

From Bias to Better Decisions: Behavioral Insights for Financial Literacy Curriculum Development in Higher Education

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DOI: <https://doi.org/10.46245/ijorer.v7i1.984>

Sections Info

Article history:

Submitted: July 08, 2025

Final Revised: Nov 07, 2025

Accepted: November 12, 2025

Published: January 30, 2026

Keywords:

Behavioral Bias; Risk Perception; Financial Literacy; Investment Decision; Behavioral Finance; Curriculum Development; Higher Education



ABSTRACT

Objective: This study aims to analyze the effect of behavioral bias on investment decisions among undergraduate students in Indonesia within the higher education context, with risk perception as a mediating variable and financial literacy as a moderating variable. The research provides an empirical foundation for strengthening behavioral-based financial literacy curricula in universities and preparing students to become rational investors. **Method:** A quantitative approach was employed by distributing questionnaires to 385 undergraduate students in Indonesia who are active individual investors registered with the Indonesia Central Securities Depository. The structural model was analyzed using SmartPLS 4, while the moderated mediation effect was tested using PROCESS Model 59 in SPSS. **Results:** The findings indicate that behavioral bias significantly and negatively affects risk perception, which in turn has a detrimental impact on students' investment decisions. Critically, financial literacy moderates this relationship by weakening the adverse influence of behavioral bias on risk perception and transforming the effect of risk perception on investment decision into a positive one at higher levels of financial literacy. Moreover, risk perception mediates the relationship between behavioral bias and investment decisions, particularly at moderate levels of financial literacy. **Novelty:** The findings highlight the importance of integrating behavioral aspects into financial literacy curricula in higher education to equip students with cognitive and affective competencies for rational investment decision-making. This study contributes not only to the behavioral finance literature but also enriches the financial literacy curriculum literature by providing empirical evidence on how behavioral and psychological mechanisms can be embedded into financial education design. This contribution bridges the gap between financial literacy education and behavioral finance research, emphasizing curriculum design that enhances students' cognitive, affective, and behavioral competencies.

INTRODUCTION

In higher education, improving financial knowledge is now a key focus for helping students make better financial choices. But many financial literacy programs in colleges mainly focus on things like budgeting, saving, and calculating investments. They don't pay enough attention to the personal habits and behaviors that really influence how people make financial decisions in real life. This curricular gap limits students' ability to understand how psychological biases and emotional factors influence financial behavior. Addressing this issue is increasingly urgent because the younger generation, particularly Generation Z, has become highly active in investment activities driven by the rapid expansion of digital financial platforms. According to data from the Indonesia Central Securities Depository (2024), as of January 2024, Generation Z accounted for 56.29 percent of all investors on the Indonesia Stock Exchange, with total stock assets valued at IDR 50.26 trillion. This trend reflects a growing reality that university students today are not

only learners but also financial actors who actively engage in real economic decision-making processes.

As students become more involved in investment activities, they also face increasingly complex financial choices that require not only analytical reasoning but also emotional control and behavioral awareness. However, many do not yet possess sufficient cognitive and affective capacities to make rational investment decisions (Armansyah et al., 2023; Maheshwari & Samantaray, 2025; Pašiušienė et al., 2023). This condition underscores the need for educational institutions, particularly universities, to redesign their financial literacy curricula to move beyond the mere transfer of financial knowledge. A comprehensive curriculum should equip students with the ability to recognize and manage risk, mitigate behavioral biases, and cultivate reflective decision-making in financial contexts (Mane & Sangale, 2023; Rochelle et al., 2017; Williams & Oumlil, 2015; Zhou et al., 2024).

Several higher education institutions have begun integrating financial literacy materials in the curriculum through special courses or thematic learning programs. However, the approach used is still technical. Generally, it still focuses on understanding basic concepts and personal financial managerial skills, such as budgeting, debt management, and the principle of risk diversification in investment (Garman & Forgue, 2020; Kapoor et al., 2017; Keown, 2023). Financial decisions are not only influenced by cognitive aspects but also by affective mechanisms such as risk perception and irrational behavioral tendencies (Baker & Nofsinger, 2010; Hirshleifer, 2015; Pompian, 2011). This indicates a persistent gap between the cognitive focus of current curricula and the behavioral dimensions that shape real-world financial decisions, underscoring the urgency for curriculum redesign that integrates behavioral insights into financial education.

Some forms of behavioral bias that often appear in the investment context include overconfidence, herding, and disposition effects (Dhingra et al., 2024; S. Kumar & Goyal, 2015; Mittal, 2022; Yuliawati et al., 2024; Zahera & Bansal, 2018). Overconfidence is the tendency of individuals to overestimate their skills, cognitive abilities, and the accuracy of their information (Jain, Walia, Kaur, et al., 2023; J. Kumar & Prince, 2023; Pikulina et al., 2017). Herding is the tendency of individuals to feel comfortable when following the actions of the majority around them (Ahmad & Wu, 2022; Din et al., 2021; Jain et al., 2019). The disposition effect is the tendency of individuals to sell profitable assets too quickly because of the desire to secure profits, while at the same time, they are reluctant to sell loss-making assets in the hope that their value will recover (Braga & Fávero, 2017; Dvorackova et al., 2023; Rau, 2015; Zahera & Bansal, 2019).

