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LOSS AVERSION, REGRET AVERSION, HERDING IN FRAUDULENT INVESTMENT DECISIONS MODERATED BY FINANCIAL LITERACY

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Abstract: *Fraudulent investment schemes continue to deceive the public despite ongoing improvements in financial literacy across Indonesia. This phenomenon presents a serious threat to personal financial management, as many individuals are still lured by promises of unrealistic profits and pressured into high-risk financial traps. These schemes exploit specific psychological vulnerabilities that influence decision-making. This study aims to examine the influence of three behavioral loss aversion, regret aversion, and herding on fraudulent investment decisions, with financial literacy analyzed as a moderating variable. Total of 100 respondents in Semarang who had experienced financial losses due to fraudulent investment practices were selected using purposive and snowball sampling methods. Data were analyzed using feasibility tests, classical assumption testing, multiple regression analysis, and moderated regression analysis (MRA). The findings reveal that loss aversion and regret aversion both have a significant negative effect on fraudulent investment decisions, while herding has a positive influence. Additionally, financial literacy plays a quasi-moderating role, effectively weakening the impact of these psychological traits. These findings underscore the importance of psychological factors in irrational financial behaviors and highlight the critical need for improved financial literacy education. Strengthening financial awareness may help reduce vulnerability to deceptive investment offers and promote healthier financial decision-making.*

Keywords : *loss aversion, regret aversion, herding, financial literacy, fraudulent investment decision*

INTRODUCTION

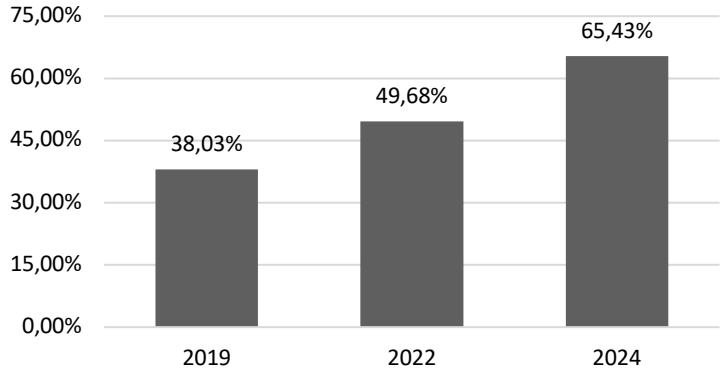
In the past few years, a noticeable shift has occurred, with an alarming rise in fraudulent investments that deceive people looking for profitable investment opportunities. These investment schemes often promise unrealistic returns, far exceeding the average returns of legitimate investment instruments. The operating steps used vary, including pyramid schemes and investment offers with promises of large returns in a short period. These scams capitalize on the ignorance and greed of victims, who are often tempted by the promise of instant wealth. Consequently, many people lose their savings and become entangled in financial losses.

Apart from fraudulent investments, another phenomenon to watch out for is online gambling disguised as investment. These platforms often use terms similar to investment, such as trading or stock investment, to disguise their gambling activities. Victims are usually asked to deposit money to create rapid financial gains. However, in reality, these platforms only serve as tools to drain victims' funds. This phenomenon is increasingly troubling because many people are trapped, notably amid a lack of financial literacy among the public. Low financial literacy makes many people vulnerable to fraudulent investment scams and gambling.

Some websites or platforms often present themselves as places to invest in various forms, such as stock trading and investment. However, some of these platforms are merely places for illegal gambling practices in

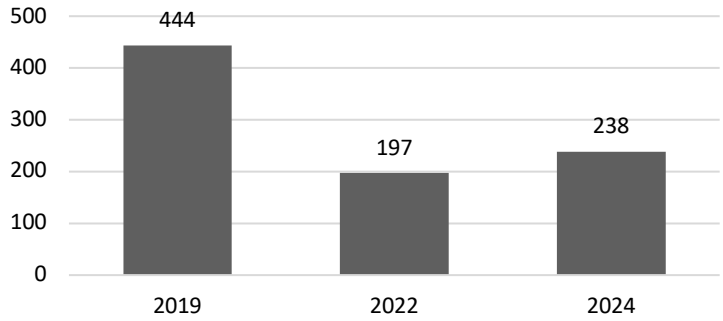
disguise, where users are directed to make high-risk transactions without any clear foundation or market analysis. People interested in growing their investments are often trapped in unfair and high-risk gambling games, with the promise of huge profits that are difficult to achieve. This is further exacerbated by people's lack of understanding of safe investments, making them more vulnerable to fraudulent investment scams that have the potential to cause massive financial losses.

Data from the National Survey on Financial Literacy and Inclusion (SNLIK) carried out three financial literacy and inclusion surveys over the past five years in 2019, 2022, and 2024, showing a substantial rise in the financial literacy of Indonesians in that time period. In 2019, the financial literacy level of Indonesians showed a figure of $38{,}03\%$, which then increased sharply to $49{,}68\%$ in 2022, and reached $65{,}43\%$ in 2024. This data show progress in the public's knowledge of financial services and products, driven by more widespread financial literacy education. With this increase, it is hoped that people will understand how to manage their finances and choose safe investment options.



Source: Financial Services Authority (2024)
Figure 1. Financial Literacy Index in Indonesia by 2024

Despite the increasing level of financial literacy, the number of illegal investment closures remains high. In 2019, the Financial Services Authority (OJK) successfully closed 444 illegal investment entities, while in 2022, the number decreased to197, and rose again in 2024 to238. These data show that although public financial literacy has increased over the past five years, fraudulent investment offers remain a threat to the public with more advanced marketing methods and modes.



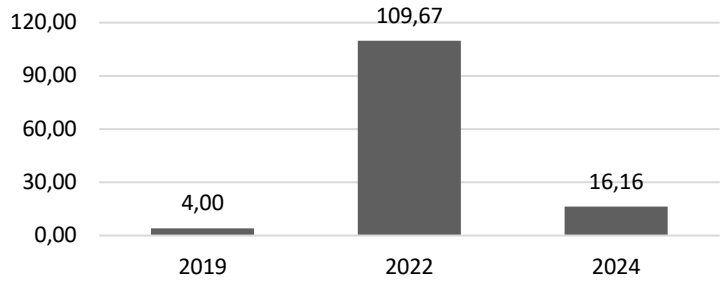
Source: Financial Services Authority (2024)
Figure 2. Index of the Number of Illegal Investment Blocks by 2024

Although the number of fraudulent investments closed by the OJK in 2019 was the highest compared to the following years, the number of losses due to illegal investments was actually the lowest, amounting to Rp100 trillion. This can happen because most of the fraudulent investments in that year were still in the early stages of operation or were relatively small-scale, so the impact of the losses was not as big as in the following years. In this year, many people also do not know too much about investment, in line with the data on the degree of financial knowledge in 2019, which remains inadequate.

Meanwhile, in 2022, losses due to fraudulent investments amounted to109,67 trillion rupiah. This makes it the year with the highest level of losses. This spike reflects the increasing impact of more advanced fraud schemes, which, in turn, attract more investors with the promise of unrealistically high returns. This situation shows that

although the closure of illegal investments reduced to197 entities, the losses incurred by the public are huge, signaling a gap between low financial literacy and high investment offers, including fraudulent investments. This drastic surge is partly due to many investors being attracted by the promise of huge profits amid the post-pandemic economic situation. The COVID-19 pandemic has made many people more vulnerable to investments that promise quick returns but do not fully understand the risks involved.

In 2024, there was a decrease in losses due to fraudulent investments to16,16 trillion. This figure is still relatively high and shows that the impact of illegal investments is still felt by many people. Although the number of closed fraudulent investments increased to 238, the losses emphasized the need for more serious efforts to close illegal investments and educate the public. Improved financial literacy has helped, but many obstacles must be overcome to safeguard society against the risks of harmful financial ventures.



Source: Financial Services Authority (2024)

Figure 3. Index of Total Losses Due to Illegal Investment by 2024

According to Tambunan & Hendarsih (2022), safe investments are characterized by clear legality (having a legal entity), a good track record without any disputes with investors or customers, and investment products that offer reasonable returns. To prevent illegal investments, the Investment Alert Task Force educates the public, follows up on public complaints, and requires all unregistered industry players to obtain licenses from relevant agencies.

Iswahyudi (2023) reveals that illegal investments often employ Ponzi schemes or money games, where capital sourced from society is used to distribute rewards to previous victims by utilizing money obtained from recent customers. These schemes are not supported by genuine commercial operations to sustain the disbursement of returns to the society. Consequently, public funds are at risk of being lost within a short timeframe. Therefore, it is important for people to be more vigilant and careful in choosing investments and ensuring the legality and sustainability of the business they choose.

Silalahi et al. (2022) highlight the need to increase the level of financial literacy in Indonesia so that people can be more careful in managing and choosing financial instruments that suit their needs. Adequate financial literacy also enables people to understand the risks inherent in each financial instrument or product. With this understanding, the public is expected to be able to avoid various financial cases, such as the Binomo case, which are detrimental to them. Efforts to improve financial literacy and prevent financial cases are not only the responsibility of the government alone, but also require active support from associated financial entities along with the function of the community collectively.

