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The Impact of Financial Literacy on Financial Risk Tolerance: Mediating Role of Financial Behavior

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Abstract
Financial risk tolerance (FRT) is reported to have impact on one's financial decision. Increased risk tolerance while investing in assets is reportedly another key factor in enticing investors to take advantage of market possibilities. Findings from previous studies agreed that age and income level are among the factors that influence an individual's FRT. This research intends to identify the influence of financial literacy on FRT with the mediating role of financial behavior among Malaysian investors. Primary data was analyzed involving 148 investors among working adults. To analyze the collected data, this research applied Partial Least Squares Structural Equation Model (PLS-SEM) by employing the software SmartPLS 3. Results revealed that financial literacy has a positive influence on financial behavior, and financial behavior has a positive impact of FRT. Additionally, findings indicated that financial behavior mediates the relationship between financial literacy with FRT. These findings contribute to the awareness of financial literacy, financial behavior, and FRT importance in making effective financial decisions. This study also will be useful for government and regulators to develop financial education and training programs among investors.

Keywords: Financial literacy, Financial behavior, Financial risk tolerance

Introduction

Financial risk tolerance (FRT) is defined as the volume of risk a person is keen to have when determining a financial conclusion (Ferreira & Dickason, 2018). FRT is also thought to play a significant role in influencing how consumers make financial decisions (Grable, 2016). Furthermore, Stanley and Chok (2017) argued that making wise financial decisions and planning are essential for attaining financial freedom, particularly for needs related to insurance, education, and long-term retirement for parents who are married with children. This is because most people's pension funds are currently found to be insufficient. In investment decision making, an investor's attitude towards understanding and accepting risk is important for financial service provider as this criterion is the key in selecting suitable investment package and the criterion used by financial advisors to construct suggested portfolio composition for their clients (Dhinaiya, 2018; Bilsky, 2021).

In financial market participation, FRT among consumers is an important aspect to consider evaluating their readiness to participate. The vital importance of FRT was highlighted by Ronnie Lim, managing director of United Overseas Bank Malaysia Berhad (UOB Malaysia) and head of personal financial services for the country. He emphasized in the New Straits Times (2021) that stockholders' involvement in marketplace during times of turbulent financial market activity owing to global crises like the coronavirus (Covid-19) pandemic requires a higher risk tolerance for asset investments. He suggested that the secret to ensuring investors attain their long-term financial goals despite economic setbacks is their ongoing engagement in the financial market.

Financial market participation is a crucial component of economic growth as we move from a pandemic to an endemic phase and as individuals and the government try to expand the economy after the pandemic. Investors therefore play a critical role in efficiently managing their investments in accordance with their level of risk tolerance. This will assist them in developing portfolio resilience. Hence this study intends to investigate the FRT level among Malaysian investors since FRT is an important indicator to measure investors' willingness to accept risk when they make a financial decision (Grable, 2016; Ferreira & Dickason, 2018) and after the pandemic will participate in the financial market and together improve the individual and national economies. Furthermore, this study examined the financial behavior as the mediating factor in the association of financial literacy and FRT among Malaysian investors.

Several earlier research have investigated the important roles that financial behavior and literacy play in engaging in the financial markets. Corresponding to Zakaria et al., (2017), financial literacy is a key factor in choosing proper financing products. Stated in the report, Malaysian consumers who are lack of financial knowledge find it is difficult to make educated choices about their savings and investment options. Financial market involvement and financial well-being are both thought to be impacted by financial behavior. Corresponding to Aboagye and Jung (2018) and Arianti (2018), financial behavior and income have a big influence on investors' financial contentment.

This study aimed to answer research questions as follows; (1) Does financial literacy influence financial behavior? (2) Does financial literacy influence FRT? (3) Does financial behavior influence FRT? (4) Does financial behavior mediate the relationship between financial literacy with FRT?

In 1982, Loomes and Sugden (1982) developed this Regret Theory incorporating with the Expected Utility Theory. According to this theory, under uncertainties decision makers are rational and care about the known consequences of their choices, as well as counterfactual outcomes that possibly occur if they choose different options also. Therefore, this study aims to conclude how financial literacy contributes to FRT with the mediating role of financial behavior. As proposed by Regret Theory, investors are rational when evaluating investment risk, and mindful of the effects of their taken choices. As a result, their financial practices and knowledge, which in turn affect their financial knowledge and actions, should be the source of this reason.

