not always produce negative outcomes. Certain biases may enable investors to make decisions more quickly, simplify complex financial choices, reduce excessive fear, manage psychological pressures such as fear and greed, and strengthen confidence when facing uncertainty (Risman et al., 2021). These characteristics are particularly relevant in financial markets where information and prices change rapidly. Therefore, understanding investors' financial behavior requires consideration of both rational factors, such as financial knowledge, and behavioral factors, including herding, overconfidence, and risk perception, which are examined further in this study. This is consistent with evidence from digital-based investment platforms in Indonesia, where financial literacy, overconfidence, and herding behavior were each found to significantly shape investors' decisions, underscoring the relevance of examining these factors jointly (Zima et al., 2025).

2.2 Green Finance Literacy and Investors' Financial Behavior

Green finance literacy refers to individuals' understanding of sustainable finance concepts, including green financial products, environmental considerations, and the risks and opportunities associated with sustainable financial activities. Adequate financial literacy can improve individuals' ability to process information and evaluate financial alternatives. Risman (2025) emphasizes that increased financial literacy can support the intention to improve financial behavior, including investors' behavior in making investment decisions. Therefore, green finance literacy may provide a cognitive foundation for investors to incorporate sustainability considerations into their financial decisions.

Empirical findings generally indicate a positive relationship between financial literacy and financial behavior, although the evidence is not fully consistent. Aren and Zengin (2016) found that green financial literacy positively influences sustainable investment behavior, while Xu et al. (2022) reported a positive relationship between financial literacy and financial behavior. In contrast, Bethlendi et al. (2022) found no significant effect of green financial literacy on financial behavior while Budiman and Vivien (2026) found that financial literacy indirectly shapes financial management behavior, suggesting the relationship may operate through additional mechanisms rather than a direct pathway. Similarly, Jonathan and Pradana (2025) found that financial literacy and cognitive biases jointly shape investment decisions, further illustrating that the translation of financial knowledge into investment-related actions is not always direct. Consistent with this, Yucel et al. (2023) found that sustainable finance literacy positively shapes investors' attitudes toward sustainable investment, while Aristei and Gallo (2024) and Lanciano et al. (2025) showed that financial knowledge and confidence remain key determinants of households' engagement with sustainable financial products. These differences suggest that the relationship between green finance literacy and financial behavior may depend on the mechanism through which financial knowledge is translated into actual financial actions. This is in line with evidence showing that digital financial literacy, alongside green fintech adoption, can enhance sustainable financial performance, indicating that financial knowledge and sustainability considerations are increasingly interconnected in the digital era (Purwantini et al., 2026).

From the perspective of behavioral finance, investors with greater green finance literacy may be better able to evaluate financial information, recognize relevant risks, and make more deliberate financial decisions. Such knowledge may encourage more planned and informed financial behavior rather than decisions based solely on market trends or psychological impulses. Based on the theoretical reasoning and empirical evidence, this study proposes the following hypothesis:

H_1: Green Finance Literacy has a positive effect on investors' financial behavior

2.3 Herding Behavior and Investors' Financial Behavior

Herding behavior refers to the tendency of individuals to follow the decisions or actions of others rather than independently evaluating available information. In financial decision-making, this behavior may arise from information limitations, social pressure, and the assumption that following the majority provides a safer basis for decision-making (Kumari et al., 2022). Social interaction and the increasing accessibility of investment information through digital platforms may further strengthen this tendency, as investors are continuously exposed to the opinions, experiences, and decisions of other market participants.

Previous studies generally indicate that herding behavior is associated with investors' financial behavior. Dar and Kumar (2023) found that herding encourages individuals to adjust their financial decisions based on collective information, while Yoon and Oh (2022) showed that social media sentiment strengthens herding behavior. Wanidwaranan and Padungsaksawasdi (2022) found that high investor attention to market information increases herding tendencies, while Ahn et al. (2024) reported that economic uncertainty encourages greater reliance on collective behavior. Prihanto and Risman (2025) further concluded that herding-related behavior contributes to unstable investor behavior influenced by market sentiment. Similar findings were reported by Shah and Hussain (2024) and Soraya et al. (2023), who found that herding behavior influences investor behavior and investment decisions.

Although these findings generally support a positive relationship, much of the previous research has focused on investment decisions or short-term market responses rather than financial behavior more broadly. This suggests a need to examine whether herding behavior influences investors' financial behavior beyond specific investment activities. Based on the behavioral finance perspective and the empirical evidence, this study proposes the following hypothesis:

H_2: Herding Behavior has a positive effect on investors' financial behavior

2.4 Overconfidence and Investors' Financial Behavior

Overconfidence refers to the tendency of individuals to overestimate their knowledge, ability, or accuracy in making financial decisions. This bias may cause investors to rely excessively on their own judgments and underestimate relevant information or potential risks. Empirical evidence indicates that overconfidence is associated with excessive trading and greater risk-taking. Qureshi, Iqbal, and Sultana (2022) found that overconfidence bias significantly affects investment performance, with risk propensity mediating the extent of its influence, while Singh, Malik, and Jha (2024) showed that overconfidence increases risk-taking through excessive confidence in one's predictive ability.

