



The influence of financial literacy, education, and stress on investment fraud moderated by financial behavior in millenials

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ABSTRACT

The aim of this research is to explore the influence of financial literacy (FL), financial education (FE), and financial stress (FS) on investment fraud (IF) moderated by financial behavior (FB) among Millennials in the Greater Jakarta Area (Jakarta, Bogor, Depok, Tangerang, Bekasi, and Cianjur). The study sample consists of Millennials residing in the Greater Jakarta Area. The research methodology employed a survey method using a Google Form with 174 respondents. Data collection took place from May 2024 to June 2024. The findings indicate that Millennials' FB is influenced by their levels of FL and FE. High levels of FS affect Millennials' FB. Millennials with good FL and FE are better equipped to avoid IF. Managerial implications suggest a need to enhance financial knowledge among Millennials through FE and internal training. Government initiatives should focus on providing accurate investment knowledge and enhancing investment regulations.

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1. INTRODUCTION

The millennial generation in Indonesia has increasingly considered how to manage their finances through investment. This demographic is currently navigating critical financial decision-making stages, including education, marriage, career development, and retirement planning (Wulandari, 2022). In 2020, the millennial population in the Jabodetabekjur area (Jakarta, Bogor, Depok, Tangerang, Bekasi, and Cianjur) reached 6,654,648, highlighting the importance of understanding the financial behavior of this group. The rise of investment fraud in the digital investment era has become a growing concern. The Financial Services Authority reported total losses from investment fraud amounting to IDR 139.674 trillion between 2017 and 2023, with 1,218 fraudulent entities blocked as of early 2024. These substantial losses reflect the significant risks faced by investors.

Since 2020, the trend of losses due to investment fraud among millennials in the Greater Jakarta area (Jabodetabekjur) has shown an alarming increase. The Investment Alert Task Force recorded that total public losses in 2022 reached IDR 112.2 trillion, a drastic surge from IDR 2.54 trillion in the previous year, with the majority of victims coming from younger generations such as Millennials and Gen Z, who tend to have

relatively low financial literacy (Yogatama, 2022). Although national financial literacy programs continue to be promoted, their effectiveness remains suboptimal in curbing vulnerability to illegal investment schemes. A 2022 survey by the Financial Services Authority (OJK) indicated that the financial literacy rate among Indonesians is still around 50%, a figure that is not sufficiently robust to serve as a shield against various types of fraud (Yogatama, 2022). Globally, an OECD study also revealed that approximately two-thirds of financial fraud victims scored below the minimum recommended threshold for financial literacy, underscoring the urgent need for more inclusive and in-depth education (OECD, 2023).

Academic literature, both domestic and international, highlights the complex interplay between financial literacy, financial behavior, and financial stress, as well as their roles in fraud prevention. A national study, for instance, found that financial literacy and positive financial behavior significantly reduce financial pressure among university students (Putrisari & Fachruzzaman, 2025). Another study in Indonesia reported that good financial literacy significantly lowers the vulnerability of Gen Z and millennials to investment fraud. International findings are consistent with these results: Kasim et al. (2024) observed that retirees with high financial literacy are far more cautious and less likely to fall victim to fraudulent investments. Similarly, other studies have reported that a high level of financial literacy correlates with a lower risk of becoming a victim of investment scams (Kasim et al., 2023). Altogether, the evidence underscores that financial literacy and prudent financial behavior can both reduce financial stress and prevent fraud. This scientific foundation has subsequently informed financial education and consumer protection policies aimed at minimizing the risk of fraudulent investments among millennials (Kasim et al., 2024; Putrisari & Fachruzzaman, 2025).

Previous studies have emphasized that millennials with sound financial literacy and education are better equipped to avoid fraudulent investment schemes, thereby underscoring the urgency of exploring factors that support fraud prevention. The aforementioned context highlights the critical importance of financial literacy. Sound financial literacy enables individuals to make informed financial decisions and reduces financial risk (Afriani & Yanti, 2019). Conversely, individuals with low financial literacy are more likely to mismanage their finances, increasing the risk of financial crises (Andarsari & Ningtyas, 2019). In this regard, a higher level of financial literacy correlates with more prudent financial behavior.