Literature Review

Financial literacy

Financial literacy is defined by the Organization for Economic Co-operation and Development (OECD) as having the acquaintance, thoughtful of monetary notions and risks, and the aptitude, drive, and self-assurance to put that information and considerate into practice to make sound conclusions in a variety of monetary events. This skill will assist people and society become more financially stable and able to engage in economic life (Lusardi, 2019).

There are several factors that influencing financial literacy. Kimiyaghalam and Yap (2017) reported that financial literacy among Indians is low as compared to Malay and Chinese in Malaysia, indicating the role of race in determining one's financial literacy. The study also found that people with lower incomes are less financially literate. Whereas women and younger adults were reported to have low financial literacy among middle income populations of Colombia, Lebanon, Mexico, Turkey, and Uruguay indicating roles of gender and age in determining financial literacy (Karakurum-Ozdemir et al., 2019). The research revealed that not just the number of years of education that everyone has, but also the quality of that education, positively influences financial literacy.

Additionally, research have explored the effects of financial literacy. For instance, Tuffour et al. (2020) performed research to determine the influence of financial knowledge among Ghanaian managers on the success of small-scale firms. The survey revealed, financial knowledge contributes on the businesses succeed. The conclusion highlighted the implication of financial literacy in deciding small businesses' ability to survive. Additionally, Razak et al. (2020) highlighted the importance of financial knowledge in Malaysian business performance. Since inadequately minimal financial literacy among the corporations was revealed to be the foundation for their catastrophe, the survey discovered that the degree of financial literacy impacts the achievement of Micro Small and Medium Enterprises (MSMEs) of Amanah Ikhtiar Malaysia (AIM).

In financial services sector, Madinga et al. (2022) examined the importance of financial socialization and financial literacy on financial satisfaction amongst customers, company, and government. Using web-based self-administered questionnaire, results from the study indicated that increasing one's financial literacy and financial socialization will enhance their monetary happiness directly. Furthermore, the study also unveiled that respondents who were voluntarily involved in the survey were among those who are satisfied with their financial situation. This study was in line with finding from Karakurum-Ozdemir et al. (2019) and Younas et al. (2019) which concluded that financial literacy positively impacts financial well-being as a crucial factor.

Afgani et al. (2021) revealed that financial literacy in Bandung City, Indonesia, had a significant impact on Generation Z's stock market participation. Additionally, Asmara and Wiagustini (2021) investigated how financial literacy affects people who have capitalized or are participating in the Indonesian Stock Exchange. The survey's findings are constant with previous studies, which found a strong optimistic association among financial literacy and investing decisions. Considering this, Hypothesis 1 states that,

H1 Financial literacy (FL) has a positive impact on financial risk tolerance (FRT)

Financial behaviour

Financial knowledge and self-confidence influence one's financial behavior (Ramalho & Forte, 2019). The link among financial literacy and saving behavior among Ugandan owners of Micro and Small Enterprises (MSEs) was investigated by Mpaata et al. (2021). According to the survey, the business owners' saving behaviors are explained by their financial literacy. The study also showed that, to have a beneficial impact on their saving behaviors, those with minimal self-control need further financial literacy training than people with good self-control.

Tang and Baker (2016) hypothesized psychological characteristics like self-esteem play a significant factor in describing variations in financial behaviors. According to findings from a nationwide representative of American adults, the survey claims, after adjusting for financial knowledge and other socioeconomic factors, self-esteem has a significant impact on financial behavior both directly and indirectly through subjective financial knowledge. Whereas Atmadja et al. (2021) argued that financial behavior comes from financial attitudes, that individuals who have issues to respond to financial problems wisely have tendency to face poor financial management.

There are several investigations conducted to examine the effects of financial behavior. For example, Çera et al. (2021) described financial behavior as the significant factor to determine individuals' financial capabilities amongst Albanian in the context of a post-communist transition country. Financial capability refers to the talent to employ financial knowledge to attain financial well-being. Communism ideology practices central economy system, that leads to lack of knowledge on handling market-oriented economy among citizens of a communist country, as financial markets did not exist.

Furthermore, Zhou (2021) revealed that behavioral traits such as paying the minimum amount or less on credit cards in the prior year and delaying or skipping a mortgage or non-mortgage debt payment led to very low liquid wealth and high debt-to-asset ratio. The investigation studied financial vulnerability through debt management amongst older households in Canada, classified as main income recipient aged 55 to 74 years from 1999 to 2016. Moreover, Ramli et al. (2022) investigated the effect of financial behavior on financial fragility among single middle-income group (M40) youths aged 25 to 34 in Malaysian urban areas as one of the indicators for individual well-being. The study revealed that financial behavior, spending knowledge, and financial shock give impact on financial fragility on M40 individual youths in urban areas.