The results of research Putri & Sudiyatno (2023) reveal that financial literacy and regret aversion have a positive impact and a significant effect on student investment decisions in Semarang City, while the independent variable herding has a significant negative impact on student investment decisions in Semarang City. This research is still limited to the general facets of financial literacy and only includes two behavioral trait variables that have an influence. Therefore, this research has not explored the possibility of other factors that influence students' decisions on where to invest, especially in investment places that might be able to plunge students into fraud or fraudulent investment schemes. Although students with high financial literacy are usually inclined to make better investment decisions, this knowledge may not be enough to detect fraudulent schemes and fraudulent investments that are increasingly advanced in tricking their victims. Therefore, further research is needed on other psychological factors, such as those that can influence fraudulent investment decisions.

Previous research has drawn various conclusions regarding the influence of loss aversion on public investment decisions. Prior studies have yielded mixed results regarding the role of loss aversion in investment decision making. Nalurita et al. (2020) found that loss aversion positively influences investment decisions,

suggesting that individuals tend to hold onto assets to avoid realizing losses. In contrast, Holly et al. (2022) reported a negative effect, indicating that loss-averse individuals are more likely to avoid risky investments. Meanwhile, Ainia & Lutfi (2019) found no significant relationship between loss aversion and investment behavior. These contradictory findings may stem from differences in research contexts, such as varying levels of market maturity, investment literacy, and the types of investment instruments assessed.

Research on the role of regret aversion in investment decision-making has yielded inconsistent results. Kumar & Chaurasia (2024) observed that regret aversion positively influences investment decisions, suggesting that individuals who anticipate future regret may act more decisively to avoid missing opportunities. However, Suprasta & Nuryasman (2020) reported a negative influence, indicating that regret-averse individuals tend to avoid risky financial choices because of the fear of making a wrong decision. Meanwhile, Dhungana et al. (2022), focusing on the Pokhara Valley, found no significant impact of regret aversion, which may reflect cultural or contextual differences in how emotional factors shape financial decision-making.

The existing literature on herding behavior in investment decisions presents inconsistent outcomes. Hussain et al. (2022) reported a positive influence, indicating that investors tend to follow the crowd, assuming that others possess better information or insight, which reinforces group-based decision-making. In contrast, Khan (2020), studying investors in Pakistan, found a negative relationship, suggesting that following others may lead to overreactions or suboptimal financial choices. Meanwhile, Ranaweera & Kawshala (2022), focusing on the Colombo capital market, observed no significant influence of herding on investment decisions, possibly due to market maturity or stronger individual decision frameworks.

Multiple prior studies have found that loss aversion is moderated by financial literacy in investment decisions. Firmansyah et al. (2023) found that financial literacy amplifies the effect of loss aversion, suggesting that financially literate individuals may become more cautious and risk-averse when they understand the full implications of potential losses. In contrast, Butt et al. (2023) reported that financial literacy weakens this relationship, implying that knowledgeable investors may be more confident in overcoming emotional biases and making rational decisions. Meanwhile, Bibi et al. (2023) found no significant moderating effect, highlighting that financial literacy alone may not be sufficient to alter the influence of psychological traits such as loss aversion.

Previous research has also examined regret aversion moderated by financial literacy in investment decisions. Fitriyani & Anwar (2022) found that financial literacy strengthens the influence of regret aversion on investment decisions, implying that those with higher financial awareness may be more cautious in avoiding decisions they might later regret. In contrast, Wangzhou et al. (2021) found that financial literacy weakens this effect, suggesting that better-informed individuals are more likely to accept risk as part of rational decision-making. Hariono et al. (2023) found no significant moderating role, arguing that emotional tendencies such as regret may persist even among financially literate individuals.

Financial literacy can also moderate herding in investment decision-making. Hussain et al. (2023) suggest that financial literacy strengthens herding behavior, potentially because individuals use collective decisions as shortcuts to evaluate complex investment information. In contrast, Koma & Jatiningsih (2024) argue that financial literacy reduces susceptibility to herding, as financially knowledgeable individuals rely more on independent analysis. Novianggie & Asandimitra (2019) found no significant moderating effect, indicating that even literate individuals may still be influenced by social dynamics.

This research was conducted in response to the persistent ineffectiveness of existing efforts to combat fraudulent investment schemes. Although financial literacy has been widely promoted as a preventive measure and the Financial Services Authority's Investment Task Force continues to take action against such schemes, a significant gap remains between individuals' financial knowledge and its practical application in investment decision-making. Despite having a basic understanding of financial concepts, many people continue to fall victim to fraudulent investment offers that promise high returns with little to no risk. The rise of deceptive investment schemes in Indonesia poses serious challenges to personal financial stability, causing significant losses and destabilizing household finances in the process. This phenomenon underscores the urgency of examining the behavioral drivers that influence risky decisions. However, existing research has primarily focused on general investment behavior or individual psychological biases in isolation, often overlooking the specific context of fraudulent investments and the potential moderating role of financial literacy. Moreover, prior studies have rarely integrated multiple behavioral biases simultaneously within this high-risk context, leaving a gap in understanding how these biases interact and how their effects may be mitigated. The novelty of this study lies in its integrated examination of three key behavioral biases—loss aversion, regret aversion, and herding behavior— in the context

of fraudulent investments. Additionally, the moderating role of financial literacy was tested to assess its potential protective factor. By addressing these gaps, this research offers a new perspective on the psychological mechanisms that contribute to susceptibility to fraudulent financial schemes and provides insights for enhancing investor protection and financial education initiatives.

THEORETICAL FRAMEWORK AND HYPOTHESIS

Prospect Theory

Prospect Theory was proposed by Kahneman & Tversky (1979) as a criticism of the notion that risky prospects are often inconsistent with the principles of Expected Utility Theory. In Prospect Theory, people place value on profits and losses instead of focusing on their final total assets, and people substitute opportunities in consideration of the effect of these outcomes. The value function in this theory proposes that individuals generally exhibit risk aversion when they are close to realizing potential profits, but are more willing to take risks to avoid losses. This suggests that losses feel heavier or have a greater emotional impact than equivalent gains.

Recent studies affirm that Prospect Theory remains a dynamic and empirically grounded alternative to classical Expected Utility Theory (EUT), integrating psychological heuristics and cognitive limitations. Researchers have emphasized its ability to explain consistent deviations from rationality through biases such as loss aversion, reference dependence, and heuristic-driven judgments, such as representativeness, availability, and anchoring. Moreover, effects such as certainty, reflection, and isolation continue to validate their behavioral relevance in economic and financial contexts (Cortés et al., 2023; Fan, 2024; Júlia et al., 2022; W. U. Khan et al., 2022; Kononovych & Myasoid, 2020).

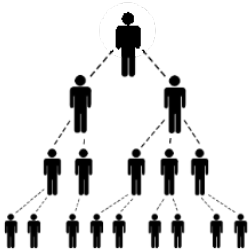
This theory includes several key principles, such as the Certainty Effect, where people tend to give more weight to predetermined outcomes than to outcomes that are only possible or uncertain. Such as people will choose the option of getting $Rp\ 400.000$ for sure rather than getting $Rp\ 1.000.000$ with a chance of failing 50%. Furthermore, the Reflection Effect shows that people will be risk-averse in profit situations but risk-seeking in loss situations. An example is people prefer the option of a chance of 50% no loss and 50% loss $Rp\ 500.000$ or maybe the loss can be greater than choosing the option of a definite loss of $Rp\ 300.000$. The last is the Isolation Effect, which is the tendency of people to ignore equal or irrelevant parts of several options when making decisions. For example, if someone is given two options with multiple steps in the process, they may only consider the final step without considering previous steps that are relevant.

Fraudulent Investment Decision

According to Tandelilin (2010), investment is a dedication of certain assets or capital made today with the objective of securing future returns. Investment activities involve various activities, such as buying financial assets (e.g., securities) or real assets (e.g., land, houses, or gold). The concept of investment has evolved beyond traditional financial activities to encompass social, technological, and sustainable development dimensions. Modern investment is understood as the allocation of resources in various tangible assets, such as land and infrastructure, and intangible assets, such as training and social programs, with the aim of generating future economic returns, value appreciation, or positive social and environmental impact. Technological advancements have broadened public access to investment opportunities, particularly through digital platforms such as online trading. Contemporary investment approaches emphasize the importance of regulatory compliance and the role of investment in contributing productively and sustainably to societal well-being (Midgley, 2017; Pangestu & Bagana, 2022; G. T. M. Putri & Santoso, 2024; Tiurina et al., 2023; Valencia et al., 2020).

According to Hidajat (2018), fraudulent investment decisions based on Ponzi and pyramid schemes involve models that are not based on real investment activity but on the flow of funds from new investors. In Ponzi schemes, the returns promised to investors come from funds deposited by new investors; thus, the sustainability of the scheme depends on a continuous flow of funds from new members. Conversely, pyramid schemes have a similar mechanism but require investors to actively recruit new members to earn returns. If an investor fails to recruit new members, they will not receive any profits. Both schemes tend to collapse when the flow of new investors stops, leading to huge losses for many participants in the Ponzi scheme. Fraudulent investments occur when investors hand over their funds to an investment company with the promise that they will be managed for profit, but in reality, the company does not manage the funds productively. Some funds are only rotated among investors or even taken away by the management. From these two definitions, it can be concluded that fraudulent investment is the decision to entrust funds to a party that claims to manage the investment for future profits. However, in practice, the funds

are not managed legitimately, but only rotated between investors or taken without a proper management process, resulting in high risks and often leading to huge losses for investors.