Previous studies further indicate that overconfidence can influence financial behavior through different forms of decision-making bias. Inghelbrecht and Tedde (2024) reported that overconfident individuals tend to rely more heavily on their own beliefs than on relevant external information. Jonathan and Pradana (2025) found that overconfidence bias moderates the relationship between financial literacy and investment decisions, exhibiting a negative influence, indicating that overconfident investors may not fully translate their financial knowledge into better decisions. Agustin, Ariffendi, Satiti, and Karina (2026) found that overconfidence increases risk propensity while reducing the mediating role of financial literacy, suggesting that behavioral biases can weaken the extent to which financial knowledge translates into rational investment decisions. In a similar vein, Shunmugasundaram and Sinha (2025) found that overconfidence and disposition effects serially

mediate the influence of behavioral biases on investment decisions, while Kumar and Chaurasia (2024) reported a consistent positive association between emotional biases, including overconfidence, and investment decisions across multiple studies.

Although previous studies generally indicate a relationship between overconfidence and financial behavior, many have focused primarily on investment activities such as trading frequency, portfolio performance, or risk-taking. The broader relationship between overconfidence and investors' financial behavior, particularly when combined with other factors such as green finance literacy and risk perception, remains less explored. Based on the behavioral finance perspective and the empirical evidence, this study proposes the following hypothesis:

H_3: Overconfidence has a positive effect on investors' financial behavior

2.5 Green Finance Literacy and Risk Perception

Green finance literacy reflects an individual's ability to understand financial concepts that incorporate sustainability considerations, including environmental risks and their implications for financial decisions (Anderson, & Robinson, 2022; Bethlendi, Nagy, & Póra, 2022). Adequate knowledge enables individuals to interpret complex risk information more systematically and evaluate financial alternatives beyond short-term returns. Investors with higher green finance literacy are therefore expected to develop a more informed and measured perception of financial risk.

Previous studies support the relationship between financial knowledge and risk perception. Saivasan and Lokhande (2022) and Ahmed, Rasool, Saleem, Khan, and Kanwal (2022) indicate that individual cognitive characteristics and understanding contribute to differences in risk perception. Consistent with this, Suresh (2024) found that financial literacy and ESG-related risk perception jointly influence individual investment interest, providing further evidence that financial knowledge shapes how risk in sustainability-related investment is perceived. These findings suggest that financial knowledge can strengthen investors' ability to identify, interpret, and evaluate uncertainty rather than relying solely on intuition or incomplete information.

For sustainable finance specifically, greater green finance literacy may increase investors' awareness of financial and sustainability-related risks, leading to a more deliberate assessment of potential consequences. Thus, investors who understand green finance may be better able to recognize and evaluate risks associated with financial decisions. Based on this reasoning and the empirical evidence, the following hypothesis is proposed:

H_4: Green Finance Literacy has a positive effect on risk perception

2.6 Herding Behavior and Risk Perception

Herding behavior reflects the tendency of individuals to adjust their judgments and decisions to the actions of the majority, particularly under conditions of uncertainty (Yoon & Oh, 2022). In financial markets, this tendency may reduce reliance on individual analysis and increase dependence on social signals. As a result, investors' risk perception may be influenced by collective views, causing perceived risk to become lower when market sentiment is optimistic or higher during collective pessimism.

Previous studies support the relationship between herding behavior and risk perception. Kumari et al. (2022) showed that herding behavior affects how individuals process risk-related information in financial decision-making. Bhutto et al. (2025) demonstrated that market dynamics and emotional consensus amplify individuals' tendency to mimic group behavior, which directly alters their risk evaluation framework. Soraya et al. (2023) further indicated that herding behavior, alongside other behavioral biases, can significantly influence how investors assess risk in their decision-making. This is consistent with cross-market evidence that herding intensity varies with systemic risk conditions (Hasan et al., 2023) and with broader market sentiment (Ah Mand et al., 2023).

These findings suggest that herding behavior may affect not only investors' financial decisions but also the way they interpret uncertainty and potential losses. Investors who rely heavily on collective signals may form risk perceptions that are influenced by prevailing market sentiment rather than independent evaluation. Therefore, based on the theoretical reasoning and empirical evidence, the following hypothesis is proposed:

H_5: Herding Behavior has a negative effect on risk perception

2.7 Overconfidence and Risk Perception

Overconfidence may affect how investors assess uncertainty and potential losses. Individuals with excessive confidence tend to rely strongly on their own judgments and may underestimate the uncertainty associated with financial decisions(Qureshi, Iqbal, & Sultana, 2022). Consequently, overconfidence may reduce investors' sensitivity to risk and lead them to underestimate the potential risks associated with financial decisions.