In this situation, risk perception plays an important role as a psychological mechanism that links bias to final decisions because individuals tend to consider decisions based on the perception of potential losses or perceived gains (Almansour et al., 2023; Jain, Walia, Singla, et al., 2023; Nguyen et al., 2019). According to Baker & Ricciardi (2014), risk perception is a subjective process that individuals carry out when evaluating risk and uncertainty involving various quantitative and qualitative factors. This perception influences how investors choose a financial service or product that best suits their needs and expectations (Bairagi, 2021; Hossain & Siddiqua, 2024).

Adequate financial literacy can be a cognitive protection tool that helps students evaluate decision alternatives more logically and structurally (Tang & Baker, 2016). Individuals with good financial literacy tend to have the ability to compare risks and

potential returns more objectively before making investment decisions (Gupta, 2021; Lusardi, 2019) and can minimize the influence of behavioral biases such as overconfidence and herding in their decision-making process (Adil et al., 2022; Suresh G., 2024). This literacy also plays an important role in helping individuals prepare personal financial planning, manage debt wisely, and understand the principle of risk diversification in investment so that individuals can avoid impulsive decision-making (Kadoya & Khan, 2020; Lusardi, 2019).

In the context of higher education, strengthening financial literacy is not only a means of transferring knowledge but also an effort to form critical thinking patterns and a cautious attitude among students in facing the complexity of the digital financial market, which is increasingly accessible to the younger generation (Nivrutti, 2024; Zhou et al., 2024). Thus, financial literacy is one of the important pillars in equipping students with relevant financial managerial skills for rational and sustainable investment decision-making.

Previous studies have shown that behavioral bias can negatively impact the quality of investment decisions (Baker & Ricciardi, 2015; Banerji et al., 2023; Mittal, 2022; Ogunlusi & Obademi, 2021; Shunmugasundaram & Sinha, 2024; Yasmin & Ferdaous, 2023). On the other hand, research has shown that people's understanding of money can help reduce the harmful effects of these biases. (Adil et al., 2022; Gulzar et al., 2024; Hayat & Anwar, 2016; Khan et al., 2023; Suresh G., 2024). Therefore, the educational approach to financial literacy should not only emphasize the normative aspect but also be responsive to students' psychological characteristics as individuals vulnerable to bias in financial decision-making. Creating a financial education program that takes into account how people think and act is becoming more important. This is because it helps us understand how biases affect how people see risks and how much financial knowledge they have. By doing this, we can design better learning programs that help students develop a more complete understanding of financial skills, attitudes, and skills in dealing with complex financial decisions.

This study looks at how biases in behavior, how people see risk, and the decisions they make when investing are connected among university students. It also checks how financial literacy affects this connection. The study also wants to give suggestions based on real findings to create a better and more complete financial literacy program for higher education. The findings can help make students more skilled and confident in handling their money, by covering what they know, what they can do, and how they think about financial matters.

Although more students are investing, there aren't many studies in Indonesia that look closely at how things like behavioral bias, how people see risk, and their financial knowledge affect their investment choices. It's important to understand these factors because they help create a financial education program that's both useful and takes into account how students think and feel. Because of this, the study wants to:

- (1) Study how personal biases affect the way students at universities in Indonesia make their investment choices.
- (2) Check how risk perception affects the link between behavior biases and the choices people make when investing.
- (3) Explore how financial knowledge affects the link between people's mental shortcuts, their view of risks, and the choices they make when investing.

(4) Provide recommendations based on research results for developing a more contextual and behaviorally based financial literacy curriculum in Indonesian universities.

ThusThis study aims to offer both theoretical and practical contributions by providing, evidence-based insights to strengthen financial literacy education in higher education. The ultimate goal is to inform and support the development of a more effective and behaviorally oriented financial literacy curriculum that not only enhances students' conceptual understanding but also fosters rational, reflective, and responsible financial decision-making.

RESEARCH METHOD

Research Design

This study employs a quantitative method based on surveys. This method enables researchers to gather a large volume of data in a structured way, which helps in examining the connection between different variables as outlined in a clear conceptual model (Creswell & Creswell, 2017). The main goal of this study is to look at how behavioral biases affect the investment choices of students. It also looks at how people's understanding of risk plays a role in this effect, and how their level of financial knowledge influences this relationship. The study aims to understand how mental and thinking factors shape students' decisions when investing, so that universities can create better financial education programs based on real evidence.

To test the proposed moderated mediation model, Partial Least Squares Structural Equation Modeling (PLS-SEM) and PROCESS Model 59 were used. PLS-SEM was selected because it works well with complex models that include hidden factors and when the number of participants is not too large, and it allows simultaneous estimation of multiple dependent relationships, which is essential in educational and psychological research (J. F. Hair et al., 2019). PROCESS Model 59 complements PLS-SEM by enabling the conditional process analysis of mediation and moderation effects within a single analytical framework (Hayes & Rockwood, 2020). These combined methods ensure robust testing of both direct and indirect effects, providing comprehensive insight into students' behavioral and cognitive mechanisms in financial decision-making.