Source: Hidajat (2020)
Figure 4. Illustration of Ponzi Scheme

Loss Aversion

Loss aversion refers to the inclination of individuals to feel the emotional impact of losses more than commensurate gains, which encourages investors to place greater emphasis on avoiding losses rather than pursuing gains (Thaler et al. 1997). Loss aversion is a strong emotional drive to avoid losses as opposed to pursuing gains (Pompian, 2011). The concept of loss aversion has been increasingly refined to reflect its psychological and behavioral depth in decision-making. Contemporary studies consistently reinforce the idea that individuals perceive losses as significantly more impactful than equivalent gains, emphasizing inherent cognitive and emotional asymmetry. Loss aversion is now widely recognized as a cognitive bias in which individuals exhibit a stronger emotional response to potential losses than to potential gains of equal magnitude, often relative to a personal reference point. This asymmetry shapes how people evaluate outcomes, with losses typically outweighing gains in subjective value assessments (Gao, 2023; Liu, 2023; Qiao, 2023; Walasek et al., 2024; Yang, 2023). This trait reflects an investor's preference for certain gains over probabilistic ones and a tendency to prefer probabilistic losses over definite losses. This trait often leads investors to make less rational decisions, as they tend to remember the experience of losses more than gains. As a result, investors become more cautious in making investment decisions as they want to avoid making the same mistakes and feeling down due to losses. This trait may also limit potential gains owing to an excessive focus on loss aversion. Considering the narrative, the first hypothesis is as follows:

H1 : Loss Aversion negatively affects fraudulent investment decisions.

Regret Aversion

As stated by Pompian (2011), regret aversion refers to the inclination to evade decisive action for fear that the decision will, in the end, prove to be suboptimal. This trait encourages individuals to avoid feeling regret from bad decisions; thus, investors may hesitate to enter a market that is experiencing losses or hold stocks that are increasing in value. Research conducted by Bell (1982) showed that when respondents are faced with an investment plan, and the results of their investment decisions turn out to be less good than other alternatives, this triggers a sense of regret. Such regret can make investors tend to avoid risky investment decisions to prevent negative consequences in the future. Recent developments have further clarified the psychological mechanisms underlying regret aversion in investment behaviors. Regret aversion is now widely understood as a cognitive-emotional bias in which individuals avoid making potentially regret-inducing decisions, often opting for safer alternatives to minimize future emotional distress. Scholars distinguish between experienced regret, which stems from past decision failures and influences future actions, and anticipated regret, which emerges from the fear that a current choice may later prove inferior to other options. This bias leads to a reluctance to take risks or engage in new investment opportunities, particularly when previous experiences or imagined future scenarios evoke the possibility of regret. Modern interpretations emphasize that an excessive focus on avoiding regret, whether from action or inaction, can hinder rational financial decision-making (Mahadevi & Haryono, 2021; Nursalimah & Utami, 2022; I. R. Putri & Hikmah, 2020; Salvatore & Esra, 2020; Santoso & Safariah, 2023). Considering the narrative above, the hypothesis tested is as follows:

H2 : Regret Aversion negatively affects fraudulent investment decisions.

Herding

According to Banerjee (1992), herding represents an individual's inclination to follow the decisions of others, assuming that others have important information. Although this seems rational, this behavior makes people ignore their personal information, resulting in less efficient joint decisions. Research results from Dhall & Singh (2020) state that an in-depth understanding of herding behavior at the industry level benefits individual investors, helping them make prudent and more effective financial decisions that consider broader market trends and reduce the risk of following majority decisions. Herding behavior is increasingly understood as a complex behavioral bias in which investors tend to imitate others' actions rather than rely on personal judgment or available information. This phenomenon often arises from psychological and emotional factors, such as fear of making wrong decisions, uncertainty during volatile markets, or the belief that others possess superior information to make decisions. Social influence also plays a significant role, where decisions are driven by the collective behavior seen on social media or through public figures rather than by fundamental analysis. Herding can manifest rationally, such as following credible professionals, and irrationally, such as panic buying or selling. Moreover, underlying biases, such as the illusion of control or self-attribution, may intensify this behavior. Recognizing these nuances, recent literature emphasizes that herding is not merely an act of conformity but a multifaceted response to informational asymmetry, social pressure, and psychological vulnerabilities in investment contexts (Alamsyah et al., 2023; Ayoub & Balawi, 2022; Din et al., 2021; Kuria, 2024; Trisno & Vidayana, 2023). According to the narrative, the third hypothesis is as follows:

H3 : Herding has a positive effect on fraudulent investment decisions.

Financial Literacy

According to Atkinson & Messy (2011), financial literacy constitutes a blend of attitudes, awareness, behaviors, knowledge, and skills needed to make wise financial decisions to attain personal financial stability. Nalurita et al. (2020) emphasizes that finance represents a crucial element in individuals' daily lives. Financial knowledge can help individuals make decisions regarding financial products to optimize their financial management. A lack of understanding of finance can cause losses, either due to the impact of inflation, worsening economic conditions, or the pressure of the economic system that encourages consumptive or wasteful behavior. Recent literature emphasizes that financial literacy comprises a combination of financial awareness, knowledge, skills, attitudes, motivation, and self-confidence in applying financial principles to real-life decision-making. Financially literate individuals are not only capable of understanding essential concepts such as budgeting, saving, investing, and retirement planning, but are also equipped to make effective and responsible financial decisions that promote both personal and societal financial well-being. Thus, financial literacy is regarded as a crucial foundation for fostering sound financial behavior in an increasingly complex economic landscape (Alsmadi, 2022; Bunyamin & Wahab, 2022; Lusardi & Messy, 2023; Rani & Siwach, 2023). In the study of the influence of psychological traits on investment decisions, financial literacy can function as a moderating variable that can increase or decrease the impact of the influence of these traits. Atkinson & Messy (2011) explain that financial literacy refers to an individual's capacity to comprehend, manage, and apply financial knowledge, attitudes, and skills in daily decision-making to improve financial well-being. Based on the findings of the narrative above, the fourth hypothesis tested is as follows:

H4a : Financial literacy strengthens negative effect of loss aversion on fraudulent investment decisions.

H4b : Financial literacy strengthens negative effect of regret aversion on fraudulent investment decisions.

H4c : Financial literacy weakens positive influence of herding on fraudulent investment decisions.

Source: Developed for Research (2024)

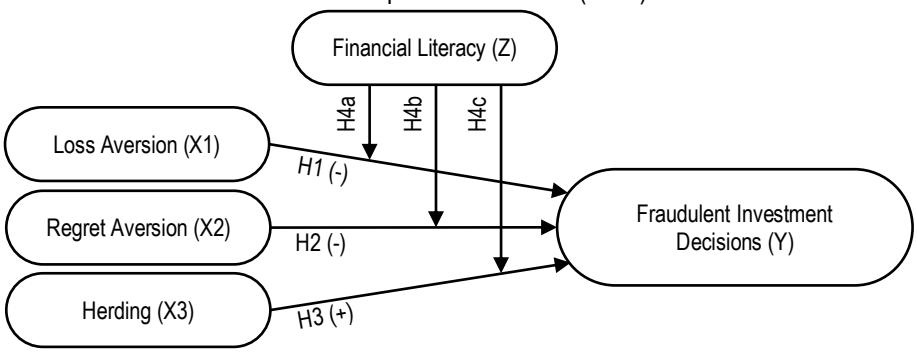


Figure 5. Research Design

RESEARCH METHODS

Research Approach and Design

This study is classified as an empirical research article employing a quantitative research approach with a survey design. Quantitative methods were employed in this study to enable systematic measurement and statistical testing of the relationships among psychological traits, financial literacy, and fraudulent investment decisions. The use of a structured questionnaire allowed for the collection of standardized data from a large number of respondents who directly experienced fraudulent investments, ensuring relevant and comparable information. Multiple regression analysis was chosen to identify the influence of each behavioral bias, while Moderated Regression Analysis (MRA) was applied to test the interaction effects of financial literacy as a moderating variable. This analytical approach is well aligned with the study's objective of not only assessing direct relationships but also evaluating how financial literacy may alter the strength of those relationships.

In addition to the structured primary data, this study also refers to several secondary data sources, such as national financial literacy trends, records of illegal investment shutdowns, and reported loss statistics, to establish the background context and reinforce the relevance of the research problem. However, core analysis and hypothesis testing were conducted using primary data collected directly from individuals with firsthand experience of fraudulent investment schemes.

Population and Sample

According to Sugiyono (2020), the population is defined as a generalization area comprising individuals and objects possessing specific characteristics and attributes defined by researchers to be observed and subsequently derive conclusions. The population used is the population in Semarang with 1.708.830 people, which is the total population in Semarang in 2024 (BPS Kota Semarang, 2024). Sugiyono (2020) indicated that the sample represents a subset of the whole and the characteristics that exist in the population. The number of respondents in this research was determined using the Slovin formula with an error tolerance level of 10%, so that the sample size obtained was 100 respondents.

In this study, the researchers chose snowball and purposive sampling. Snowball sampling is a sampling technique that starts with a limited quantity. Subsequently, the sample was instructed to select their acquaintances for sampling. Purposive sampling is a sampling technique that provides its own assessment of the sample among the selected population (Asari et al., 2023). This assessment was conducted in accordance with certain conditions based on this research. The criteria for selecting participants who had been victims of fraudulent investments were as follows: (i) having experienced losses from fraudulent investments, investments with member recruitment schemes for a reward, or involvement in online gambling/slots under the guise of an investment place, (ii) at least 17 years old, and (iii) domiciled in Semarang City.