Financial education likewise plays a pivotal role. Effective financial education enhances individuals' knowledge and skills in planning their finances (Starček & Trunk, 2013). In the absence of adequate financial education, individuals may encounter serious problems such as excessive debt and insufficient savings. Financial stress also contributes significantly to investment decision-making. Many millennials experience anxiety resulting from complex financial issues (Riani et al., 2024), which can drain mental energy and lead to exhaustion (Chan et al., 2017). Financial pressure often intensifies during economic crises and is difficult to manage without external support (Moon et al., 2023). Thus, financial stress must be considered as a key variable in studies on financial literacy and investment decisions.

Prior research has found that financial literacy and education significantly improve positive financial behavior. For instance, sound financial literacy and education encourage individuals to be more disciplined and cautious in managing their investments. In other words, financial knowledge and education foster more rational financial behavior. Meanwhile, high levels of financial stress tend to drive individuals to make suboptimal financial decisions. Excessive financial stress increases the likelihood of careless investment decisions, as reported by several previous studies.

These interrelationships between variables have direct implications for investment fraud risk emphasized that financial literacy, when supported by prudent financial

behavior, can protect individuals from fraudulent investment schemes. Kasim et al. (2024) further found that financial literacy, mediated by financial behavior, can effectively shield individuals from investment fraud. On the other hand, high financial pressure may impair an individual's ability to evaluate investments properly; Kasim et al. (2024) explained that financial pressure often causes individuals to rush into investment choices, making them more vulnerable to fraud.

However, gaps remain in the existing literature. For example, Pham and Toan (2023) focused exclusively on the impact of financial literacy among individuals aged 18 – 24 in Vietnam, which does not represent the entire millennial generation. Moreover, most studies have not incorporated financial stress as an analytical variable, particularly in local contexts. Geographic focus is also limited, as there has been relatively little similar research conducted in Indonesia.

To address this research gap, the present study focuses on millennial respondents in the Jabodetabekjur area. By targeting this region, the study aims to capture the local characteristics of millennial investment behavior as well as implications for financial education and policy in Indonesia. Based on the phenomena and research gaps identified above, this study seeks to examine the influence of financial literacy, financial education, and financial stress on investment fraud among millennials, while considering the mediating role of financial behavior. The findings are expected to offer valuable insights for developing effective strategies to prevent investment fraud among the millennial population.

2. RESEARCH METHOD

This study examines and analyzes the impact of FL, FE, and FS on IF, moderated by FB, among the Millennial generation. The research utilized a quantitative approach and the sampling technique used the probability method. An electronic survey was utilized by the study to gather data from millennials (those born between 1981 and 1996) in Jakarta, Bogor, Depok, Tangerang, Bekasi, and Cianjur (Jabodetabekjur) between May and June 2024. The Google Form questionnaire was distributed through various channels (e.g., WhatsApp, Instagram) to ensure that every millennial in the region had an equal chance of being selected, thereby minimizing selection bias in the online sample (Le Masson, 2021). The survey was also designed with a mobile-first approach, considering that the majority of internet users (92.6%) access the internet via mobile devices (Le Masson, 2021). Through this approach probability sampling, cross-platform distribution, and demographic distribution checks this study aimed to ensure a representative sample and reduce bias resulting from reaching only a specific subset of internet users (Le Masson, 2021). All items were rated using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The final sample included 174 respondents from the Jabodetabekjur area (Jakarta, Bogor, Depok, Tangerang, Bekasi, Cianjur).

In this research model, financial behavior is positioned as a mediator, not a moderator, because financial literacy and education are expected to influence how individuals behave financially, which in turn determines vulnerability to investment fraud. Theoretically, a mediator explains the causal process: financial literacy/education shapes financial habits and discipline, and then financial behavior reduces the risk of fraud. For example, a study by Rodriguez et al. (2024) showed that financial behavior mediates the relationship between literacy and Gen Z spending habits. In the context of fraud, Kasim et al. (2024) found that financial literacy, through prudent financial behavior, can protect individuals from investment fraud. Thus, the empirical literature supports that financial behavior is a mechanism (not just an amplifier) that translates financial knowledge into fraud prevention actions.