Population and Sample

The population in this study includes undergraduate students from Indonesia who are individual stock investors and have registered with the Indonesia Central Securities Depository. The sample was selected using a purposive sampling method, based on the following inclusion category: (1) having the status of an active undergraduate, (2) having a personal securities account in their name, and (3) actively transacting stocks.

Data collection was conducted online using Google Forms, which was distributed through the Investment Gallery network at various universities in Indonesia in collaboration with the Indonesia Stock Exchange (IDX). The number of respondents who met the criteria and could be analyzed was 385 students.

The demographic features of the respondents are as follows:

- Based on gender, 208 people (54%) were male and 177 people (46%) were female.
- Based on age, all respondents were in the range of 17-28 years, which demographically falls into the Generation Z category (100%).

- All respondents (100%) were active students pursuing a Bachelor's degree from various universities in Indonesia.

This composition provides a fairly representative picture of Generation Z students who are active as individual stock investors. It is thus relevant to studying investment behavior in the context of higher education in Indonesia.

Research Procedures

This study was conducted through the following stages (Figure 1):

1. Conceptual Model Design: Developing the research framework and designing the questionnaire based on established theories and previous empirical studies.
2. Data Collection: Gathering information through online questionnaires.
3. Validity and Reliability Testing: Ensuring the accuracy and consistency of the data.
4. Data Analysis: Interpreting the data using statistical methods.

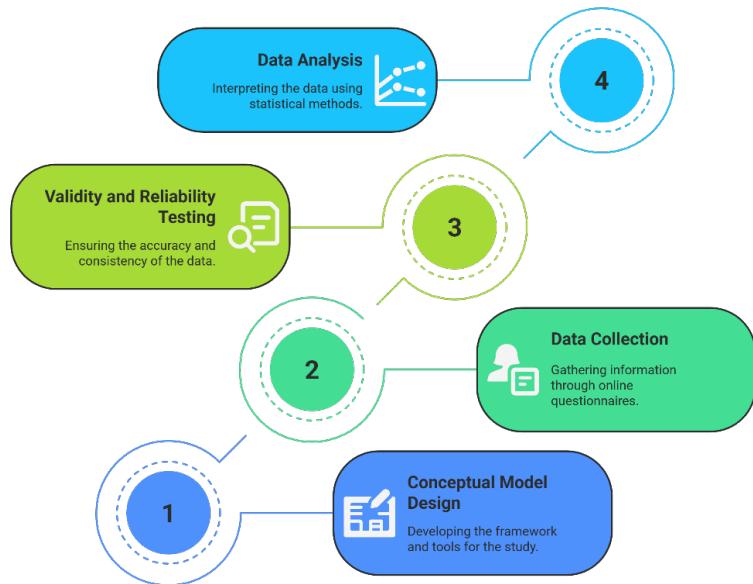


Figure 1. Research Process Steps

Research Instrument

The instrument used was a structured questionnaire consisting of 33 statements that measure four main constructs, as shown in Table 1 below. Prior to the main data collection, the instrument has gone through pilot testing on 30 active investor student respondents to test item clarity and internal consistency. The first Confirmatory Factor Analysis (CFA) results showed that all the items met the required standards: each had a factor loading of at least 0.7, average variance extracted (AVE) of at least 0.5, composite reliability (CR) of at least 0.7, and Cronbach's alpha of at least 0.8. This means the items are reliable and ready to be used for collecting primary data.

Table 1. Operationalization of Research Variables, Dimensions and Indicators

Variable	Type/Dimension	Code	Indicators	References
Behavioral Bias	Overconfidence	BB1	Confidence in market knowledge and skills	(Jain et al., 2019; Jain, Walia, Kaur, et al., 2023; J. Kumar & Prince, 2023)
		BB2	Ability to control investment outcomes	
		BB3	Experience and trust in personal abilities	
		BB4	High trading frequency	
		BB5	Satisfaction with previous investment decisions	
		BB6	Confidence in timing stock purchases and sales	
	Herding	BB7	Tendency to follow other people's investment decisions	(Ahmad & Wu, 2022; Jain, Walia, Kaur, et al., 2023)
		BB8	Influence of recommendations from brokers or well-known analysts	
		BB9	Influence of opinions from friends and colleagues	
		BB10	Response to information from the media	
		BB11	Quick reaction to the actions of other investors	
		BB12	Expectation of low risk and high returns	
Disposition Effect	Disposition Effect	BB13	Tendency to sell stocks that have increased in price	(Rau, 2015; Zahera & Bansal, 2019)
		BB14	Keep holding onto stocks that have gone down in value	
		BB15	Focus on avoiding capital losses	
		BB16	Tendency to avoid losses rather than pursue gains (loss aversion)	
		BB17	Excessive attention to price declines of stocks in the portfolio	
Risk Perception	Single construct	RP1	Primary focus on risk when making decisions	(Almansour et al., 2023; Bairagi, 2021; Hossain & Siddiqua, 2024)
		RP2	Discomfort with market uncertainty	
		RP3	Concern about price fluctuations	
		RP4	Anxiety over poor asset performance	
		RP5	Subjective assessment of the risk of loss	
		RP6	Perceived control over risk	