Research Variables

According to Sugiyono (2020), variables are attributes of a person or object that have variations between one person and another or one object and another object. This study has dependent, independent, and moderating variables. Independent variables influence or cause changes in the dependent variables (Sugiyono, 2020). The independent variables (X) used in this study are loss aversion, regret aversion, and herding. The dependent variable can be explained as a variable that is influenced or becomes the result of the independent variable (Sugiyono, 2020). The dependent variable (Y) used in this study is the fraudulent investment decision. Moderating variables can be explained as variables that can affect (strengthen or weaken) the relationship between the independent and dependent variables (Sugiyono, 2020). The moderating variable (Z) used in this research is financial literacy. Therefore, an explanation of the operational definitions and variable measurement methods is presented in Table1.

Analysis Tool

Data Eligibility Test

Validity Test

Validity tests can be used to evaluate whether a questionnaire is valid, which can be done with a bivariate correlation, which is evaluated based on the significance value in the Pearson product-moment correlation. If the value shows $\alpha < 0{,}05$, then it can be determined that the research statement is valid, while if it shows the value $\alpha > 0{,}05$ then the research statement is invalid (Ghozali, 2021).

Table 1. Operational Definition of Research

No	Variables	Operational Definition	Variable Indicator
1	Loss Aversion (X1)	Loss aversion refers to individuals' inclination to feel heavier facing losses than enjoying equally large profits. investors tend to place greater emphasis on preventing losses rather than pursuing profits (Thaler et al., 1997).	1) Avoiding losses. 2) Holding on to loss-making investments for too long. 3) Not willing to try other investments. 4) Know the exact performance of the investment to be invested. 5) Be aware of sudden changes in investments that may lead to losses. (Aprilianti et al., 2023)
2	Regret Aversion (X2)	Regret aversion is a person's tendency to avoid bolder decisions because of the fear that the decision will turn out to be wrong. This trait is influenced by regret over past mistakes, which ultimately affects future investment decisions and makes plans often fall short of expectations (Pompian, 2011).	1) Avoid exiting dubious investments for fear of missing out on profit opportunities. 2) Feeling more regret if you fail to make a big profit than keeping a risky investment. 3) Feelings of doubt and regret when wanting to exit the investment. 4) The effect of past losses on the decision to persist in fraudulent investments. (Cao et al., 2021; Loppies et al., 2022)
3	Herding (X3)	Herding is the tendency for people to follow others' decisions because they think they have important information. As a result, people often ignore their own personal information, which can lead to less effective joint decisions (Banerjee, 1992).	1) Follow other investors' reviews. 2) Mimicking other investors decisions in choosing assets to buy. 3) The choice to purchase or dispose of an asset is determined by the decisions of other investors. 4) Quickly follow investment decisions made by other investors. (Mahadevi & Haryono, 2021)
4	Fraudulent Investment Decision (Y)	A fraudulent investment decision is a decision to hand over money to a party that promises profits, but the funds are not managed in a legitimate or productive manner. Typically, funds are simply rotated between investors or taken without legal management, thus often harming investors (Tandelilin, 2010).	1) Not deep investment knowledge but looks confident. 2) Unrealistic or Overly Ambitious investment goals. 3) Prioritization of quick profits without regard to risk. 4) Reliance on public figures for investment validation. 5) Ignoring legality and credibility. (Iswahyudi, 2023; Prayudi & Purwanto, 2023)
5	Financial Literacy (Z)	Financial literacy is the ability that includes understanding, attitudes, skills, and behavior in managing finances effectively. A person needs financial skills, namely the ability to make good decisions in managing personal finances (Atkinson & Messy, 2011).	1) Fundamental understanding of personal financial management. 2) Understanding of money management. 3) Expertise in credit and debt management. 4) Understanding of savings and investment. 5) Understanding of risk mitigation strategies. (Fitriyani & Anwar, 2022)

Source: Developed for Research (2024)

Reliability Test

The reliability test relates to the steadiness and stability of the data used in the study (Ghozali, 2021). This test was performed using the one-shot technique and statistical analysis $Cronbach\ Alpha\ (\alpha)$. According to Budiastuti & Bandur (2018) data is considered reliable if the value $\alpha > 0{,}70$ because the more the measurement scale, the higher the value limit $Cronbach\ Alpha\ (\alpha)$.

Classical Assumption Test

Normality Test

According to Ghozali (2021), the normality test assesses whether the research data follow a normal distribution. An effective regression model has a normal pattern of residual distribution. If the significance value is $Asymp.Sig.(2-tailed) > 0{,}05$, then the data follows a normal distribution.

Multicollinearity Test

The multicollinearity test aims to determine whether a correlation exists between the independent and dependent variables in the regression model, because a correlation with a high value can interfere with the relationship between the variables used (Ghozali, 2021). If the values of $tolerance > 0{,}10$ and $VIF < 10$ it indicates that the data is free from multicollinearity.

Heteroscedasticity Test

The heteroscedasticity test is designed to identify any differences in the residual variances in the regression model to identify the presence of heteroscedasticity. This study uses the Glejser test by observing the probability of significance. Good data have a significance value $\alpha > 0{,}05$ and it can be inferred that the constant residual variance is not affected by the independent variable (Ghozali, 2021).

Hypothesis Test

Multiple Linear Regression Analysis

Multiple linear regression is a statistical model that incorporates multiple independent variables to predict the dependent variable. Multiple regression analysis can be used to assess the direction and magnitude of the influence of an independent variable on a dependent variable (Ghozali, 2021). In this study, multiple linear regression tests were conducted to analyze how the independent variables, namely loss aversion ($X1$), regret aversion ($X2$), and herding ($X3$), affect the dependent variable, namely fraudulent investment decisions (Y).

Statistical t Test

The t test is used to test how much influence each independent variable has individually in explaining the effect on the dependent variable (Ghozali, 2021). This test was carried out by setting $level\ of\ significance\ (\alpha)$ by $0{,}05\ (5\%)$. If the probability value is $\alpha < 0{,}05$, then it can be concluded that the independent variable has a significant effect on the dependent variable.

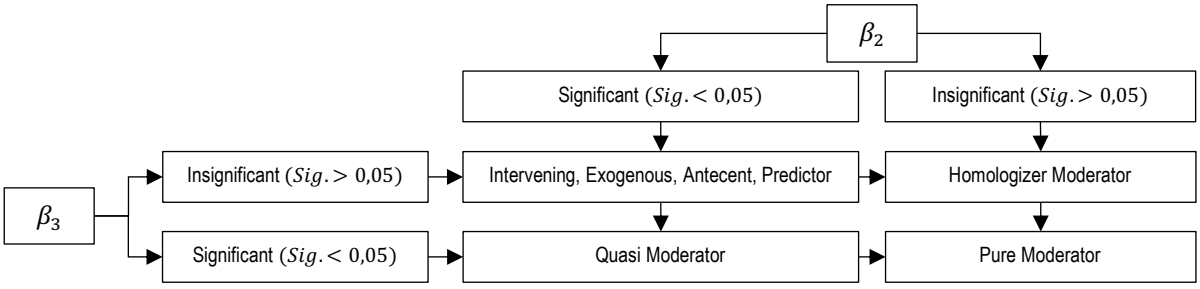
Determination Coefficient Test ($\mathbf{R^2}$)

The coefficient of determination test is an evaluation tool used to assess the extent to which the regression model can describe the effect of the independent variable on the dependent variable. Assessment can be assessed through the value of $Adjusted\ R^2$ which is in the range between 0 to 1. The more the value of $Adjusted\ R^2$ approaches the number 1, the better the model is in explaining and predicting the effect of the independent variable on the dependent variable, indicating that the independent variables provide almost complete information in influencing and predicting the dependent variable (Ghozali, 2021).

Statistical F Test

The F test was conducted to determine whether the independent variables as a whole have an impact on the dependent variable and whether one or all of the independent variables have no significant effect (Ghozali, 2021). If the calculation results show a significance value of less than $0{,}05$, it can be inferred that the independent variable has a significant impact and can predict the dependent variable.

Moderated Regression Analysis (MRA)



Source: Sharma et al. (1981) & Sugiyono (2020)

Figure 6. Types of Moderating Variables

Quasi moderator is a variable that can interact with the dependent variable while acting as an independent variable, has a significant effect on the independent variable (β_2) and also plays a role in the interaction $X * Z$

(β_3) on the dependent variable. Pure moderator only interacts with the dependent variable without being an independent variable, where the value of β_2 is not significant, but the value of the interaction $X * Z$ (β_3) is significant. Predictor moderator acts as an independent variable because the effect of the moderating variable on the dependent variable (β_2) is significant, but the interaction $X * Z$ (β_3) is not significant. Homologizer moderator is referred to as potential moderation because it has no significant relationship with the dependent variable (β_2) or interaction $X * Z$ (β_3) (Rahadi & Farid, 2021).

If the MRA test results show that the moderating variable can act as a moderating variable but is not significant, then the correlation between the influence of the moderating variable between the independent and dependent variables depends on the value of the error terms. The greater the value of the error terms, the smaller the effect. Conversely, the smaller the error term value, the greater the influence given to the correlation between the independent and dependent variables (Wahyuni & Lukiastuti, 2019).