This research employed measurement items that were adapted from established prior studies for each variable examined. The construct of financial literacy was evaluated

using six indicators sourced from Sutherland and Canwel (1997), while financial education was assessed with five items derived from Garman et al. (1999). To measure financial stress, five statements adapted from Heckman et al. (2014) were used. The financial behavior variable was captured through nine items, also based on Garman et al. (1999). Meanwhile, investment fraud was measured using six indicators taken from Deb et al. (2020). Overall, the study utilized a total of 31 survey questions.

Building upon the conceptual foundation and prior empirical studies discussed in the introduction, the researcher has constructed the research model and formulated the hypotheses as follows.

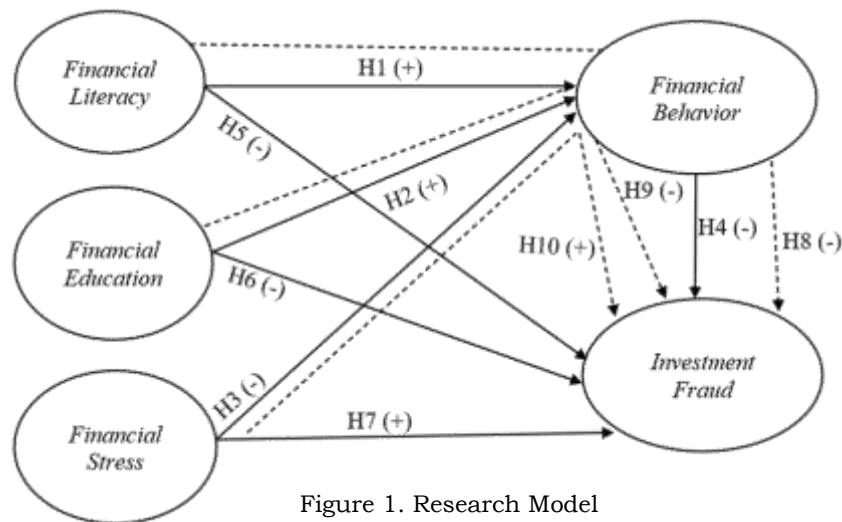


Figure 1. Research Model

Hypothesis:

- H1: Financial literacy has a positive impact on Financial Behavior.
H2: Financial Education has a positive impact on Financial Behavior.
H3: Financial Stress has a negative effect on Financial Behavior.
H4: Financial Behavior has a negative effect on Investment Fraud.
H5: Financial Literacy has a negative effect on Investment Fraud.
H6: Financial Education has a negative effect on Investment Fraud.
H7: Financial Stress has a positive effect on Investment Fraud.
H8: Financial Literacy has a negative effect on Investment Fraud, mediated by Financial Behavior.
H9: Financial Education has a negative effect on Investment Fraud, mediated by Financial Behavior.
H10: Financial Stress has a positive effect on Investment Fraud mediated by Financial Behavior.

3. RESULTS AND DISCUSSIONS

The demographic characteristics of the 174 millennial respondents from the Jabodetabekjur region were analyzed based on data collected via a Google Forms questionnaire. Of these respondents, 54 percent were male and 46 percent were female. The majority (59.2 percent) fell within the 27–32 year age bracket, followed by 26.4 percent aged 33–38 years and 14.4 percent aged 39–43 years. In terms of educational attainment, 64.9 percent held a bachelor's degree, 16.7 percent had completed senior high school, 8 percent possessed a diploma, and 10.3 percent had attained a master's degree or higher. Marital status was nearly evenly distributed, with 56.9 percent single

and 43.1 percent married. Geographically, 74.7 percent of respondents resided in Jakarta, while smaller proportions lived in Depok and Tangerang (6.3 percent each), Bekasi (5.7 percent), Bogor (4.6 percent), and Cianjur (2.3 percent). Occupationally, 51.1 percent were private-sector employees, 17.8 percent were entrepreneurs, 16.1 percent were government employees, 8 percent were students, and 7 percent were classified as “other.” Finally, the distribution of average monthly income indicated that 41.4 percent earned between IDR 5 million and IDR 10 million, 21.3 percent earned less than IDR 5 million, 17.8 percent earned between IDR 10 million and IDR 15 million, 8 percent earned between IDR 15 million and IDR 20 million, and 11.5 percent earned more than IDR 20 million.