Variable	Type/Dimension	Code	Indicators	References
Investment Decision	<i>Single construct</i>	ID1	Alignment with investment goals	(Almansour et al., 2023; Ogunlusi & Obademi, 2021)
		ID2	Expected outcomes and realized gains	
		ID3	Risk tolerance	
		ID4	Investment security	
		ID5	Cash flow growth	
		ID6	Lower risk than the general market	
		ID7	Investment time horizon	
Financial Literacy	<i>Single construct</i>	FL1	Basic financial knowledge	(Kadoya & Khan, 2020; Lusardi, 2019)
		FL2	Personal financial management skills	
		FL3	Understanding of investment risk management	

Note: Behavioral Bias is a multidimensional construct consisting of three dimensions: Overconfidence, Herding, and Disposition Effect. In contrast, Risk Perception, Investment Decision, and Financial Literacy are single-factor constructs measured directly through their indicators without sub-dimensions. This structure ensures conceptual clarity and consistency between the theoretical framework and the measurement model.

All items were rated using a 5-point Likert scale. The questions in the questionnaire were taken from earlier studies that had been checked and proven reliable, and then changed to fit the situation of student investors in Indonesia.

Data analysis was done in three steps.

1. First, the measurement model was evaluated to check if the construct was valid and reliable. The SmartPLS 4 software version 4.1.1.2 was used, following the criteria from (J. Hair & Alamer, 2022). The evaluation included:
 - a. Indicator validity was checked by ensuring the loading factor was at least 0.7,
 - b. Convergent validity was confirmed by having an Average Variance Extracted (AVE) of 0.5 or higher,
 - c. Construct reliability was measured using Composite Reliability (CR) and Cronbach's Alpha, both needing to be 0.70 or more,
 - d. Discriminant validity was tested using the Heterotrait-Monotrait Ratio (HTMT) method, with a result of 0.85 or less.

2. Structural Model Analysis

To examine how different factors relate to each other, a method called Partial Least Squares Structural Equation Modeling (PLS-SEM) was used. This approach helps understand how one variable affects another and how well the overall model predicts outcomes. The analysis included looking at R-square (R^2) to show how much of the variation in the outcome is explained by the model, f-square (f^2) to measure the effect size of each variable, and model fit values such as SRMR and NFI to assess how well the model matches the data.

3. Moderated Mediation Testing

To analyze moderated mediation, PROCESS Macro Model 59 by Andrew F. Hayes was used, with the help of SPSS Statistics 26 software. The moderated mediation test was conducted by:

- a. Analyzing the direct and indirect paths between variables X (behavioral bias), M (risk perception), W (financial literacy), and Y (investment decisions),
- b. Testing two-way interactions ($X \times W$ and $M \times W$),
- c. Testing conditional effects at three levels of financial literacy (low, medium, high),
- d. Bootstrapping as many as 5000 samples to obtain significance values and confidence intervals for indirect effects.

The moderated mediation analysis was conducted using PROCESS Model 59 in SPSS (Hayes & Rockwood, 2020). The financial literacy (FL) variable was measured on a five-point Likert scale with three indicators (total range 3–15). The PROCESS output automatically generated conditional effects at three representative levels of financial literacy: low (FL = 6), moderate (FL = 12), and high (FL = 15), corresponding to the 16th, 50th, and 84th percentiles of the data distribution. Therefore, FL = 12 represents the moderate (median) level of financial literacy in the sample and serves as the reference point for interpreting conditional indirect effects.

RESULTS AND DISCUSSION

Results

Results of Measurement Model Evaluation

Here are the results of the algorithm analysis using SmartPLS 4 for the measurement model assessment of the research model:

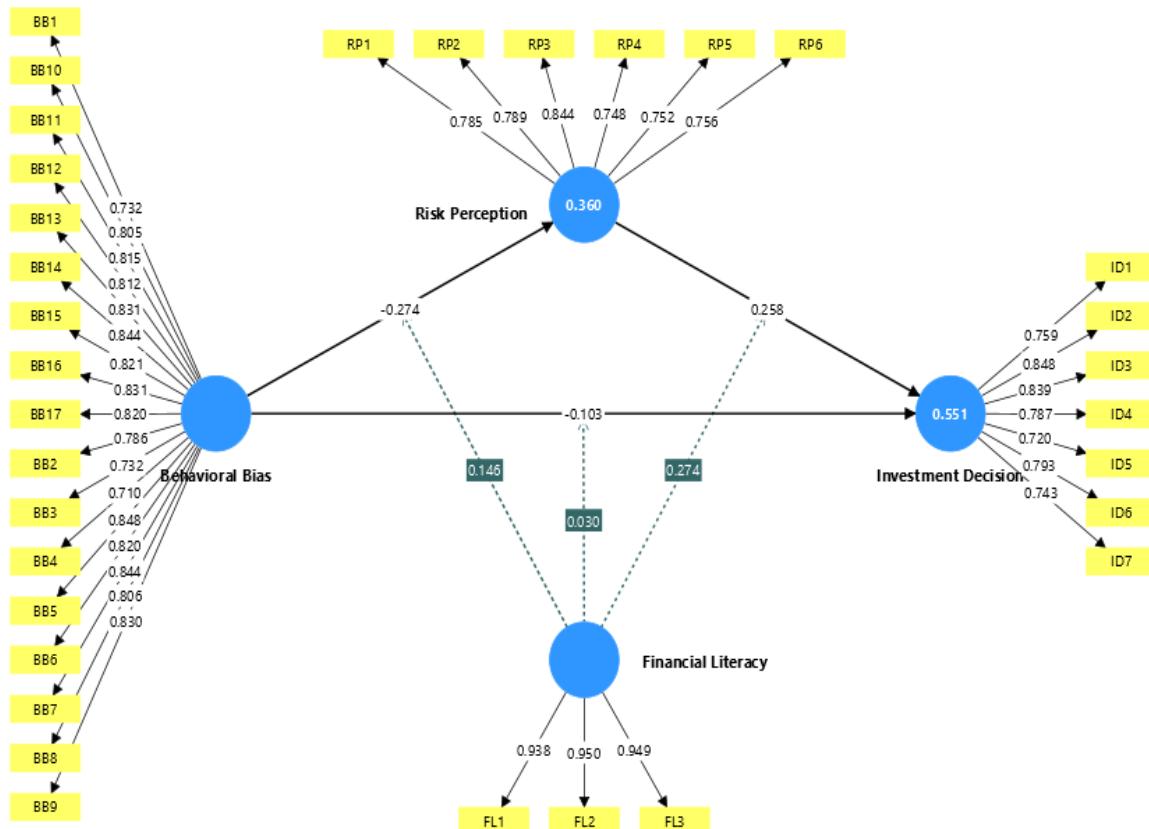


Figure 2. Measurement Model of Research Model

Table 1. Convergent Validity and Reliability Analysis of Research Model

Constructs	Measurement Items	Loadings	AVE	Composite Reliability	Cronbach's Alpha
Behavioral Bias (BB)	BB1	0.732	0.650	0.969	0.967
	BB2	0.786			
	BB3	0.732			
	BB4	0.710			
	BB5	0.848			
	BB6	0.820			
	BB7	0.844			
	BB8	0.806			
	BB9	0.830			
	BB10	0.805			
	BB11	0.815			
	BB12	0.812			
	BB13	0.831			
	BB14	0.844			
	BB15	0.821			
	BB16	0.831			
	BB17	0.820			
Risk Perception (RP)	RP1	0.785	0.608	0.903	0.871
	RP2	0.789			
	RP3	0.844			
	RP4	0.748			
	RP5	0.752			
	RP6	0.756			
Investment Decision (ID)	ID1	0.759	0.617	0.918	0.896
	ID2	0.848			
	ID3	0.839			
	ID4	0.787			
	ID5	0.720			
	ID6	0.793			
	ID7	0.743			
Financial Literacy (FL)	FL1	0.938	0.895	0.962	0.941
	FL2	0.950			
	FL3	0.949			

Table 1 shows the results of the convergent validity and reliability tests for the research model, using Confirmatory Factor Analysis. The factors for all the indicators are between 0.710 and 0.950, which is higher than the suggested minimum of 0.70 (J. F. Hair et al., 2019). This means the indicators are good at showing the underlying concepts they are meant to measure. The Average Variance Extracted (AVE) values for all the concepts range from 0.608 to 0.895, which is above the suggested minimum of 0.50, confirming that the constructs are valid and well measured (Fornell & Larcker, 1981). For reliability, the Composite Reliability (CR) values for all the constructs are over 0.90, and Cronbach's Alpha is also above 0.85, showing that the constructs are reliable and have good internal

consistency (Nunnally & Bernstein, 1994). These results show that the measurement model used in this study is both valid and reliable, allowing the constructs of behavioral bias, risk perception, investment decisions, and financial literacy to be used for more detailed structural analysis.

Table 2. HTMT Results

Constructs	Behavioral Bias	Financial Literacy	Investment Decision	Risk Perception	FL x BB	FL x RP
Behavioral Bias	-	0.252	0.309	0.391	0.048	0.137
Financial Literacy	0.252	-	0.725	0.566	0.037	0.044
Investment Decision	0.309	0.725	-	0.534	0.051	0.185
Risk Perception	0.391	0.566	0.534	-	0.173	0.340
FL x BB	0.048	0.037	0.051	0.173	-	0.381
FL x RP	0.137	0.044	0.185	0.340	0.381	-

The test for discriminant validity using the Heterotrait-Monotrait Ratio (HTMT) method shows that all the HTMT values between the different constructs are less than 0.85. This means that the discriminant validity is satisfied. Each construct in the model is clearly different from the others.