Meanwhile Prakash et al. (2022) explored financial behavior and financial stress as factors that explain financial well-being among information technology employees in India. The study suggested that financial behavior explains respondents' financial well-being positively. In addition, financial stress shows negative implication on financial well-being. Whereas Rahman (2019) investigated the effect of behavioral factors on FRT amongst undergraduate students in public universities around Klang Valley, Malaysia. The study concluded that propensity of trait success to luck and propensity for overconfidence provide a significant impact on FRT. From the findings above, Hypothesis 2 proposes that,

H2 Financial literacy (FL) has a positive impact on financial behavior (FB)

Furthermore, Chin (2021) indicates significant positive correlation between investor's behavior with trading frequency during Covid-19 pandemic. Investor's trading frequency during pandemic shows their high degree of FRT in the stock financing. Moreover, Rahman et.al (2020b) indicates that FRT is influenced at most by behavioral propensities for trust, followed by regret and the least by happiness in life. Therefore, Hypothesis 3 states as,

H3 Financial behavior (FB) has a positive impact on financial risk tolerance (FRT)

Ramli et al. (2022) examines the effect of financial behavior on financial fragility amongst single middle-income group (M40) youths aged 25 to 35 in urban areas as one of the indicators for individual well-being. Based on the study, financial behavior, saving behavior, spending knowledge and financial shock give impact on financial fragility. Furthermore, Purohit et al. (2022) proves that saving behavior, financial attitudes and cash management have significant effects on financial wellness. Hypothesis 4 suggests that,

H4 Financial behavior (FB) mediates the relationship between financial literacy (FL) and financial risk tolerance (FRT)

The research framework is shown in Figure 1.

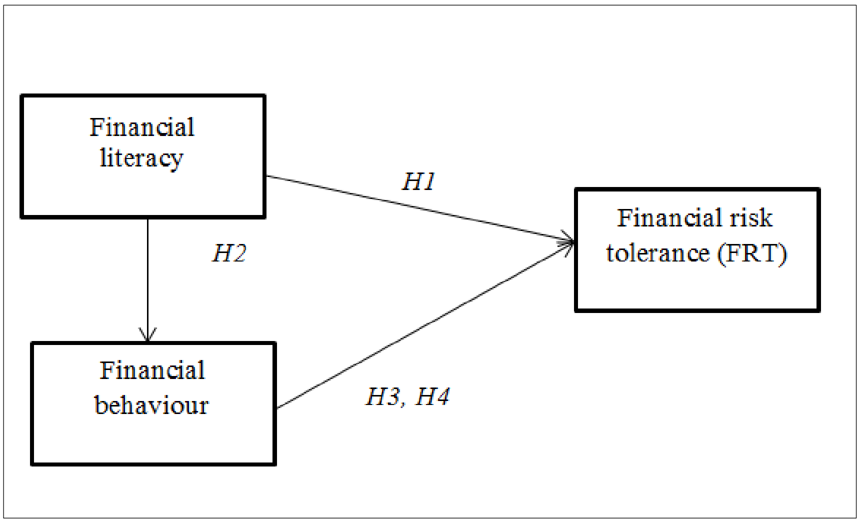

Figure 1: Theoretical Framework

Method

Data Collection and Sample

This is quantitative research which is based on the number of respondents that involved a large scale of people which will lead to a greater objectivity from the statistical analysis.

The respondents in this study were investors among Malaysian working adults. This study was using G*Power (Faul et al., 2007) to compute minimum sample size of this convenience sampling data collection (Bilal et al., 2021) of 148 sample.

The information for this survey was gathered from primary sources involving individual investors in Malaysia in the year 2022. A self-administered questionnaire was sent to investors through financial advisors who work in banks. Meanwhile the online set of questionnaires was sent to individual investors by emailing their investment companies, as well as distributed through social media for instance Telegram, WhatsApp, LinkedIn, and Facebook.