RESULTS AND DISCUSSION

Description of Characteristics of Research Respondents

The research object is people who have been victims of fraudulent investments. Most respondents were victims of counterfeit money investment ($20{,}7\%$) and online gambling/slots under the guise of investment ($18{,}1\%$). Other fraud motives have a smaller proportion. This shows that the types of fraud in fraudulent investments tend to trick victims by promising instant profits.

Table 2. Types of victims of fraudulent investments

Description	Total	Percentage
Forex & Future Trading	15	12,9%
Giveaway	1	0,9%
Fake Cryptocurrency Investment	18	15,5%
Counterfeit Money Investment	24	20,7%
Online Gambling / Slots Under the guise of Investment	21	18,1%
Like & follow	1	0,9%
MLM Illegal	17	14,6%
Illegal Money Game	19	16,3%
Total	116	100%

Source: SPSS Data Processing, 2024

Respondents were spread across different regions, with the majority coming from Pedurungan (12%), Tembalang (11%), and Ngaliyan and West Semarang (9%). respectively. A small number came from areas such as Banyumanik, Genuk, East Semarang, and North Semarang ($7 - 9\%$), while domiciles such as Gajahmungkur, Central Semarang, and Tugu had lower frequencies ($2 - 4\%$). This explains the proportion of respondents' distribution based on their domicile within each sub-district in Semarang City.

Most of the respondents were male 59%, while females accounted for 41%. Regarding age, the majority of participants are aged 17-27 years old (65%), followed by the age groups 28-43 years old (21%) and 44-59 years old (13%). The education level of the respondents also varies, with the majority graduating from senior high school (42%) and D1-D3 (26%), while there are graduates from D4-S1 (22%) and S2-S3 (5%). There are also respondents with basic education (SD/equivalent 2%, SMP/equivalent 3%). This shows that victims of fraudulent investments come from various age groups and education levels, with a dominance of young people with secondary education.

Most of the respondents are students (44%) and private employees (31%), followed by self-employed (13%) and employees of BUMN/ASN/PNS (9%). Only a few respondents are unemployed (2%) or work in positions such as accounting managers (1%). In terms of income, the majority have income below $Rp\ 1.000.000$ (41%) or are in the range of $Rp\ 3.000.001$ - $Rp\ 5.000.000$ (31%). Respondents with high income (above $Rp\ 10.000.000$) are only 2%. This indicates that victims of fraudulent investment scams do not only come from those with low income, but are also spread across a wide range of income levels.

Description Statistics of Variables

Descriptive statistics of variables are data summaries that describe the tendency trends in respondents' responses to the questions in the questionnaire. Thus, the resulting nominal index has a range of values from $20 - 100$, with a range distance of 80. The three-box method is used by dividing the value range 80 into three parts, resulting in a distance between criteria of $26{,}67$. So that the criteria can be stated as $20 - 46{,}66$ (Low), $46{,}67 -$

$73{,}33$ (Medium), dan $73{,}34 - 100$ (High). This distance is then used as the basis for interpreting the index value (Ferdinand, 2014).

According to the findings of the questionnaire responses regarding the indicators of the loss aversion, the maximum mean score was found in the indicator with the statement: "The fear of losing money makes me hesitant to make investment decisions". This indicates that the fear of losing money significantly influences respondents' investment decisions. Among all statements within each indicator that fall into the moderate and high criteria, the average respondent response for the loss aversion variable was $322{,}30$ categorized as medium. This suggests that while there is a level of caution in investment decision-making, some respondents still tend to take certain risks.

The assessment results for each statement under the regret aversion variable indicate that the highest respondent scores were identified in the indicator alongside the statement: "I consider past losses when deciding to stay in an investment despite additional risks". This suggests that respondents tend to maintain their investments even when there is potential for additional risk, as their past loss experiences influence their decision-making mindset. The average respondent response for the regret aversion variable was $329{,}63$ categorized as medium. This indicates that although most respondents consider additional risks, they still tend to persist with their previously chosen investments.

For the herding variable, the highest respondent score was recorded for the indicator "Reviews from other investors are one of my main references in selecting an investment type". This demonstrates that many respondents tend to follow others' investment decisions based on reviews or testimonials they read. This phenomenon indicates that many individuals still rely on collective decisions when choosing investments, which can lead to trend following behavior without conducting in-depth analysis. The herding variable had an average score of $336{,}38$ categorized as medium, suggesting that while other investors influence investment decision making, some respondents still consider other factors such as personal analysis and fundamental investment aspects.

Regarding the fraudulent investment decision variable, respondents' highest scores were identified in the indicator alongside the statement: "I believe the investment I chose can yield higher returns than what is typically offered". This suggests that many respondents have high expectations for their investment returns, which could be a driving factor for them to engage in fraudulent investments without fully considering the risks. Similar to the other variables classified under the moderate category, the fraudulent investment decision variable had an average score of $313{,}10$ indicating that while most respondents exercise caution, some still believe in the potential for high profits promised by such investments.

For the financial literacy variable, the highest respondent scores were identified in the indicator alongside the statement: "I understand basic concepts such as budgeting and personal financial record-keeping". This shows that most respondents have a fairly good understanding of fundamental financial concepts, which can assist them in making wiser financial decisions. However, derived from the average respondent responses, the financial literacy variable had a score of $338{,}30$ categorized as medium. This indicates that although financial literacy is at a moderate level, further improvements are needed in understanding broader aspects so that respondents can better distinguish whether an investment is a safe opportunity or not.

The results in this research show variations in respondents' responses, with the average index across all variables falling within the moderate category. This reflects that most respondents exhibit neither excessively low nor high tendencies regarding behavioral traits, fraudulent investment decisions, and financial literacy. The variations are seen among respondents with high or low behavioral traits (loss aversion, regret aversion, and herding) and financial literacy levels. Despite some respondents exhibiting low or high traits or financial literacy levels, all respondents in this study experienced losses due to making incorrect investment decisions. These findings suggest that there may be other factors influencing fraudulent investment decisions that were not examined in this study.

Descriptive Statistics of Research Data

Standard deviation, variance, and mean have a complementary relationship in describing data distribution. Mean indicates the magnitude of the center point of the data set. Standard deviation measures how far the data is spread from the mean value. The higher the standard deviation, the greater the variation or spread of the data from the average value. While the variance is determined by squaring the standard deviation, serving as an indicator of data dispersion in larger units. The main function of the mean is to show the center within the data set's distribution, while standard deviation also variance describe the extent to which the data spreads from the center.

Descriptive statistics in this research show that the average (mean) of the five variables has varying values. The financial literacy variable (Z) has the highest average, which is $33{,}83$, loss aversion ($X1$) with an average of $32{,}23$, and fraudulent investment decisions (Y) with an average of $31{,}31$. Meanwhile, herding ($X3$) and regret aversion ($X2$) have lower averages $26{,}91$ and $26{,}37$. All the mean values of the psychological traits of loss aversion, regret aversion, and herding are above the mean, indicating that most of the respondents have psychological traits that still easily fall into risky investments even though the majority of respondents already possess strong financial literacy.

Furthermore, the financial literacy has the largest deviation from the mean value with a standard deviation of $12{,}139$ and variance $147{,}355$ which indicates that the respondents' answers to this variable vary greatly. The variable of fraudulent investment decisions (Y) also has considerable variation with a standard deviation of $10{,}528$ and variance $110{,}842$. In contrast, the variables of loss aversion ($X1$), regret aversion ($X2$), and herding ($X3$) have smaller deviations, with standard deviations of $7{,}817$, $7{,}389$, and $7{,}260$ respectively and lower variance values $61{,}108$, $54{,}599$, and $52{,}709$. It can be interpreted that the distribution of data on the variables Z and Y is more heterogeneous or more varied or some respondents already have good financial literacy while some of the rests do not have good financial literacy. Meanwhile, the variables $X1$, $X2$, and $X3$ are more homogeneous or most respondents tend to have psychological traits.

Data Eligibility Test

Validity test results in this research show that all variables in this paper, namely loss aversion, regret aversion, herding, fraudulent investment decisions, and financial literacy, have a significance value of $0{,}000$ which is lower than the predetermined significance level $0{,}05$. This indicates that all items in the research instrument are declared valid so that it means that all variable instruments or variable indicators are able to assess the variables utilized in this research properly.

In the reliability test, all variables analyzed have a value of Cronbach Alpha above 0,7 which is the threshold for stating the dependability of the research instrument. These results indicate that the research statements have a very good level of consistency and can be relied upon to measure the variables in this study even at different research sites and times.