Results of Structural Model Analysis

Table 3. R² Value

Constructs	R-square	R-square adjusted
Investment Decision	0.551	0.545
Risk Perception	0.360	0.354

The R-square (R²) value on the Investment Decision construct is 0.551, indicating that the independent variables in the model explain 55.1% of the variation in students' investment decisions. Meanwhile, the R² value on Risk Perception is 0.360, indicating that the model explains 36.0% of students' risk perception variation.

Table 4. F² Value

Constructs	Behavioral Bias	Financial Literacy	Investment Decision	Risk Perception	FL x BB	FL x RP
Behavioral Bias	-	-	0.020	0.109	-	-
Financial Literacy	-	-	0.425	0.284	-	-
Investment Decision	-	-	-	-	-	-
Risk Perception	-	-	0.088	-	-	-
FL x BB	-	-	0.002	0.032	-	-
FL x RP	-	-	0.156	-	-	-

The f-square value (f²) shows that financial literacy has a considerable influence on investment decisions (0.425), while financial literacy on risk perception has a moderate influence (0.284). Meanwhile, the interaction of financial literacy and risk perception on investment decisions shows a moderate effect (0.156), and other paths show minor to minimal effects according to the classification of Hair et al. (2019).

Model fit testing shows SRMR values of 0.072 (saturated) and 0.074 (estimated), below the cut-off limit of 0.08, indicating that the model fits well. The NFI value of 0.726–0.727 is also acceptable in PLS-SEM analysis. The d_ULS and d_G values are within the acceptable range, indicating no significant deviation in the model.

Table 5. Model Fit Index Results

	Saturated model	Estimated model
SRMR	0.072	0.074
d_ULS	2.918	3.034
d_G	1.710	1.711
Chi-square	3327.901	3342.904
NFI	0.727	0.726

Results of Moderated Mediation Hypothesis Testing (PROCESS Model 59)

The following are the results of testing the moderated mediation hypothesis conducted using PROCESS Model 59 in SPSS.

Table 6. Summary of Hypothesis Testing (PROCESS Model 59)

Nu	Hypothesis	Path	Coefficient (β)	t-value	p-value	Decision
H1	Behavioral bias negatively affects risk perception.	BB → RP	-0.2306	-5.14	<0.001	Supported
H2	Financial literacy moderates BB → RP.	BB x FL → RP	0.0135	3.42	0.001	Supported
H3	Risk perception negatively affects investment decision.	RP → ID	-0.3490	-5.38	<0.001	Supported
H4	Financial literacy moderates RP → ID.	RP x FL → ID	0.0489	7.73	<0.001	Supported
H5	Behavioral bias negatively affects investment decision.	BB → ID	-0.0407	-1.55	0.123	Not Supported
H6	Financial literacy moderates BB → ID.	BB x FL → ID	0.0015	0.68	0.498	Not Supported
H7	Risk perception mediates BB → ID.	BB → RP → ID	-0.0165 (FL=12)	-	95% CI: [-0.0245, -0.0090]	Supported

The results from the moderated mediation analysis using PROCESS Model 59 show that behavioral bias has a significant negative impact on risk perception ($\beta = -0.2306$, $p < 0.001$), which supports the first hypothesis. This means that students who have a high level of behavioral bias tend to perceive less risk. Financial literacy also plays a moderating role in the relationship between behavioral bias and risk perception ($\beta = 0.0135$, $p = 0.001$), supporting the second hypothesis. The findings suggest that as students' financial literacy increases, the negative effect of behavioral bias on risk perception becomes weaker.

Risk perception was found to have a significant negative effect on investment decisions ($\beta = -0.3490$, $p < 0.001$), supporting the third hypothesis. This means that students with higher risk perception are less likely to make investment decisions. Financial literacy also moderates the relationship between risk perception and investment decisions ($\beta = 0.0489$, $p < 0.001$), supporting the fourth hypothesis. The effect of risk perception on investment decisions shifts from negative to positive as financial literacy increases.

The direct effect of behavioral bias on investment decisions was not significant ($\beta = -0.0407$, $p = 0.123$), which means the fifth hypothesis is not supported. The moderating effect of financial literacy on the direct path of behavioral bias on investment decisions was also not significant ($\beta = 0.0015$, $p = 0.498$), so the sixth hypothesis is not supported.

This result indicates that students with an average level of financial literacy are most susceptible to behavioral influences in their investment decision-making. At low levels

of financial literacy ($FL = 6$), limited cognitive capacity weakens their ability to assess risk, while at high levels ($FL = 15$), greater financial competence allows them to manage risk more rationally and reduce the indirect effect. Hence, the conditional mediation is most evident at the moderate level of financial literacy, highlighting the transitional zone where knowledge and behavior interact most strongly.