Measurements of Variables

The survey was constructed into four parts. Part A consists of demographic profile of investors. Part B consists of FRT assessments to examine the investors' FRT levels adapted from Patel and Dave (2019). Part C consists of financial behavior elements adapted from OECD (2012) and Rahman (2019). Finally, Part D consists of financial literacy evaluations adapted from Mwangi and Onsomu (2018). The survey utilized a 5-point Likert scale ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) and 5 (Strongly Agree).

Analytical tool

The analysis of the data utilized PLS-SEM by running Smart-PLS 3 software to generate the statistical analysis. This will help to improve efficiency and minimize risks that occur. Multiple regression analysis was employed to analyze the hypotheses.

Findings

Results from the PLS-SEM were analyzed by two-step approach. The first step analysis was generated to obtain the results from outer model and later was the analysis to attain the results from the inner model.

The outer model analysis

Analysis of the outer model have been conducted twice. According to the analysis of the outer model, this study excluded all the indicators that had low factor loading values. This step aimed to achieve the composite reliability (CR) value more than 0.7. After all indicators with low values were dropped, analysis was conducted again. The results are shown in Figure 2.

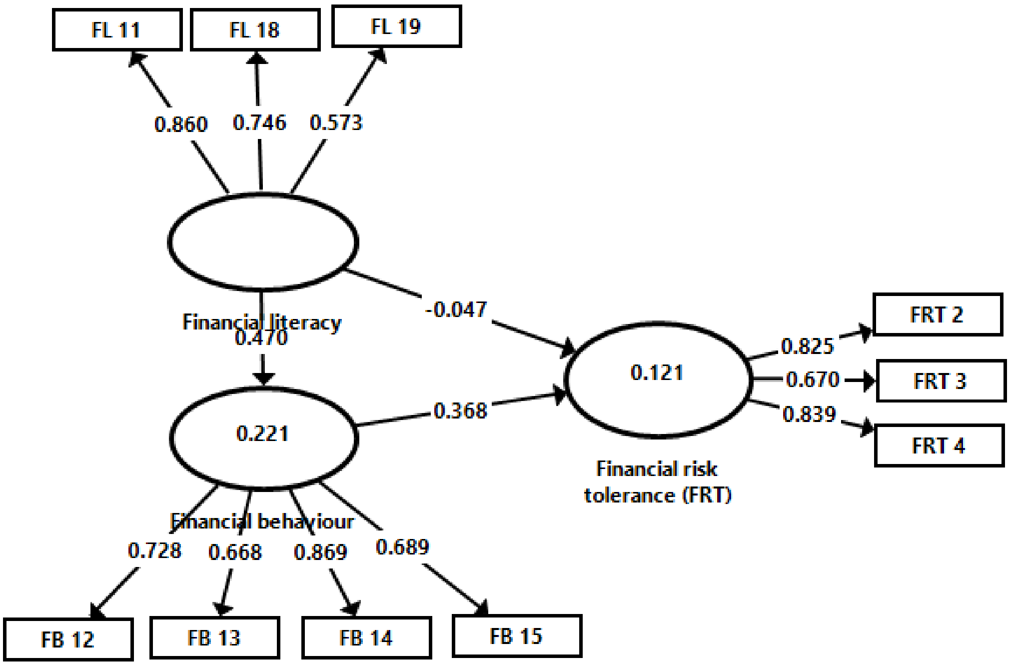

Figure 2: Outer Model Analysis

The convergent validity values were obtained from the factor loading and average variance extracted (AVE) values. Factor loading is the correlation between the indicator and the latent construct. The values of AVE for every construct need to be larger than 0.5. Table 1 illustrates that the AVE values of each construct are greater than 0.5. In this investigation, the values of reliability were determined from the composite reliability (CR). According to Ghozali and Latan (2015), CR can be used to measure reliability instead of Cronbach's alpha (CA) as CA shows lower value in PLS-SEM. Table 1 shows that each construct has CR value greater than 0.7, which is acceptable.

Table 1: Convergent Validity and Reliability

Variables	Indicators	Factor Loading	CA	CR	AVE
Financial behaviour	FB 12	0.728	0.725	0.829	0.551
	FB 13	0.668			
	FB 14	0.869			
	FB 15	0.689			
Financial literacy	FL 11	0.860	0.573	0.775	0.542
	FL 18	0.746			
	FL 19	0.573			
Financial risk tolerance (FRT)	FRT 2	0.825	0.693	0.824	0.611
	FRT 3	0.670			
	FRT 4	0.839			

The discriminant validity was determined from the value of cross-loading. Comparison between the square root of AVE and association values between constructs can be found from the Fornell-Larcker criterion. Table 2 shows that the values of AVE square root are greater than the association values. Since this model has fulfilled the discriminant validity, thus this model is valid.