Table 3. Validity and Reliability Test

Variable	Item	Value	Description	Variable	Item	Value	Description	Variable	Item	Value	Description
Loss Aversion	X1.1.1	0,000	Valid	Financial Literacy	Z.1.1	0,000	Valid	Fraudulent Investment Decision	Y.1.1	0,000	Valid
	X1.1.2	0,000	Valid		Z.1.2	0,000	Valid		Y.1.2	0,000	Valid
	X1.2.1	0,000	Valid		Z.2.1	0,000	Valid		Y.2.1	0,000	Valid
	X1.2.2	0,000	Valid		Z.2.2	0,000	Valid		Y.2.2	0,000	Valid
	X1.3.1	0,000	Valid		Z.3.1	0,000	Valid		Y.3.1	0,000	Valid
	X1.3.2	0,000	Valid		Z.3.2	0,000	Valid		Y.3.2	0,000	Valid
	X1.4.1	0,000	Valid		Z.4.1	0,000	Valid		Y.4.1	0,000	Valid
	X1.4.2	0,000	Valid		Z.4.2	0,000	Valid		Y.4.2	0,000	Valid
	X1.5.1	0,000	Valid		Z.5.1	0,000	Valid		Y.5.1	0,000	Valid
	X1.5.2	0,000	Valid		Z.5.2	0,000	Valid		Y.5.2	0,000	Valid
	Cronbach's Alpha	0,773	Reliable		Cronbach's Alpha	0,845	Reliable		Cronbach's Alpha	0,847	Reliable
Regret Aversion	X2.1.1	0,000	Valid	Herding	X3.1.1	0,000	Valid				
	X2.1.2	0,000	Valid		X3.1.2	0,000	Valid				
	X2.2.1	0,000	Valid		X3.2.1	0,000	Valid				
	X2.2.2	0,000	Valid		X3.2.2	0,000	Valid				
	X2.3.1	0,000	Valid		X3.3.1	0,000	Valid				
	X2.3.2	0,000	Valid		X3.3.2	0,000	Valid				
	X2.4.1	0,000	Valid		X3.4.1	0,000	Valid				
	X2.4.2	0,000	Valid		X3.4.2	0,000	Valid				
	Cronbach's Alpha	0,911	Reliable		Cronbach's Alpha	0,954	Reliable				

Source: SPSS Data Processing, 2024

Classical Assumption Test

The value at this research shows the number $0{,}200$ whose value is greater than the significance level $0{,}05$. This indicates that the residual data in this regression model follows a normal data distribution. And then, the $tolerance$ value for all variables, loss aversion ($0{,}846$), regret aversion ($0{,}659$), herding ($0{,}755$), and financial literacy ($0{,}956$) is greater than the level limit $0{,}10$. And the results of the value of

$Variance\ Inflation\ Factor\ (VIF)$ for each independent variable and moderating variable are $1{,}183$, $1{,}517$, $1{,}325$, and $1{,}046$ which are all smaller than the number 10. This explains that the absence of strong linear relationship among the independent variables, so all three can be used together in regression analysis without causing multicollinearity problems. Furthermore, the results of the heteroscedasticity test show that the significance values for loss aversion $(0{,}703)$, regret aversion $(0{,}562)$, herding $(0{,}083)$, and financial literacy $(0{,}974)$ is above than $0{,}05$. These results indicate that the assumption of homoscedasticity is met and the residual variance is constant and not affected by the independent variables. In other words, as the value of the independent variable changes, the distribution of residuals does not change, and the amount of error that occurs remains the same.

Table 4. Normality, Multicollinearity, and Heteroskedasticity Test

Variable	Normality Test (Kolmogorov Smirnov)	Multicollinearity Test (Tolerance > 0,1 & VIF < 10)		Heteroskedasticity Test (Glejser Test)
	Asymp. Sig. (2-tailed)	Tolerance	VIF	Sig.
Loss Aversion Bias	0,200	0,846	1,183	0,703
Regret Aversion Bias		0,659	1,517	0,562
Herding Bias		0,755	1,325	0,083
Financial Literacy		0,956	1,046	0,974
Conclusion	Normally Distributed	No Multicollinearity		No Heteroskedasticity

Source: SPSS Data Processing, 2024

Hypothesis Test

Multiple Linear Regression Analysis

Table 5. Statistical t, Determination Coefficient, and Statistical F Test

	Model	Unstandardized Coefficients β	t Sig.	Adjusted R Square	F Sig.
1	(Constant)	38,226	0,000	0,166	0,000
	Loss Aversion Bias	−0,295	0,031		
	Regret Aversion Bias	−0,410	0,011		
	Herding Bias	0,498	0,001		

Source: SPSS Data Processing (2024)

Based on the coefficient value of the statistical t test results in table 5 Unstandardized Coefficients β column, the multiple linear regression equation in this study can be formulated as follows:

$$Y = 38{,}226 - 0{,}295\ (X1) - 0{,}410\ (X2) + 0{,}498\ (X3) + \varepsilon \quad (1)$$

Furthermore, based on the explanation of the t statistical test results above, the hypothesis can be accepted if the value of $sig < 0{,}05$ on each variable, so the conclusion of the statistical t test $(t - test)$ is:

a. The regression coefficient for loss aversion is $-0{,}295$ with values $t = -2{,}192$ and $p - value = 0{,}031$. Because the value of $p - value$ is smaller than $0{,}05$, thus loss aversion has a significant negative effect on fraudulent investment decisions.
b. The regression coefficient for regret aversion is $-0{,}410$ with values $t = -2{,}578$ and $p - value = 0{,}011$. The value of $p - value$ less than $0{,}05$ explains that regret aversion also has a significantly negative effect on fraudulent investment decisions.
c. The regression coefficient for the herding variable is $0{,}498$ with values $t = 3{,}311$ and $p - value = 0{,}001$. The value of $p - value$ is smaller than $0{,}05$ explaining that herding has a significant positive effect on fraudulent investment decisions.

The $Adjusted\ R^2$ value of $0{,}166$ listed in table 5 Adjusted R Square column indicates that only $16{,}6\%$ fluctuation in the dependent variable (fraudulent investment decisions) can be interpreted through the independent variables (loss aversion, regret aversion, and herding). So, although this model explains a small part of the variation in fraudulent investment decisions, the lower value of $Adjusted\ R^2$ suggests that the independent variables employed do not fully describe the variability in fraudulent investment decisions. The low $Adjusted\ R^2$ value of $0{,}166$ can be caused by a fairly small spread of data on the independent variables, namely loss aversion $(7{,}817)$, regret aversion $(7{,}389)$, and herding $(7{,}260)$. This relatively small standard deviation indicates that respondents' answers to the three variables tend to gather around the average value, so the variation that can be explained by the model is limited, which indicates that the independent variables in this study are less suitable for explaining fraudulent investment decisions. So that there are other variables that are more relevant to fraudulent investment decisions that have not been included in this research model.

The findings of the F statistical test presented in table 5 F Sig. column show the $p - value = 0{,}000$. Thus, it can be inferred that the regression model involving loss aversion, regret aversion, and herding as a whole or simultaneously has a significant influence on fraudulent investment decisions. This model explains the good relationship between all independent variables and fraudulent investment decisions.

Moderated Regression Analysis (MRA)

Table 6. Development of the Moderation Regression Equation

	Model	Unstandardized Coefficients β	Sig.
1	(Constant)	11,179	0,318
	Loss Aversion Bias	0,591	0,076
	Financial Literacy	1,001	0,002
	LA_LK	−0,030	0,002
a. Dependent Variable: Fraudulent Investment Decision			
	Model	Unstandardized Coefficients β	Sig.
2	(Constant)	−4,682	0,157
	Regret Aversion Bias	1,324	0,235
	Financial Literacy	0,834	0,046
	RA_LK	−0,030	0,045
a. Dependent Variable: Fraudulent Investment Decision			
	Model	Unstandardized Coefficients β	Sig.
3	(Constant)	−4,682	0,675
	Herding Bias	1,324	0,001
	Financial Literacy	0,834	0,008
	HB_LK	−0,030	0,007
a. Dependent Variable: Fraudulent Investment Decision			

Source: SPSS Data Processing (2024)

Development of the First Model Moderation Regression Equation

Drawing from the findings of the moderated regression examination in table 6 number (1), the Unstandardized B column, the first model moderation regression equation can be expressed as follows:

$$Y = 11{,}179 + 0{,}591\ (X1) + 1{,}001\ (Z) - 0{,}030\ (X1 * Z) + \varepsilon \quad (2)$$

Based on the Loss Aversion*Financial Literacy coefficient (β_3) $-0{,}030$ and the significance value $p - value = 0{,}002$. It can be inferred that that the interaction between loss aversion and financial literacy has a significant effect on fraudulent investment decisions. Furthermore, in the data processing results, the negative β_3 coefficient shows that financial literacy weakens the loss aversion variable in fraudulent investment decisions.

To identify the type of moderation of financial literacy (pure moderator or quasi moderator or homologizer moderator), we use reference to the coefficient and significance of the following variables:

a. $p - value\ \beta_2$ (Financial Literacy) = $0{,}002$
b. $p - value\ \beta_3$ (Interaction of Loss Aversion and Financial Literacy) = $0{,}002$

Since β_2 (Financial Literacy) is significant and β_3 (Interaction of Loss Aversion and Financial Literacy) is also significant, this type of moderation is included in the quasi moderator.

Development of the Second Model Moderation Regression Equation

Drawing from the findings of the moderated regression examination in table 6 number (2), the Unstandardized B column, the first model moderation regression equation can be expressed as follows:

$$Y = 16{,}855 + 0{,}503\ (X2) + 0{,}621\ (Z) - 0{,}022(X2 * Z) + \varepsilon \quad (3)$$

Based on the coefficient of Regret Aversion*Financial Literacy (β_3) $-0{,}022$ and the significance value $p - value = 0{,}045$. It can be inferred that that the interaction between regret aversion and financial literacy has a significant effect on fraudulent investment decisions. Furthermore, in the data processing results, the negative β_3 coefficient shows that financial literacy weakens the regret aversion variable fraudulent investment decisions.