As stated by Hair et al. (2021), for analyses using SmartPLS, outer loading values should ideally be greater than 0.7 to confirm indicator reliability. The results of the current study demonstrate that this threshold has been successfully achieved. In addition to this, further analysis was conducted to assess both the validity and reliability of the constructs. Construct validity was evaluated through Composite Reliability (CR) and Average Variance Extracted (AVE), with acceptable benchmarks being a minimum of 0.7 for CR and 0.5 for AVE. Reliability, on the other hand, was measured using Cronbach's Alpha (CA), which is considered satisfactory when it exceeds 0.7 or approximates 1. The results can be seen in the loading factor table.

Table 1. Loading Factor.

	Loading Factor	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
FB		0.939	0.948	0.671
FB1	0.869			
FB2	0.836			
FB3	0.886			
FB4	0.882			
FB5	0.793			
FB6	0.858			
FB7	0.708			
FB8	0.801			
FB9	0.714			
FE		0.888	0.917	0.690
FE1	0.821			
FE2	0.853			
FE3	0.788			
FE4	0.842			
FE5	0.847			
FL		0.880	0.909	0.626
FL1	0.798			
FL2	0.761			
FL3	0.796			
FL4	0.817			
FL5	0.768			
FL6	0.805			
FS		0.881	0.913	0.678
FS1	0.765			
FS2	0.844			
FS3	0.801			
FS4	0.886			
FS5	0.818			
IF		0.882	0.910	0.628
IF1	0.744			
IF2	0.793			
IF3	0.789			
IF4	0.783			
IF5	0.808			
IF 6	0.836			
FB X FL	1.000			
FB X FS	1.000			

Discriminant validity is established to ensure that each construct within the Structural Equation Modeling (SEM) framework is conceptually distinct and captures different dimensions. The Fornell-Larcker criterion was employed to assess discriminant validity in this study. According to Hair et al. (2021), discriminant validity is confirmed when the square root of the Average Variance Extracted (AVE) for each construct is greater than its correlations with other constructs in the model. This condition indicates that each construct represents a unique aspect of the model, with minimal overlap with other constructs, thereby enhancing the overall validity of the structural model. The results of the Fornell-Larcker test are presented in Table 2.

Table 2. Fornell Larcker

Variables	Financial Behavior	Financial Education	Financial Literacy	Financial Stress	Investment Fraud
Financial Behavior	0,819				
Financial Education	0,317	0,831			
Financial Literacy	0,274	0,332	0,791		
Financial Stress	-0,373	0,063	0,210	0,824	
Investment Fraud	-0,319	0,211	0,341	0,613	0,793

The results indicate that the Average Variance Extracted (AVE) values reported in Table 1 Loading Factor do not exceed the corresponding values presented in the Fornell-Larcker criterion (Table 2). This finding confirms that all constructs satisfy the required standards for discriminant validity. The indicators serve to evaluate the predictive relevance of the proposed model (Hair et al., 2021). The outcomes of the analysis are illustrated in the path coefficient diagram (Figure 2) and further detailed in Table 3, which presents the bootstrapping and hypothesis testing results.

Table 3. Bootstrapping and Hypothesis Result

Path	Sample Mean	T Statistics (O/STDEV)	P-values	Hypotesis
H1. Financial Behavior -> Investment Fraud	-0.390	5.290	0.000	Significant
H2. Financial Education -> Financial Behavior	0.254	4.181	0.000	Significant
H3. Financial Education -> Investment Fraud	-0.196	2.575	0.010	Significant
H4. Financial Literacy -> Financial Behavior	0.285	4.401	0.000	Significant
H5. Financial Literacy -> Investment Fraud	0.320	3.308	0.001	Significant
H6. Financial Stress -> Financial Behavior	-0.451	8.165	0.000	Significant
H7. Financial Stress -> Investment Fraud	0.330	4.611	0.000	Significant
H8. Financial Behavior -> Financial Literacy -> Investment Fraud	-0.165	2.174	0.030	Significant
H9. Financial Behavior -> Financial Education -> Investment Fraud	-0.017	0.443	0.658	Insignificant
H10. Financial Behavior -> Financial Stress -> Investment Fraud	0.0291	3.957	0.000	Significant