Table 2: Fornell-Lacker Criterion

	Financial behaviour	Financial literacy	FRT
Financial behaviour	0.743		
Financial literacy	0.470	0.736	
Financial Risk Tolerance (FRT)	0.346	0.126	0.782

Moreover, Hair et al. (2020) recommended that an analysis includes the collinearity measurement or variance inflation factor (VIF) for the construct. This is due to the possible multicollinearity problem that will undermine the statistical significance of an independent variable. In addition, it also will reduce the precision of the estimate coefficients which weakens the statistical power of the model. Multicollinearity was inspected by VIF and tolerance. The proposed VIF values should be less than 5. The values that greater than 5 are considered as showing multicollinearity (Hair et al., 2010). Values of VIF in Table 3 show that all the variables have VIF less than 5 indicating that multicollinearity issue does not exist.

Table 3: Collinearity Diagnostic

	VIF
FB 12	1.611
FB 13	1.249
FB 14	1.940
FB 15	1.273
FL 11	1.352
FL 18	1.359
FL 19	1.065

The inner model analysis

Analysis of the inner model aimed to evaluate the implication of the pathestimates. The analytical power of the outer model can be obtained from the R-Square values of the dependent variables. Based on R-Square values in Table 4, it shows that 22.1 percent of financial behavior among working adult investors is influenced by financial literacy. Whereas 12.1 percent of financial risk tolerance (FRT) among working adult investors is influenced by financial behavior and financial literacy. Therefore, financial behavior and FRT are 77.9 and 87.9 percent effected by other variables outside this model. The values of 0.221 and 0.121 show that this research model has moderate and weak rating (Yusliman et al., 2019).

There are other elements that affect financial behavior and FRT. Tang and Baker (2016), for instance recommended that psychological characteristics like self-esteem play a significant factor in describing variations in financial behaviors among American adults. This finding was in line with Ramalho and Forte (2019) which argued that financial behavior is explained by self-confidence. Whereas Mpaata et al. (2021) revealed that low self-control is associated to negative saving behaviors.

Table 4: The R-Square Values of Dependent Variables

Variable	R-Square	R-Square Adjusted	Rating
Financial behaviour	0.221	0.216	Moderate
Financial risk tolerance (FRT)	0.121	0.109	Weak

According to Mohan and Singh (2017), age, education level, marital status, and the number of dependents all have an impact on FRT. This research measures the level of investment return volatility that investors are willing to endure. Zeeshan et al. (2021) revealed that gender, education, and income have positive impact on level of risk tolerance where Mokoena et al. (2021) indicated that male, younger, and high-income individual investors are more risk tolerant.

Additionally, Niszczota and Biaek (2021) came to the same conclusion regarding the impact of gender on investors' perceptions of morally dubious stocks. When comparing men and women's investment expertise and risk tolerance, the study found that men were substantially more tolerant of problematic stocks.

Table 5: Summary of the Effect Size Values

Relationship	F-square	Description
Financial behaviour -> FRT	0.120	Moderate
Financial literacy -> Financial behaviour	0.284	Strong
Financial literacy -> FRT	0.002	Weak

The results for the effect size shown in Table 5 were obtained by bootstrapping analysis option, it shows that financial literacy affects financial behavior and financial behavior affects FRT. Financial literacy also was found to affect FRT. According to Yusliman et al. (2019), the f-square values show that relationship between financial behavior with FRT has moderate effect. Meanwhile financial literacy has strong impact on financial behavior. Whereas financial literacy shows weak effect on FRT.

Table 6 shows the path coefficient values. The outcomes show that the P-value for the relationship between financial literacy with FRT has 0.645 value. Since the P-value is greater than 0.05, therefore it is proved that financial literacy does not have positive relationship with FRT. However, financial literacy has a positive association with financial behavior since the P-value is significant.

Table 6: Summary of Hypothesis Testing

Hypotheses	Path	Mean (M)	Standard Deviation	T-Statistics	P-Values	Decision
H1	FL -> FRT	-0.033	0.101	0.461	0.645	Not supported
H2	FL -> FB	0.489	0.074	6.361	0.000	Supported
H3	FB -> FRT	0.372	0.085	4.328	0.000	Supported
H4	FL-> FB-> FRT	0.181	0.047	3.648	0.000	Supported

Note: $p < 0.05$ (1-tailed)

Furthermore, it is confirmed that financial behavior has positive relationship with FRT as the P-value is at 0.000. Meanwhile the P-value for the mediating effect of financial behavior in the association between financial literacy with FRT shows 0.000 value, thus it shows that financial behavior mediates the association between financial literacy with FRT among working adult investors.