To identify the type of moderation of financial literacy (pure moderator or quasi moderator or homologizer moderator), we use reference to the coefficient and significance of the following variables:

a. $p - value\ \beta_2$ (Financial Literacy) = $0{,}046$
b. $p - value\ \beta_3$ (Interaction of Regret Aversion and Financial Literacy) = $0{,}045$

Since β_2 (Financial Literacy) is significant and β_3 (Interaction of Regret Aversion and Financial Literacy) is also significant, this type of moderation is included in the quasi moderator.

Development of the Third Model Moderation Regression Equation

Drawing from the findings of the moderated regression examination in table 6 number (3), the Unstandardized B column, the first model moderation regression equation can be expressed as follows:

$$Y = -4{,}682 + 1{,}324\ (X3) + 0{,}834\ (Z) - 0{,}030\ (X3 * Z) + \varepsilon \quad (4)$$

Based on the Herding*Financial Literacy coefficient (β_3) $-0{,}030$ and the significance value $p - value = 0{,}007$. It can be inferred that the interaction between herding and financial literacy has a significant effect on fraudulent investment decisions. Furthermore, in the data processing results, the negative β_3 coefficient shows that financial literacy weakens the herding variable in fraudulent investment decisions.

To identify the type of moderation of financial literacy (pure moderator or quasi moderator or homologizer moderator), we use reference to the coefficient and significance of the following variables:

a. $p - value\ \beta_2$ (Financial Literacy) = $0{,}008$
b. $p - value\ \beta_3$ (Interaction of Herding and Financial Literacy) = $0{,}007$

Since β_2 (Financial Literacy) is significant and β_3 (Herding and Financial Literacy Interaction) is also significant, this type of moderation is included in the quasi moderator.

Discussion

The Relevance of Loss Aversion in Fraudulent Investment Decision

Grounded in the questionnaire results, the highest average score for the loss aversion variable indicator lies in the statement: "The fear of losing money makes me hesitant to make investment decisions". This indicates that the fear of potential losses has a profound influence on respondents' investment decisions. Among all statements with moderate to high criteria, the average respondent's answer for the loss aversion variable is $322{,}30$ categorized as medium. This reflects that although respondents are inclined to be careful when making investment decisions, some still have a tendency to take certain risks under specific conditions.

In this study, the research subjects are individuals who have been victims of fraudulent investments. Based on demographic data, most of the respondents fall into the 17-27 age category (65%), with the highest education levels being high school or equivalent (42%) and diploma (D1-D3) (26%). This younger age group tends to have limited investment experience, making them more vulnerable to loss aversion bias. Additionally, most respondents have an income below $Rp\ 1.000.000\ (41\%)$ or between $Rp\ 3.000.001$ and $Rp\ 5.000.000\ (31\%)$, indicating that financial constraints can reinforce the impact of loss aversion in investment decision-making. To put it differently, individuals with lower incomes and limited investment experience are more likely to avoid risks but may also fall into irrational decisions due to the fear of losing their invested capital.

From a theoretical perspective, the relation between loss aversion and fraudulent investment decisions can be explained through Prospect Theory. This theory states that individuals tend to avoid risks when gaining but are more willing to take risks to avoid losses. The Reflection Effect in this theory suggests that when individuals are in a loss situation or fear experiencing losses, they tend to make riskier decisions. This explains why some individuals remain trapped in fraudulent investments despite having high levels of loss aversion. The anxiety of losing the money they have already invested actually pushes them to stay or even invest more to avoid realizing a loss.

This study is in accordance with research carried out by Holly et al. (2022), which found that loss aversion tends to reduce individuals' tendency to choose high-risk investments, including fraudulent investments. The research also showed that people with greater levels of loss aversion are more likely to reject unclear or high-risk investment offers. Thus, these findings support the notion that loss aversion influences fraudulent investment decisions, particularly in excessive risk avoidance.

According to the regression test in table 2, the regression coefficient for loss aversion is $-0{,}295$ with a $p - value$ of $0{,}031$. Since the $p - value$ is less than $0{,}05$, it can be inferred that loss aversion has a significant negative impact on fraudulent investment decisions. This signifies that the higher a person's level of loss aversion, the less more likely they are to fall into fraudulent investments. These findings confirm the research hypothesis that loss aversion negatively influences fraudulent investment decisions.

The Relevance of Regret Aversion in Fraudulent Investment Decision

According to the questionnaire results for the regret aversion variable indicators, the highest average score appears in the statement: "I consider past financial losses when deciding to stay in an investment despite additional risks". This indicates that respondents tend to remain in investments they have previously chosen, even when facing increased risks, as their past financial losses influence their decision-making patterns. The overall average

regret aversion score is $329{,}63$ categorized as medium. This suggests that although most respondents are aware of additional risks, they remain invested in fraudulent schemes due to the fear of regretting their previous decisions.

From a demographic perspective, the majority of respondents who fell victim to fraudulent investments belong to the 17-27 age group (65%), with the highest education levels being high school or equivalent (42%) and diploma (D1-D3) (26%). Younger individuals typically have limited investment experience, making them more susceptible to regret aversion bias. Regarding occupation, most respondents are students (44%) or private-sector employees (31%), indicating that they are still in the early stages of gaining investment experience. In terms of income, the majority of respondents earn below $Rp\ 1.000.000$ (41%), suggesting that they have financial constraints, which may make them more likely to stick to their initial investment decisions to avoid regretting later.

Regret aversion can be explained using Prospect Theory, which states that individuals tend to steer clear of risk when in a favorable situation but are more willing to take risks when facing potential losses. In this context, respondents who have previously experienced losses in fraudulent investments tend to maintain their investments despite additional risks because they want to prevent the regret of acknowledging a poor decision. The Reflection Effect in Prospect Theory explains why individuals prefer to remain in risky investments, as they fear regretting their decision to exit an investment that might still have the potential for gains.

This study aligns with studies conducted by Suprasta & Nuryasman (2020), which revealed that regret aversion leads to risk avoidance in investments that could actually offer greater returns. This suggests that individuals with elevated levels of regret aversion tend to be more cautious in changing their investment strategies, even when they are involved in fraudulent investment schemes that clearly carry high risks.

The results of the test in Table 2 show regret aversion have a regression coefficient of -0.410 with a $p-value$ of $0{,}011$. Since the $p-value$ is less than $0{,}05$ it can be inferred that regret aversion has a significant negative impact on fraudulent investment decisions. This implies that the greater an individual's level of regret aversion, the less probable it is for them to withdraw from a fraudulent investment, even as the risk of loss increases.

The Relevance Herding in Fraudulent Investment Decision

For the herding variable, the highest-scoring statement among respondents is: "Reviews from other investors are one of my main references when choosing an investment type". This indicates that many respondents tend to follow others' investment decisions based on reviews or testimonials they have read. This phenomenon suggests that many individuals still rely on collective decision-making when choosing investments, which can lead to blindly following market trends without conducting in-depth analysis. The herding variable has an average score of $336{,}38$, categorized as moderate, indicating that while other investors' influence plays a role in investment decision-making, some respondents still consider other factors such as personal analysis and fundamental investment factors.

The study focuses on individuals who have been victims of fraudulent investments. The majority of respondents fell victim to fake investment schemes ($20{,}7\%$) and online gambling disguised as investments ($18{,}1\%$), with other types of fraudulent schemes having smaller proportions. This suggests that fraudulent investment schemes are often designed to deceive victims by promising instant profits. With regard to demographic characteristics, most of the victims are male (59%) and belong to the 17-27 age group (65%), with the highest education levels being high school or equivalent (42%) and diploma (D1-D3) (26%). Most respondents are students (44%) and private-sector employees (31%). These characteristics indicate that younger individuals, who are still in the initial phases of financial literacy, are more vulnerable to being influenced by others when making investment decisions, which often results in involvement in fraudulent investment schemes.

In Prospect Theory, individuals tend to avoid risks when gaining but are willing to take greater risks to avoid losses. In the context of herding, the theory explains how investors follow the majority to reduce uncertainty in decision-making. The Isolation Effect in Prospect Theory also indicates that investors are focus to concentrate on information provided by others without conducting independent, in-depth analysis. This leads to a tendency to follow popular investment trends, even if they carry high risks. Therefore, in fraudulent investment decisions, herding behavior is driven by trust in information from other investors without critically assessing the underlying risks.

These results are consistent with studies carried out by Hussain et al. (2022), which explains that *herding* encourages individuals to follow majority decisions, which can lead to riskier investment choices, such as fraudulent investments. Thus, blindly following trends or the majority's actions without thorough consideration increases the likelihood of making harmful investment decisions. This further strengthens the argument that *herding* is one of the factors influencing irrational investment decisions.

Regression analysis results in table 2 show that the regression coefficient for herding is $0{,}498$, with a $p - value$ of $0{,}001$. Since the p-value is less than $0{,}05$ it indicates that herding has a significant positive impact on fraudulent investment decisions. This means that the higher a person's level of herding, the greater the likelihood that they will fall into fraudulent investments.