These findings reinforce that financial literacy plays an essential moderating role in shaping students' cognitive and behavioral mechanisms in investment decisions. Therefore, improving students' financial literacy can serve as an effective educational intervention to reduce behavioral bias and enhance rational financial decision-making under different risk conditions.

Discussion

The Effect of Behavioral Bias on Students' Investment Decisions

This study aims to analyze the effect of behavioral bias on investment decisions of students in universities in Indonesia. The results indicate that the direct effect of behavioral bias on students' investment decisions is not significant. This finding indicates that students, as novice investors, do not immediately change their investment decisions just because they are influenced by their behavioral biases.

A possible explanation for this finding is that students, despite having bias tendencies such as overconfidence, herding, and disposition effects (Jain, Walia, Kaur, et al., 2023; Zahera & Bansal, 2019), still consider other factors in decision-making, such as personal financial goals and financial conditions, as well as the influence of the academic environment that increases their understanding of investment risk (Mane & Sangale, 2023). This indicates that psychological mechanisms influence students' investment decisions more in the form of risk perception than direct behavioral bias.

This finding is consistent with Bairagi (2021) and Almansour et al. (2023) studies, which show that behavioral bias influences investment decisions indirectly through risk perception. Therefore, to understand students' investment decision-making more comprehensively, it is necessary to consider the role of risk perception as a mediator in the relationship between behavioral bias and investment decisions.

The Role of Risk Perception as a Mediator in the Relationship between Behavioral Bias and Investment Decisions

This study also aims to examine the role of risk perception as a mediator in the relationship between behavioral bias and students' investment decisions. The results show that behavioral bias significantly and negatively affects students' risk perception. Students with high levels of behavioral bias, such as overconfidence and herding, tend to underestimate the risk in their investment activities (Ahmad & Wu, 2022; Jain, Walia, Singla, et al., 2023).

This finding supports the behavioral finance theory, which emphasizes that investors are not always rational in facing risks but are influenced by psychological and emotional factors (Baker & Ricciardi, 2014; Hirshleifer, 2015). Low-risk perception due to behavioral bias can encourage students to make high-risk investment decisions without careful consideration. However, at a moderate level of financial literacy, risk perception can help students reassess their investment decisions, thereby reducing the potential for errors in decision-making (Nguyen et al., 2019). This suggests that risk perception is an important mediator between behavioral bias and students' investment decisions.

At a moderate level of financial literacy ($FL = 12$), students have basic financial knowledge but have not fully developed emotional control skills and stable analytical consistency. As a result, risk perception serves as a transition mechanism between intuitive reactions and rational analysis. This explains why the mediation effect only appears at moderate literacy levels, as this level represents a balancing point between behavioral bias and financial rationality (Nguyen et al., 2019; Tang & Baker, 2016).

Importantly, this study distinguishes between the direct negative effect of risk perception on investment decision ($H3, \beta = -0.3490$) and its conditional positive role under high financial literacy levels ($H4$ and $H7$). In the base model, higher risk perception discourages investment because students tend to avoid uncertain outcomes. However, when financial literacy is high, this pattern reverses, risk perception becomes a constructive signal that helps students evaluate opportunities more analytically rather than emotionally. This shift illustrates that financial literacy transforms risk perception from a purely defensive psychological reaction into a rational evaluative process that supports informed investment choices.

The Role of Financial Literacy as a Moderating Variable

Furthermore, this study looks at how financial literacy acts as a moderating factor in the connection between behavioral bias, risk perception, and students' investment choices. The results show that financial literacy plays a significant role in how behavioral bias affects risk perception. This suggests that students who have a good understanding of financial matters are better able to counteract the negative effects of behavioral bias when assessing investment risks. This matches up with other findings that financial literacy helps people develop stronger analytical skills for understanding risks and makes them more capable of making thoughtful financial decisions. (Lusardi, 2015; Suresh G., 2024).

Students with good financial literacy tend to re-examine their personal biases when facing risky investment situations. They are more careful in evaluating potential gains and losses and considering relevant data and information before making decisions (Gupta, 2021; Mane & Sangale, 2023). Thus, financial literacy is an educational tool and a cognitive filter that helps students control their behavioral biases in the decision-making process (Adil et al., 2022).

In addition to moderating the relationship between behavioral bias and risk perception, financial literacy moderates the relationship between risk perception and students' investment decisions. This study shows that at a high level of financial literacy, students' risk perception can be a positive guide in making investment decisions. Students with high financial literacy can manage risk better and use risk as a constructive consideration in their investment decision-making process (Lusardi, 2015; Nguyen et al., 2019). These results are also relevant to findings showing that financial literacy can increase individuals' confidence in facing risks and make them more rational in making investment decisions (Khan et al., 2023).

A key theoretical contribution of this study lies in the finding that the influence of risk perception on investment decision-making is not uniformly negative, as predominantly suggested in previous studies, but becomes positive when financial literacy reaches a high level. This indicates that financial literacy functions not merely as a buffering variable, but as a transformative cognitive mechanism that alters how individuals interpret and respond to risk information. Instead of viewing risk as a

deterrent, financially literate students perceive it as an opportunity for strategic decision-making. This finding extends existing behavioral finance models, which have largely adopted a linear perspective, by introducing a conditional view in which the direction and strength of the effect depend on the individual's level of financial literacy.