Discussion and Conclusion

Based on the analysis, financial literacy is confirmed to be the significant driver that influences investors' financial behavior. This finding is reliable with Samsulbahri et al. (2021) and Sabri et al. (2021). However, they asserted among young Muslim individuals in Malaysia, financial literacy is related to investment choice behavior. Furthermore, Sabri et al. (2021) revealed the beneficial effect financial literacy had on Malaysian households' financial behavior. These findings proved the importance of organizing financial education programs to promote financial knowledge and awareness to increase one's financial literacy, then financial behavior.

Secondly, financial behavior was also found to have positive impact on investors' financial risk tolerance (FRT). This finding is in line with findings from Arianti *(2018)* and Rahman and Gan (2020). However, financial literacy alone has negative direct impact on investors' FRT. This finding is consistent with Hendrawaty et al. (2020). Even if investors are financially knowledgeable during the pandemic to endemic phase, they are still hesitant about the return on their investments because we are still recuperating from the financial crisis (Tan et al.,2021). For instance, Macdonald (2021) concluded that the volatility persistence increased in all the European stock markets for the Covid-19 pandemic. Therefore, global crisis such as Covid-19 pandemic gives impact on individuals' FRT in financial decisions (Wang et al., 2021).

Furthermore, it is confirmed that the significant mediating role financial behavior plays in the correlation between financial literacy with FRT. Although financial literacy negatively influences FRT, conclusion from this survey was discovered to establish the critical mediating effect of financial behavior in this relation. This suggests that, having financial knowledge and understanding alone does not necessarily motivate investors to participate in financial market. To address this issue, this study disclosed that financial behavior has a role as a mediator to encourage investors' participation in financial market through increasing their FRT. That is the financial knowledge should come together with positive financial behavior or habit. Financial behavior was found to not only gives positive impact on FRT, but also mediates the effect of financial literacy towards FRT. Furthermore Chin (2021) unveiled that there was a considerable positive impact of investment behaviors on trading frequency in Malaysian stock market during Covid-19 pandemic, suggesting the critical role of financial behavior in investment motivation during a global crisis.

This research has examined the influence of financial literacy on financial risk tolerance (FRT) with the mediation role of financial behavior. Financial behavior is found to mediate the influence of financial literacy on FRT. This is in line with Regret Theory which suggested that under uncertainties decision makers are rational and care about the known consequences of their choices, as well as counterfactual outcomes that possibly occur if they choose different options also. In this study, investors' risk tolerance is affected by financial literacy with a mediating role of financial behavior. This confirms that investors are rational when calculating investment risk, and aware of the consequences of their taken decisions.

This rationality comes from financial knowledge and practice, that result their financial literacy and financial behavior.

By highlighting the application of Regret Theory, this study explored the mediating role of financial behavior in the influence of financial literacy on FRT. To date, prior studies have been focusing on direct relation between financial literacy with FRT. Our findings contribute to the prevailing literature by suggesting the critical mediation role of financial behavior to link financial literacy with FRT. By fostering the mediation model, this study suggests a thorough research framework to investigate the mediating role of financial behavior.

This study offers indication that financial literacy pressures financial behavior favorably even during the transitional period from the Covid-19 pandemic to endemic phase. However, being financially literate only is insufficient to raise investors' FRT. Financial literacy should be complimented with high financial behavior as well. Hence the value of financial knowledge and financial behavior are crucial to determine investors' FRT that will motivate them to participate in investment schemes. Thus, it is imperative to bring these discoveries to the consideration of authority and regulators to expand financial education plans to enhance individuals' financial understanding and financial behavior among investors and potential investors.

This study has limitations. Therefore, future research should include more respondents to test objective profile data since this study only included 148 respondents. Nevertheless, However, the authors are sure that their analysis has made a pertinent recommendation about research in psychological and behavioral finance. Moreover, for psychological and behavioral measurements like financial literacy, financial behavior, and FRT, respondents tend to be contradictory in their feeling. What they feel yes today, may be no next time when they answer the questions.

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