The Moderating Role of Financial Literacy in Loss Aversion

Based on the research findings, the financial literacy variable has a value of $338{,}30$ which falls into the moderate category. This suggests that although most of the respondents possess a reasonably good understanding of basic financial concepts, there is still a need to improve their comprehension of more complex financial aspects. The indicator with the highest score in this variable is the statement: "I understand basic concepts such as budgeting and personal financial record-keeping". Thus, financial literacy can act as a moderating variable that influences the connection between loss aversion and fraudulent investment decisions. Respondents with better financial literacy tend to distinguish between safe investments and those with potential risks, thereby reducing the negative the effect of loss aversion on investment decision-making.

The research subjects were individuals who had fallen victim to fraudulent investments, with the majority being trapped in fake money investment schemes ($20{,}7\%$) and online gambling/slot schemes disguised as investments (18.1%). In terms of demographics, most respondents were aged 17-27 years (65%), with education levels predominantly at the high school/equivalent level (42%) and diploma levels (D1-D3) (26%). The majority of respondents were students (44%) and private employees (31%), with most earning less than $RP\ 1.000.000$ (41%). This shows that victims of fraudulent investments come from groups that are more vulnerable to irrational investment decisions, which can be exacerbated by loss aversion. With financial literacy, individuals in this group are expected to develop better abilities to analyze investment opportunities and avoid fraudulent schemes.

The moderating role of financial literacy in the relationship between loss aversion and fraudulent investment decisions can be explained through Prospect Theory. The Reflection Effect in this theory states that individuals tend to avoid risk in gain conditions but are more willing to take risks in loss conditions. With financial literacy, individuals should be more capable of recognizing this pattern and making more rational decisions. Additionally, the Isolation Effect in Prospect Theory indicates that individuals tend to disregard information they do not consider relevant, which often happens in fraudulent investments that promise instant profits. Higher financial literacy can help individuals consider all relevant aspects before making investment decisions.

These results are consistent with those by Butt et al. (2023), who stated that better financial literacy can reduce the negative impact of loss aversion. With an improved comprehension of finance, individuals can critically evaluate investment risks and benefits and avoid impulsive decisions driven by fear of losses. Their study also showed that investors with better financial knowledge tend to be more skeptical of investments promising high returns in a short time.

The first moderated regression test results in table 5 indicate that financial literacy can weaken the effect of loss aversion on fraudulent investment decisions, as the data processing results show a β_3 coefficient of $-0{,}030$ and a significance value of $0{,}002$. Based on the moderated regression test results, the significance values for coefficients β_2 and β_3 are both significant ($p - value\ =\ 0{,}002$), indicating that financial literacy qualifies as a quasi-moderator. This means that financial literacy can function both as a moderating variable in the relationship between loss aversion and fraudulent investment decisions and as an independent variable.

The Moderating Role of Financial Literacy in Regret Aversion

Regarding the financial literacy variable, the highest-rated response among respondents refers to the indicator with the statement: "I understand basic concepts such as budgeting and personal financial record-keeping". This indicates that most respondents have a reasonably good understanding of basic financial concepts, which can assist them make wiser financial decisions. However, based on the respondents' average responses, the financial literacy variable has a value of $338{,}30$, which falls into the moderate category. This suggests that while financial literacy is not low, there is still a need for broader understanding to help individuals recognize safe investments and avoid fraudulent ones. Thus, financial literacy can act as a moderating factor that strengthens the negative influence of regret aversion on fraudulent investment decisions.

Most of the people in this research were individuals who had fallen victim to fraudulent investments, with the highest proportions in fake money investment schemes ($20{,}7\%$) and online gambling/slot schemes disguised as investments ($18{,}1\%$). In terms of demographic characteristics, most respondents were aged 17-27 years (65%), with education levels predominantly at the high school/equivalent level (42%). This low level of education

contributes to a lack of deep understanding of safe investments, increasing vulnerability to cognitive biases such as regret aversion. Additionally, most respondents earned less than $RP\ 1{,}000{,}000$ (41%), suggesting that they are more sensitive of the risk of financial loss. People with limited financial knowledge tend to be more likely to avoid risky investment decisions due to fear of regret but may instead fall into fraudulent investment schemes that promise instant profits with hidden risks. This reinforces the idea that financial literacy alone is not enough to protect individuals from the effects of regret aversion.

From the Prospect Theory perspective, individuals with low financial literacy tend to steer clear of choices that might cause future regret, making them more susceptible to fraudulent investments. Most of the respondents in this research had only a secondary education level, reflecting limited financial knowledge. This low financial literacy makes individuals rely more on emotional intuition rather than rational analysis when investing. Consequently, they are likely to remain in fraudulent investment schemes despite clear signs of fraud because they fear regretting their decision to exit too soon and missing out on potential profits.

These findings align in studies conducted by Wangzhou et al. (2021), which explained that financial literacy can reduce the negative impact of regret aversion, helping investors make more rational investment decisions. Their study found that people possessing greater financial literacy are inclined to have better management of over their emotional responses to investment risks.

The second moderated regression test results in table 5 indicate that financial literacy can weaken the influence of regret aversion on fraudulent investment decisions, with a β_3 coefficient of $-0{,}022$ and a significance value of $0{,}045$. Based on the moderated regression test results, the significance values for coefficients β_2 $(p - value = 0{,}045)$ and β_3 $(p - value = 0{,}045)$ are both significant, suggesting that financial literacy acts as a quasi-moderator. This means that financial literacy functions both as a moderating variable in the relationship between regret aversion and fraudulent investment decisions and as an independent variable.

The Moderating Role of Financial Literacy in Herding

Regarding the financial literacy variable, the highest-rated response among respondents refers to the indicator with the statement: "I understand basic concepts such as budgeting and personal financial record-keeping". This indicates that most respondents have a reasonably good understanding of basic financial concepts, which can help them make wiser financial decisions. However, based on respondents' average responses, the financial literacy variable has a value of $338{,}30$ which falls into the moderate category. This implies that although respondents' financial literacy is not low, there is still a need for broader understanding. In the context of moderating the correlation between herding and fraudulent investment decisions, higher financial literacy can help reduce the influence of social pressure, as individuals with better understanding tend to be more critical in evaluating investments rather than blindly following trends.

Regarding the demographic data, most victims of fraudulent investments were aged 17-27 years (65%) and had a high school/equivalent education (42%). The most common fraudulent schemes included fake money investments $(20{,}7\%)$ and online gambling/slot schemes disguised as investments $(18{,}1\%)$. This data suggests that young individuals with secondary education levels are more susceptible to herding influences due to limited investment experience and a tendency to follow trends.

The Isolation Effect principle in Prospect Theory explains that individuals tend to disregard similar or irrelevant information when making decisions, focusing only on the final outcome without considering previous critical factors. This principle explains why investors with low financial literacy are more easily influenced by others' decisions without conducting in-depth analyses of the fundamental aspects of an investment. They tend to focus only on promised high returns without evaluating the investment's legality, hidden risks, or credibility.

These findings align with research by Koma & Jatiningsih (2024), which found that financial literacy can reduce the impact of herding on investment decisions. Investors with higher financial literacy tend to be more independent in making decisions also do not merely follow trends. This proves that better financial literacy can strengthen independent decision-making, thereby minimizing the risk of falling into fraudulent investments due to social influence.

The third moderated regression test results in Table 5 indicate that financial literacy can weaken the influence of herding on fraudulent investment decisions, with a β_3 coefficient of $-0{,}030$ and a significance value of $0{,}007$. Based on the significance test results, coefficients β_2 $(p - value = 0{,}008)$ and β_3 $(p - value = 0{,}007)$ are both significant, confirming financial literacy acts as a quasi-moderator.

CONCLUSION

Based on the results of this study, it can be concluded that psychological traits such as loss aversion, regret aversion, and herding have a significant influence on fraudulent investment decisions. Loss aversion and regret aversion were found to negatively influence such decisions, indicating that individuals who strongly avoid losses or regret are more cautious. On the other hand, herding behavior showed a positive influence, where individuals tend to follow the crowd without thorough analysis. Furthermore, the moderating role of financial literacy in this study shows a significant interaction. Financial literacy acts as a quasi-moderator, weakening the influence of the three psychological traits on fraudulent investment decisions. This means that individuals with higher financial literacy are more capable of recognizing and resisting cognitive and emotional biases when evaluating investment offers.

The findings of this study highlight that the tendency to fall into fraudulent investment schemes is not merely caused by a lack of knowledge but by deep-rooted psychological motivations. People fear losses, regret past mistakes, or follow popular trends, all of which are exploited by fraudsters. Understanding these behavioral patterns can help develop more targeted financial education programs that not only increase knowledge but also build critical thinking and emotional awareness in financial decision-making. This study contributes to the behavioral finance literature and provides a foundation for preventive strategies to address investment fraud.

This study had several limitations. First, the sample used only comes from one city, so the results are difficult to generalize to other regions. Furthermore, it only focuses on three behavioral traits (loss aversion, regret aversion, and herding), which proved to be less relevant when applied in this study relating to fraudulent investment decisions. In addition, the limited specialized literature on fraudulent investments is an obstacle to developing the analysis. Future studies should broaden the scope of other behavioral trait variables that are more relevant to this study and explore other variables that have the potential to weaken the influence of biased behavioral traits. Researchers can also expand the use of more diverse and representative samples from various regions and demographics to strengthen the research results. Future research is expected to contribute to the development of a new theoretical framework that is more relevant to understanding the concept of fraudulent investment.

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