Empirical studies support this relationship. Jonathan and Pradana (2025) found that overconfidence bias negatively moderates the relationship between financial literacy and investment decisions, indicating that overconfident individuals may underestimate relevant risks despite possessing adequate financial knowledge. Soraya et al. (2023) further indicated that overconfidence, together with related behavioral biases, can distort investors' risk perception. This pattern is echoed by Kathpal et al. (2023), who found that risk perception mediates the relationship between financial literacy and heuristic-driven biases, and by Jain et al. (2023) and Zhang et al. (2022), who reported that risk perception partially mediates the effect of cognitive biases, including overconfidence, on investment decisions.

Therefore, investors with higher levels of overconfidence may perceive financial uncertainty and potential losses as less significant, resulting in a lower level of risk perception. This relationship is particularly relevant because risk perception may subsequently influence investors' financial behavior. Based on the theoretical reasoning and empirical evidence, the following hypothesis is proposed:

H_6: Overconfidence has a negative effect on risk perception

2.8 Risk Perception and Investors' Financial Behavior

Risk perception refers to the way individuals assess uncertainty, potential losses, and the consequences associated with financial decisions. In investment activities, differences in risk perception may influence how investors respond to market uncertainty and determine the level of risk they are willing to accept. Saivasan and Lokhande (2022) found that differences in investors' risk perceptions are associated with variations in financial decision-making, influenced by demographic and behavioral factors as well as changing market conditions.

Risk perception is also shaped by individual characteristics, experience, and behavioral factors. Saivasan and Lokhande (2022) found that risk propensity, behavioral biases, and demographic factors influence investors' risk perception, while Ahmed, Rasool, Saleem, Khan, and Kanwal (2022) showed that risk perception plays a mediating role between behavioral biases and investment decisions. These findings indicate that risk perception is not formed independently but may reflect the interaction between individual characteristics, psychological factors, and financial information.

Although previous studies provide evidence that risk perception is related to financial decision-making, its role in explaining broader investors' financial behavior remains less integrated with financial literacy and behavioral biases. Qureshi, Iqbal, and Sultana (2022) and Soraya, Risman, and Siswanti (2023) indicate that behavioral factors influence risk perception, but these relationships have generally been examined separately. Therefore, examining risk perception alongside green finance literacy, herding behavior, and overconfidence may provide a more comprehensive explanation of investors' financial behavior. Based on this reasoning, the following hypothesis is proposed:

H_7: Risk perception has a positive effect on investors' financial behavior

2.9 Risk Perception as a Mediating Variable

Risk perception may function as a psychological mechanism through which financial knowledge and behavioral tendencies are translated into financial behavior. Investors do not respond to financial information or behavioral stimuli directly in all situations. Rather, they first interpret the potential uncertainty and consequences associated with a financial choice. Risk perception can therefore provide a link between an investor's knowledge or behavioral characteristics and subsequent financial actions.

For green finance literacy, greater knowledge may improve investors' ability to identify and evaluate financial risks associated with sustainable financial products and investment activities. Investors who understand green finance concepts may be more capable of recognizing sustainability-related risks and incorporating them into their financial considerations. This enhanced risk perception can subsequently influence how investors manage their financial resources and make financial decisions. The findings showing a positive and significant indirect effect of Green Finance Literacy on Financial Behavior through Risk Perception. Therefore, the following hypothesis is proposed:

> *H_8:* Risk perception mediates the positive relationship between green finance literacy and investors' financial behavior

Herding behavior may also influence financial behavior through investors' perception of risk. When investors rely on the behavior and opinions of other market participants, collective behavior may become a reference for interpreting financial uncertainty. Such social influence can alter how investors perceive the risk associated with a financial alternative, which may subsequently affect their financial actions. However, the strength of this mechanism depends on whether socially influenced risk perception is sufficiently strong to translate herding tendencies into financial behavior. Accordingly, the following hypothesis is proposed:

> *H_9:* Risk perception mediates the relationship between herding behavior and investors' financial behavior

Similarly, overconfidence may influence financial behavior through the way investors perceive and interpret financial risks. Confidence in one's own ability may affect investors' assessment of uncertainty and their perceived ability to manage potential losses. If such perceptions subsequently influence financial actions, risk perception may serve as an intervening mechanism between overconfidence and financial behavior. Nevertheless, this mechanism remains an empirical question because investors may act on their confidence directly without substantially changing their perception of financial risk. Therefore, the following hypothesis is proposed:

> *H_{10}:* Risk perception mediates the relationship between overconfidence and investors' financial behavior

3. Research Methodology

3.1 Research Design

The population consisted of individual capital market investors who had a Single Investor Identification (SID) and experience in investing in the capital market. A non-probability sampling technique using purposive sampling was applied (Memon et al., 2020). Respondents were required to have experience in capital market investment, experience in making investment decisions, and willingness to complete the questionnaire based on their actual conditions. These criteria were selected to ensure that respondents had direct experience relevant to the variables examined in this study.