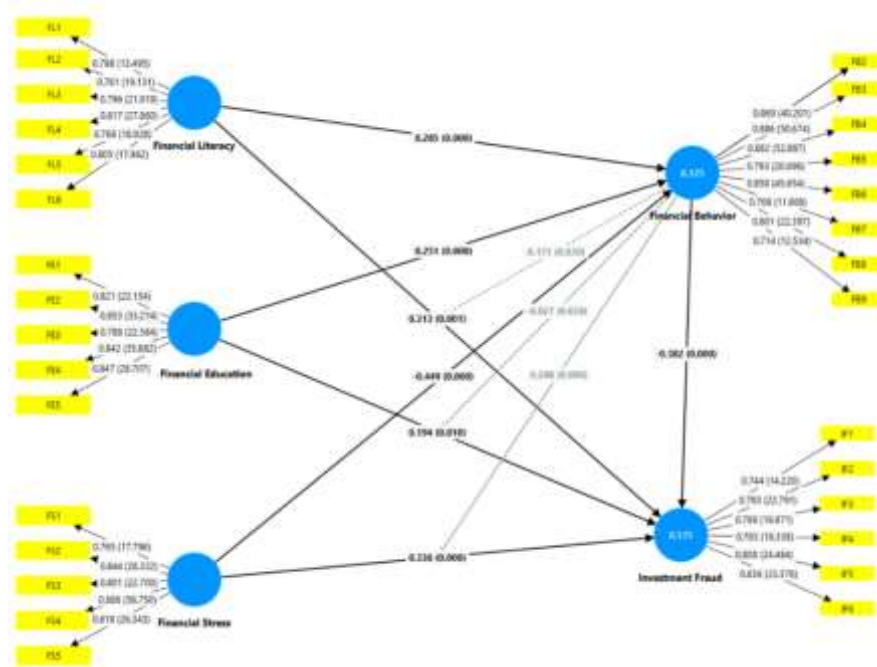


Figure 2. Outputs of PLS

The direct effect is evident from the test results, where the relationship between FB and IF has a t-statistic of 5.290 (<1.96) and a p-value of 0.000 (>0.05), indicating it is significant. Conversely, the relationship between FE and FB shows a t-statistic of 4.181 (>1.96) and a p-value of 0.000 (<0.05), thus it is significant. Similarly, the relationship between FE has negative impact to IF has a t-statistic of 2.575 (>1.96) and a p-value of 0.010 (<0.05), confirming a significant effect. The relationship between FL and FB is also significant with a t-statistic of 4.401 (>1.96) and a p-value of 0.000 (<0.05). Moreover, the relationship between FL and IF is significant as well, with a t-statistic of 3.308 (>1.96) and a p-value of 0.001 (<0.05). The relationship between FS and FB has a t-statistic value of 8.165 (>1.96) and a p-value of 0.000 (<0.05), stated to have a significant effect. The relationship between FS and IF has a t-statistic value of 4.611 (>1.96) and a p-value of 0.000 (<0.05), hence declared significant. FL mediates the relationship between FB and IF, as evidenced by the t-statistic and p-value of the indirect relationship between FB and IF, which are 2.174 (<1.96) and 0.030 (>0.05), respectively. This indicates an indirect relationship. However, the indirect relationship between financial behavior and investment fraud, with a t-statistic of 0.443 (>1.96) and a p-value of 0.000 (<0.05), does not meet the criteria, suggesting no mediating effect by financial education. The results of the particular indirect effect test indicate that FS has a mediating influence on the link between FB and IF. The indirect association between FB and IF has a t-statistic value of 3.957 (<1.96) and a p-value of 0.000 (>0.05), respectively, which demonstrate this.

The results of the path coefficient test reveal the significance of the connections between variables based on the sample mean value. The significance levels for the relationships between FE and FB, FE and IF, FL and FB, FL and IF, FS and IF, and the mediating influence of FS on the link between FB and IF are (0.254, 0.196, 0.285, 0.320, 0.330, and 0.291), all of which are less than 0.05, indicating significance. The study found that the relationships between FB and IF, FS and FB, and the mediating influence of FL on the link between FB and IF are negative (-0.390, -0.451, and -0.165). Meanwhile,

the relationship between FE has a mediating influence on the link between FB and IF, with an insignificant value of -0.017.