Therefore, this study advances the theoretical understanding of financial behavior by demonstrating that financial literacy can shift the psychological meaning of risk from a negative threat into a positive evaluative signal that supports rational investment choices. Financial literacy reframes risk perception from fear-based avoidance to analytical evaluation, enabling students to interpret uncertainty as a strategic opportunity for decision-making. This finding reinforces the argument that financial literacy is not only a moderating factor but also a transformative cognitive mechanism that reshapes behavioral responses toward risk (Baker & Ricciardi, 2014; Khan et al., 2023; Lusardi, 2019).

Implications for Financial Literacy Curriculum Development in Higher Education

In accordance with the research objectives, this study's results provide evidence-based recommendations for developing a contextual and behavioral-based financial literacy curriculum in higher education. The findings indicate that financial literacy functions not only as cognitive knowledge but also as an effective moderating mechanism for reducing the negative impact of behavioral bias and optimizing students' risk perceptions in investment decision-making. This supports Lusardi (2019) idea that financial literacy must be developed as a multidimensional competency that includes cognitive, affective, and behavioral aspects in dealing with the dynamics of financial decision-making (Suresh G., 2024).

In practice, the financial literacy curriculum in higher education so far tends to focus on cognitive aspects, such as understanding basic financial concepts, budgeting, and debt management (Garman & Fong, 2020; Kapoor et al., 2017; Keown, 2023). The results of this study indicate that students, as part of Generation Z who are increasingly actively involved in investment, also face psychological challenges in the form of behavioral biases such as overconfidence, herding, and disposition effects that can affect the quality of their investment decisions (Dhingra et al., 2024; Mittal, 2022; Zahera & Bansal, 2018).

Therefore, the financial literacy curriculum needs to be developed with a behavioral-based financial education approach, which not only provides financial knowledge material but also trains students to recognize, understand, and control behavioral biases in the context of investment decision-making (Mane & Sangale, 2023; Zhou et al., 2024). For example, the integration of behavioral finance material into the financial literacy curriculum can be done by facilitating students to study real cases (case-based learning) about investment errors due to behavioral bias, conducting simulations of investment decision-making under risk conditions using virtual investment applications, and personal reflection on each student's financial decision-making style. This aligns with the OECD (2020) recommendation regarding the need for a contextual and applicable financial literacy learning approach so that students can internalize risk management skills and rational financial decision-making in real life (Nguyen et al., 2019).

Furthermore, the findings of this study demonstrate that financial literacy can transform risk perception from an inhibitor into a catalyst for rational decision-making. This supports the inclusion of risk literacy as a key component of financial education.

Students should learn not only how to measure and understand risk but also how to develop a positive and adaptive risk mindset that sees uncertainty as an opportunity rather than a threat (Lusardi, 2015; Nguyen et al., 2019).

Finally, this study supports the proposal that financial literacy curricula in higher education should include psychological self-assessments of behavioral bias, risk perception, and financial self-efficacy to enable more personalized learning interventions. Consistent with Gulzar et al. (2024), personalization enhances the effectiveness of financial literacy programs, especially for students from diverse socio-economic and investment backgrounds.

Thus, the results of this study can serve as a foundation for developing a behavioral-based financial literacy curriculum that includes:

1. Basic financial knowledge and investment-risk management;
2. Introduction to and understanding of behavioral biases in financial decisions;
3. Investment decision-making training through simulation and self-reflection;
4. Development of a positive and adaptive risk mindset;
5. Personalization of learning interventions based on students' bias and literacy profiles.

With this curriculum approach, universities can produce graduates who are not only cognitively financially literate but also possess the affective and behavioral competencies needed to navigate the realities of financial decision-making in the future.

CONCLUSION

Fundamental Finding: This study found that behavioral bias indirectly influences students' investment decisions through risk perception, with financial literacy moderating both relationships. **Implication:** These results highlight the importance of strengthening behavioral financial literacy in higher education curricula to help students become rational investors who can manage risks and biases effectively. These findings emphasize the necessity for higher education curricula to integrate behavioral-based financial literacy that cultivates risk awareness, emotional regulation, and rational investment skills among students. **Limitation:** This study is cross-sectional, involving only active student investors, and has not examined the distinct effects of specific types of behavioral bias separately. **Future Research:** Future studies should extend this work by analyzing each type of behavioral bias (e.g., overconfidence, herding, disposition effect) individually to explore their unique mechanisms and intensity in shaping students' risk perception and investment behavior. In addition, future research is encouraged to adopt an educational research agenda by empirically testing the effectiveness of behavioral-based financial literacy curricula through experimental designs (e.g., classroom interventions, simulation-based learning, behavioral training modules) or longitudinal studies that track changes in students' financial decision-making over time. Such research would provide strong empirical evidence on whether integrating behavioral components into financial education can improve students' cognitive, affective, and behavioral competencies in real investment contexts.

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