The research model was developed to examine both the direct relationships between the independent variables and financial behavior and the indirect relationships through risk perception. Green finance literacy, herding behavior, and overconfidence were positioned as the explanatory variables, while financial behavior was the dependent variable. Risk perception was included as a mediating variable

linking the three explanatory variables to investors' financial behavior. The proposed relationships and hypotheses are presented in Figure 1.

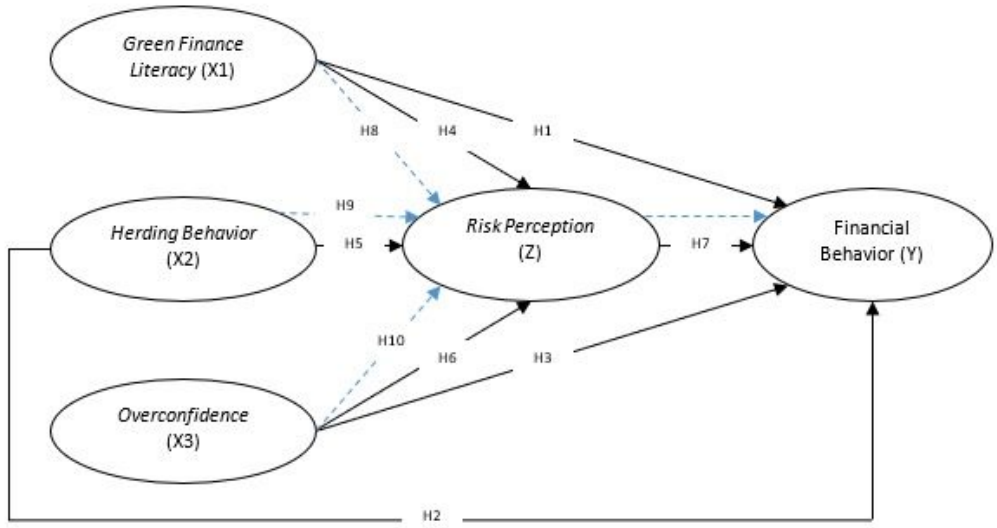


Figure 1. Research model

3.2 Population and Sample

The population consisted of individual capital market investors who had a Single Investor Identification (SID) and experience in investing in the capital market. A non-probability sampling technique using purposive sampling was applied. Respondents were required to have experience in capital market investment, experience in making investment decisions, and willingness to complete the questionnaire based on their actual conditions. These criteria were selected to ensure that respondents had direct experience relevant to the variables examined in this study.

A total of 157 usable responses were obtained and included in the analysis. The sample size was considered adequate for the PLS-SEM approach used in this study (Hair et al., 2024). The thesis also referred to G*Power analysis, which indicated a minimum sample requirement of 129 respondents based on a significance level of 5%, statistical power of 95%, an effect size of 0.15, and four predictors (Kang, 2021; Memon et al., 2020).

3.3 Measurement of Variables

The study examined three independent variables, one mediating variable, and one dependent variable. To address the operationalization of the constructs, Table 1 presents the dimensions or indicators used and their principal references. Green finance literacy was measured through respondents' understanding of sustainable finance concepts, green financial products, and sustainability-related risks and opportunities, adapted from Anderson and Robinson (2022) and Bethlendi et al. (2022). Herding behavior captured investors' tendency to consider or follow the actions, opinions, and market signals of other investors, drawing on Kumari et al. (2022) and Yoon and Oh (2022). Overconfidence measured the degree to which investors relied on their own knowledge, judgment, and perceived ability, based on Ahmad and Shah (2020) and Qureshi et al. (2022). Risk perception assessed perceived uncertainty, potential losses, and consequences associated with investment decisions, referring to Saivasan and Lokhande (2022) and Ahmed et al. (2022). Investors' financial behavior covered financial planning, financial management, investment-related behavior, financial self-control, and financial decision-making, consistent with the behavioral finance framework discussed by Risman (2026).