This study confirms that financial literacy exerts a significant and positive influence on the financial behaviors of the millennial generation, thereby enhancing their capacity to plan and manage both short- and long-term finances (Indratirta et al., 2023; Mutlu & Ozer, 2021). Financial education also reinforces positive financial behaviors by boosting confidence in investment decision-making (Pham & Toan le, 2023; Wagner & Walstad, 2018). Conversely, financial pressure is inversely associated with sound financial behaviors, as elevated stress levels lead to difficulties in saving and planning (Alvarado & Andrea, 2021; Rahman et al., 2021). Moreover, effective financial behaviors contribute to a reduced risk of falling victim to investment fraud (Bunyamin & Abdul Wahab, 2022; Rahman & Gan, 2020), while high financial literacy enables individuals to remain vigilant against fraudulent schemes through a clearer understanding of risk (Engels et al., 2020; Wei et al., 2021). Interestingly, the impact of financial education on investment fraud is marked by contradictory findings, since knowledge alone does not always safeguard against illegal investment practices (Deliema et al., 2020; Karim et al., 2018). Theoretically, this indicates that the effect of financial education on an individual's ability to avoid investment fraud does not always occur through behavioral changes, but rather through direct cognitive or affective pathways, such as increased knowledge, risk awareness, or vigilance against fraudulent schemes. Financial education can create cognitive awareness strong enough to encourage preventive action without transforming daily financial behavior (Deliema et al., 2020; Wagner & Walstad, 2018). Finally, financial behavior mediates the positive relationship between financial stress and investment fraud indicating that stressed individuals tend to assume higher risks in pursuit of financial recovery (Kasim et al., 2024) but does not mediate the effect of financial education on susceptibility to such fraud.

4. CONCLUSION

This research has almost successfully proven all the proposed hypotheses. This means that there is a significant influence of Financial Literacy, Financial Education, and Financial Stress on Investment Fraud, moderated by Financial Behavior among Millennials. Millennials with good financial literacy and education tend to exhibit wiser financial behaviors, thereby reducing the risk of falling victim to investment fraud. Furthermore, the study also indicates that Financial Literacy and Financial Education impact Financial Behavior, which significantly reduces the risk of investment fraud. Millennials with good financial literacy and education are more cautious and meticulous in selecting investments. On the other hand, high Financial Stress can increase the risk of falling into investment fraud, but this can be mitigated by good financial behavior. In this study, it was not proven that financial behavior moderates the negative influence of financial education on investment fraud. Millennials with good education are already capable of avoiding investment fraud without necessarily having good financial behavior.

Digital-based financial education strategies aimed at millennials need to be designed adaptively to avoid creating overconfidence, which could increase vulnerability to illegal investments. Educational designs based on apps or social media should incorporate personalized feedback features, investment risk simulations, and gamification that encourage reflection on financial decisions. Educational platforms can employ an adaptive learning approach, tailoring content and challenges based on the user's level of knowledge and responses. This is crucial so that users not only feel "in the know" but also recognize the limitations of their knowledge and remain cautious. By targeting behavioral biases such as overconfidence, this digital strategy has significant potential to reduce millennials' vulnerability to illegal investments in the digital economy.

This study has limitations as its respondents are solely from the millennial generation in the Jabodetabekjur area (Jakarta, Bogor, Depok, Tangerang, Bekasi, and Cianjur), which does not represent all millennials in Indonesia. Moreover, the majority of the respondents are male, highlighting the need for additional research to explore more demographic aspects of this population. The practical policy implications of the finding that financial literacy can reduce the risk of investment fraud, but is insufficient without sound financial behavior, highlight the need for a more comprehensive educational approach. Financial knowledge needs to be complemented by behavioral training that instills sound financial habits such as risk management, budget discipline, and caution with high-yield agreements. Community-based literacy programs should not only focus on improving literacy scores but also encourage behavioral change through psychological interventions such as encouragement and financial decision-making simulations. Governments and financial services authorities can collaborate with the private sector to create training programs that are not only informative but also transformative in shaping fraud-resistant financial behavior.

Future researchers are advised to further explain general financial education, which can aid in making better financial decisions. Ineffective or misdirected financial education can actually increase the risk of investment fraud as individuals may become overconfident in their knowledge and more susceptible to fraudulent schemes. Further studies on the relationship between Financial Literacy and Financial Stress in relation to Investment Fraud and its impacts are also recommended. Additionally, researchers are encouraged to add new variables that can support improved financial performance and reduced investment risks in the future.

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