Table 1. Constructs, indicators, and measurement references

Construct	Indicators / Measurement Dimensions	Primary References
Green Finance Literacy	Understanding of sustainable finance concepts; knowledge of green financial products; awareness of environmental and sustainability-related risks and opportunities	(Anderson, 2022; Bethlendi et al., 2022)
Herding Behavior	Considering other investors' actions; following market opinions or trends; reliance on collective information and social signals	(Kumari et al., 2022; Yoon, 2022)
Overconfidence	Confidence in personal financial knowledge; reliance on own judgment; perceived ability to interpret market information and make investment decisions	(Ahmad, 2020; Qureshi et al., 2022)
Risk Perception	Assessment of uncertainty; perceived potential losses; evaluation of consequences associated with investment decisions	(Saivasan, 2022; Ahmed et al., 2022)
Investors' Financial Behavior	Financial planning; financial management; investment-related behavior; financial self-control; financial decision-making	(Risman, 2026)

Risk perception was measured through respondents' assessment of uncertainty and potential financial losses associated with investment activities. Investors' financial behavior was measured through financial planning, financial management, investment-related behavior, financial self-control, and financial decision-making. The measurement items were adapted from the sources specified in the original research instrument

3.4 Data Analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. PLS-SEM was selected because the analysis involved a model containing multiple latent constructs and a mediating relationship (Hair et al., 2024). The analysis consisted of two stages. First, the measurement model was evaluated through convergent validity, discriminant validity, and reliability testing. Second, the structural model was evaluated to examine the hypothesized relationships among the constructs. The structural assessment included the coefficient of determination and predictive relevance, while hypothesis testing was conducted using the bootstrapping procedure in SmartPLS 4.

The direct effects of green finance literacy, herding behavior, overconfidence, and risk perception on financial behavior were tested together with the effects of the three behavioral and knowledge-related variables on risk perception. The mediating effects of risk perception were subsequently examined for the relationships between green finance literacy, herding behavior, overconfidence, and financial behavior

4. Results and Discussions

4.1 Results

4.1.1 Respondent Characteristics

A total of 157 valid responses were obtained from individual investors in the Indonesian capital market. The respondents were predominantly male (101 respondents; 64.3%) and employees (132 respondents; 84.1%). In terms of investment experience, 84 respondents (53.2%) had less than one year of experience, while 41 respondents (26.0%) had between one and three years. The remaining respondents had three to five years (7.6%) and more than five years (13.4%) of investment experience.

4.1.2 Measurement Model

4.1.2.1 Convergent Validity and Reliability

The measurement model was evaluated through convergent validity and construct reliability. The outer loading values of the indicators ranged from 0.633 to 0.879, with the values meeting the minimum threshold used in the study. Based on Table 2, the Average Variance Extracted (AVE) values ranged from 0.567 to 0.706, indicating that each construct explained an adequate proportion of the variance in its indicators.

Table 2. Convergent validity and construct reliability

Construct	AVE	Cronbach Alpha	Composite Reliability
Green Finance Literacy	0.604	0.836	0.884
Herding Behavior	0.611	0.838	0.886
Overconfidence	0.640	0.860	0.899
Risk Perception	0.567	0.807	0.866
Financial Behavior	0.706	0.896	0.923

The reliability assessment also showed satisfactory internal consistency. Cronbach's alpha values ranged from 0.807 to 0.896, while composite reliability values ranged from 0.866 to 0.923. These results indicate that the constructs demonstrate adequate reliability for further structural model assessment.

4.1.2.2 Discriminant Validity

Discriminant validity was assessed by comparing the loading of each indicator on its respective construct with its loadings on the other constructs. The results show that each indicator has its highest loading on the construct it is intended to measure. This indicates that the indicators adequately distinguish their respective constructs from the other constructs in the model.

4.1.3 Structural Model and Hypotheses Testing

4.1.3.1 Coefficient of Determination and Predictive Relevance

The structural model was evaluated using the coefficient of determination (R^2) and predictive relevance (Q^2). The R^2 value for Financial Behavior was 0.455, while the R^2 value for Risk Perception was 0.276. These values indicate that the variables included in the model explain 45.5% of the variance in Financial Behavior and 27.6% of the variance in Risk Perception. The Q^2 value of 0.606 indicates that the structural model has predictive relevance. The results of the coefficient of determination are presented in Table 3.

Table 3. Coefficient of determination

Endogenous Variable	R^2	Adjusted R^2
Financial Behavior	0.455	0.441
Risk Perception	0.276	0.261

4.1.3.2 Direct Effects

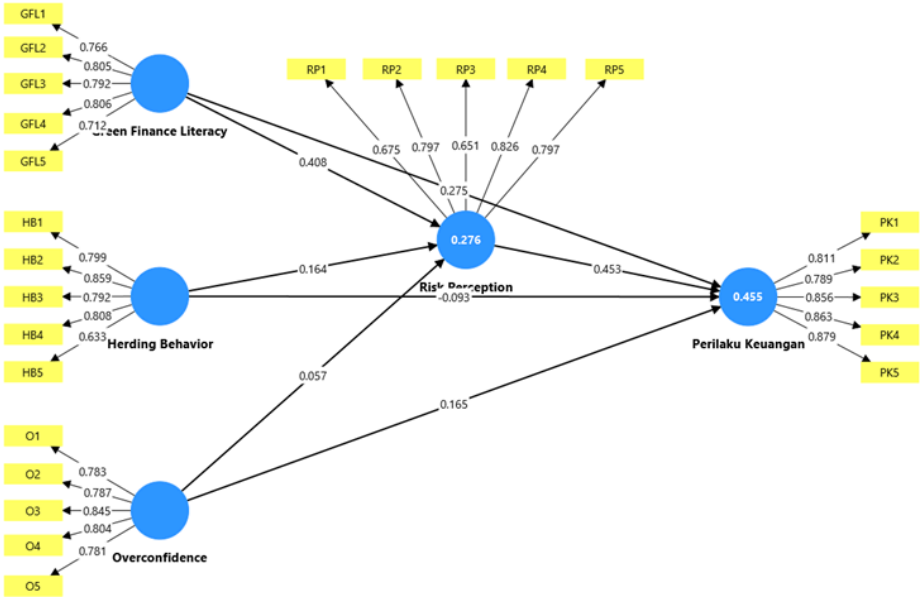


Figure 2. PLS-SEM structural model

The structural model illustrates the estimated relationships among Green Finance Literacy, Herding Behavior, Overconfidence, Risk Perception, and Financial Behavior. Figure 2 presents the PLS-SEM results, including the estimated path coefficients and the R^2 values of the endogenous constructs. The direct effects were assessed using the bootstrapping procedure in SmartPLS by considering the path coefficient, t-statistic, and p-value. The results of the seven direct hypotheses are presented in Table 4.

Table 4. Direct effects and hypotheses testing

H	Relationship	β	t-value	p-value	Result
H_1	Green Finance Literacy → Financial Behavior	0.275	3.991	0.001	Supported
H_2	Herding Behavior → Financial Behavior	−0.093	1.321	0.187	Not supported
H_3	Overconfidence → Financial Behavior	0.165	2.565	0.010	Supported
H_4	Green Finance Literacy → Risk Perception	0.408	6.123	0.001	Supported
H_5	Herding Behavior → Risk Perception	0.164	2.034	0.042	Supported
H_6	Overconfidence → Risk Perception	0.057	0.697	0.486	Not supported
H_7	Risk Perception → Financial Behavior	0.453	5.628	0.001	Supported

The results indicate that Green Finance Literacy has positive and significant effects on both Financial Behavior and Risk Perception. Overconfidence has a positive and significant effect on Financial Behavior, while Risk Perception also has a positive and significant effect on Financial Behavior. In contrast, Herding Behavior has a negative but insignificant effect on Financial Behavior. Although Herding Behavior has a positive and significant effect on Risk Perception, this result does not support the

hypothesized negative relationship. Overconfidence has a positive but insignificant effect on Risk Perception.

4.1.3.3 Indirect Effects and Mediation
The indirect effects were assessed to determine whether Risk Perception mediates the relationships between Green Finance Literacy, Herding Behavior, Overconfidence, and Financial Behavior. The results are presented inTable 5.

Table 5. Indirect effects and mediation testing

H	Indirect Relationship	β	t-value	p-value	Result
H_8	Green Finance Literacy → Risk Perception → Financial Behavior	0.185	4.195	<0.001	Supported
H_9	Herding Behavior → Risk Perception → Financial Behavior	0.074	1.867	0.062	Not supported
H_{10}	Overconfidence → Risk Perception → Financial Behavior	0.026	0.688	0.491	Not supported

The results show that Risk Perception significantly mediates the relationship between Green Finance Literacy and Financial Behavior, with an indirect effect of 0.185 (t = 4.195; p < 0.001). However, the indirect effects of Herding Behavior and Overconfidence through Risk Perception are not statistically significant. The indirect effect of Herding Behavior is 0.074 (t = 1.867; p = 0.062), while the indirect effect of Overconfidence is 0.026 (t = 0.688; p = 0.491).

4.2 Discussions

4.2.1 Green Finance Literacy and Financial Behavior
The findings support, H_1 indicating that green finance literacy has a positive and significant effect on investors' financial behavior. This result suggests that investors with greater knowledge and understanding of green finance are more likely to incorporate such knowledge into their financial decisions and behavior. Green finance literacy may provide investors with a better understanding of sustainable financial products, their characteristics, and the potential financial and environmental consequences associated with investment choices. Consequently, greater literacy can facilitate more informed financial behavior.

This finding is consistent with the behavioral finance perspective that financial behavior is not determined solely by the availability of financial information, but also by an individual's ability and intention to understand and use that information in making financial decisions. Financial literacy can strengthen the cognitive foundation for evaluating alternatives, while intention provides a mechanism through which knowledge can be translated into actual behavior. In this regard, financial knowledge without an intention to act may not necessarily result in appropriate financial behavior. Green finance literacy therefore provides not only knowledge about sustainable financial instruments but also a basis for investors to consider financial and sustainability-related factors when making decisions.

The positive relationship found in this study is consistent with Aren and Zengin (2016), who reported that financial literacy influences investment choices, and Xu et al. (2022), who documented a positive association between financial literacy and financial behavior. The present result extends this evidence to the context of green finance literacy among Indonesian retail investors, indicating that sustainability-oriented financial knowledge can also support more informed financial actions.

4.2.2 Behavioral Biases and Financial Behavior
The results provide different findings for herding behavior and overconfidence in relation to investors' financial behavior. Herding behavior has a negative but insignificant effect on financial behavior, indicating that the tendency to follow other investors does not necessarily translate into systematic changes in investors' financial behavior in this sample. Although investors may observe and consider the actions or opinions of other market participants, such social influence may not be sufficient to determine their actual financial decisions. This finding suggests that exposure to other investors' behavior does not always result in direct behavioral imitation.

One possible explanation is that investors may use information obtained from other market participants as an additional reference rather than simply copying their decisions. This interpretation is relevant to Yoon and Oh (2022), who showed that social interaction and market sentiment can strengthen herding tendencies, and to Dar and Kumar (2023), who found that collective information may influence financial decisions. However, the present study differs from findings that report a direct behavioral effect of herding, suggesting that social influence among the sampled Indonesian investors may not automatically translate into broader financial behavior.

In contrast, the findings support H_3, showing that overconfidence has a positive and significant effect on financial behavior. This result indicates that investors' confidence in their own ability and judgment can influence how they make and implement financial decisions. Overconfident investors may be more willing to act on their own assessments, particularly when they believe that they possess sufficient knowledge or ability to interpret market information. Thus, overconfidence can become a behavioral factor that encourages investors to take financial actions rather than remaining passive in uncertain market conditions.

This finding is also consistent with prior evidence that overconfidence can shape investment-related actions. For example, Qureshi, Iqbal, and Sultana (2022) found that overconfidence influences investment performance through risk propensity, while Kumar and Chaurasia (2024) reported a positive association between emotional biases, including overconfidence, and investment decisions. In line with this literature, the present findings indicate that investors' confidence in their own judgment can be associated with more active financial behavior. At the same time, this result does not imply that overconfidence is always beneficial. Risman (2026) explains that bias, including overconfidence, can sometimes facilitate faster decisions and reduce excessive hesitation under uncertainty.

Overall, the different findings for herding behavior and overconfidence suggest that behavioral biases do not operate uniformly in shaping investors' financial behavior. Socially driven behavior may depend on the extent to which investors rely on others as a basis for their decisions, whereas overconfidence is more directly associated with investors' own judgments and willingness to act. This distinction provides a possible explanation for why overconfidence significantly influences financial behavior while herding behavior does not.

4.2.3 Green Finance Literacy and Risk Perception

The findings support H_4, indicating that green finance literacy has a positive and significant effect on investors' risk perception. This result suggests that investors with greater knowledge of green finance are more likely to recognize and consider the risks associated with financial and investment activities. Rather than making investors perceive green investments as less risky, greater literacy may enable them to identify and evaluate potential uncertainties more clearly.

This relationship can be understood from the role of financial knowledge in risk evaluation. The finding is consistent with Saivasan and Lokhande (2022) and Ahmed et al. (2022), who showed that individual knowledge and behavioral characteristics are associated with differences in risk assessment and investment decision-making. It also aligns with (Purwantini, Hasirun, Handayani, & Sari, 2026), whose findings indicate that financial literacy and ESG-related risk perception are jointly relevant to investment interest. The present study extends these findings by showing that green finance literacy specifically contributes to investors' perception of risk.

4.2.4 Behavioral Biases and Risk Perception

The findings show different results for herding behavior and overconfidence in relation to risk perception. Herding behavior has a positive and significant effect on risk perception, contrary to the negative relationship hypothesized in H_5. This finding suggests that following the actions and opinions of other investors may increase investors' awareness of financial uncertainty rather than reduce it. Social interaction can expose investors to information about market conditions, potential losses, and

other investors' experiences, which may strengthen their perception of risk. This interpretation is consistent with evidence that social interaction and social media sentiment reinforce herding tendencies among investors (Yoon & Oh, 2022).

In contrast, overconfidence has no significant effect on risk perception, leading to the rejection of H_6. This result suggests that investors' confidence in their own abilities does not necessarily change how they perceive financial risk. Overconfidence may instead influence financial behavior more directly, as indicated by the significant relationship found in H_3. Thus, the findings suggest that different behavioral biases may operate through different psychological mechanisms, with social influence being more closely associated with risk perception than confidence in one's own judgment.

4.2.5 Risk Perception and Financial Behavior

The findings support H_7, indicating that risk perception has a positive and significant effect on investors' financial behavior. This result suggests that investors who perceive and evaluate financial risks more clearly are more likely to incorporate risk considerations into their financial actions. Risk perception may therefore help investors assess potential consequences before making financial decisions, particularly under conditions of market uncertainty.

The positive relationship also indicates that higher risk perception does not necessarily lead investors to avoid financial activities. This result is consistent with Saivasan and Lokhande (2022), who found that differences in risk perception are associated with variations in financial decision-making, and with Ahmed et al. (2022), who identified risk perception as an important mechanism linking behavioral factors and investment decisions. In the present study, risk perception appears to encourage more deliberate consideration of uncertainty when investors manage financial resources and make investment-related decisions.

4.2.6 The Mediating Role of Risk Perception

The mediation results show that Risk perception significantly mediates the relationship between Green Finance Literacy and Financial Behavior, supporting H_8. This finding is consistent with earlier evidence that risk perception can operate as a mechanism linking financial knowledge or behavioral characteristics to investment decisions, including the findings of Ahmed et al. (2022), Kathpal et al. (2023), and Jain et al. (2023). The present study contributes by identifying this mechanism specifically in the relationship between green finance literacy and investors' financial behavior. Green finance literacy therefore influences investors' financial behavior not only directly but also through their ability to perceive and evaluate financial risks.

In contrast, H_9 and H_{10} are not supported. Risk perception does not significantly mediate the relationships between herding behavior and financial behavior or between overconfidence and financial behavior. These findings suggest that the behavioral biases examined in this study may influence financial behavior through mechanisms other than risk perception. Herding behavior may involve social influence and information imitation, while overconfidence may encourage investors to act based primarily on their own judgments. Therefore, risk perception does not appear to be a common mediating mechanism for all behavioral factors examined in the model.

5. Conclusions

5.1 Conclusion

This study examined the role of green finance literacy, herding behavior, and overconfidence in shaping investors' financial behavior, with risk perception examined as a mediating mechanism. Using survey data from 157 individual investors in the Indonesian capital market and a PLS-SEM approach, the findings provide evidence that financial knowledge and behavioral factors do not influence investors' financial behavior through a single mechanism.

The results show that green finance literacy has a positive effect on both risk perception and financial behavior. Risk perception also has a positive effect on financial behavior and significantly mediates the relationship between green finance literacy and financial behavior. These findings indicate that

greater understanding of green finance may strengthen investors' ability to recognize financial risks, which can subsequently be reflected in their financial behavior. Thus, risk perception represents an important mechanism linking green finance literacy with investors' financial behavior.

The findings also demonstrate that behavioral biases operate differently. Overconfidence has a positive effect on financial behavior but does not significantly affect risk perception, while herding behavior does not significantly affect financial behavior and has a positive rather than negative effect on risk perception. Neither herding behavior nor overconfidence shows a significant indirect effect on financial behavior through risk perception. Overall, the findings suggest that investors' financial behavior is shaped by the interaction of financial knowledge, risk perception, and behavioral tendencies, but these factors do not necessarily operate through the same psychological pathway.

5.2 Research Limitations

This study has several limitations that should be considered when interpreting the findings. First, the study employed a cross-sectional survey design, so the relationships identified in the model reflect conditions at a particular point in time and do not establish causal changes in investors' behavior over time. Second, the sample consisted of 157 individual investors, which may limit the generalizability of the findings to the broader population of investors in the Indonesian capital market. Third, the study relied on self-reported questionnaire responses, which may be influenced by respondents' perceptions and willingness to provide accurate assessments of their financial knowledge, behavioral tendencies, risk perception, and financial behavior.

5.3 Suggestions and Directions for Future Research

Future research may extend this study by using longitudinal or multi-period data to examine whether the relationships among green finance literacy, behavioral biases, risk perception, and financial behavior change across different market conditions. A larger and more diverse sample could also improve the generalizability of the findings across different groups of investors and investment experience levels.

Further studies may also consider other psychological and behavioral variables that could explain the effects of herding behavior and overconfidence on financial behavior. Since risk perception did not significantly mediate these relationships, future research could examine alternative mechanisms such as investment intention, financial self-efficacy, market experience, or other behavioral biases. Comparative studies across different investor groups or market conditions may also provide a broader understanding of how financial knowledge and behavioral factors shape investors' financial behavior.

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Author Contributions

AAV and AR conceptualized the study and designed the research framework. AAV conducted data collection and formal analysis. AR provided supervision and critically revised the manuscript for intellectual content. AAV prepared the initial draft, while AR contributed to the final editing. Both authors reviewed and approved the final version of the manuscript.

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