

FINANCIAL EDUCATION, FINANCIAL STRESS, AND FINANCIAL WELL-BEING: THE STRATEGIC ROLE OF FINANCIAL TECHNOLOGY FOR MILLENNIAL BANK EMPLOYEES IN NORTH SUMATRA

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Abstract

This study investigates the influence of financial education and financial stress on financial well-being, with financial technology considered as a mediating variable. The research is driven by the increasing role of financial literacy and digital financial services in helping individuals manage financial challenges in today's digital era. A quantitative approach with a deductive design was employed, using structured questionnaires distributed to 400 millennial respondents aged 25–40 years working in the banking sector in North Sumatra. Data were analyzed with Partial Least Square–Structural Equation Modeling (PLS-SEM), which enables simultaneous testing of measurement and structural models. The results indicate that financial education has a positive and significant effect on both financial technology adoption and financial well-being. In contrast, financial stress is negatively associated with financial well-being but positively influences the adoption of financial technology as an adaptive mechanism to cope with financial pressures. Furthermore, financial technology is found to play a crucial mediating role, strengthening the effects of financial education and mitigating the negative impact of financial stress on financial well-being. The study provides theoretical contributions by extending the existing frameworks that link financial literacy, stress, technology, and financial outcomes. From a practical perspective, the findings highlight the importance of promoting digital-based financial education programs and developing inclusive financial technology solutions to enhance financial well-being, particularly among younger generations in the banking industry

Keywords: Financial Education; Financial Stress; Financial Technology; Financial Well-Being.

INTRODUCTION

Millennials are the generation born between 1981 and 1996, often referred to as Generation Y. Today, the average age of this generation ranges from 25 to 40 years, placing them at the core of the productive workforce. In the context of Indonesia, millennials represent a crucial demographic group that will play a central role in shaping the nation's development over the next decade (Kubota et al., 2022). Their significance is not only numerical but also qualitative, as their attitudes, skills, and adaptability make them highly influential in social, political, and economic transformations. One defining feature of millennials is their openness to diverse political and economic perspectives, which makes them responsive to changes in their environment. Unlike previous generations, millennials have grown up in an era where communication technologies and social media dominate daily interactions. Their communication style is thus more transparent, inclusive, and fast-paced. This can be attributed to the fact that Generation Y came of age during the internet boom, when digital tools became a central part of everyday life (Ardi & Putri, 2020). As Verhoef et al. (2021) note, this period marked the beginning of fundamental global changes as digital technology disrupted and reshaped systems worldwide. Millennials are often described as the “generation of hope” for the nation, highlighting the importance of ensuring that they are well-educated and prepared to face future challenges. Despite this optimistic outlook, many millennials today face serious threats to their economic stability and financial security. The consumer-driven economy encourages them to spend rather than save, while the rise of online shopping platforms and the easy availability of credit cards foster habits of instant gratification (Renaldo et al., 2020). At the same time, technological advancements, exemplified by the emerging

concept of Industry 5.0, continue to shape their lives in profound ways. Millennials are expected not only to adopt these technological changes but also to influence economic trends through their consumption and labor patterns. Their lifestyles, marked by preferences for socializing, online shopping, traveling, and enjoying leisure activities such as year-end holidays, are often financially demanding (Gunawan et al., 2023). In Indonesia, the expansion of financial technology (fintech) further illustrates the relationship between millennials and digital transformation. For instance, the Bank Indonesia Representative Office in North Sumatra reported that at least 70 percent of digital wallet users in Medan belong to younger demographics, especially millennials. While digital wallets and fintech services bring significant convenience and broaden financial inclusion, they also pose challenges that require regulatory oversight. Bank Indonesia continues to engage fintech companies in discussions, urging them to report their assets and transactions transparently. Without proper monitoring, fintech services could disrupt the existing banking system. Nevertheless, the integration of digital technology in financial services is highly beneficial, particularly for individuals who previously lacked access to traditional financial institutions (Balatif et al., 2024).

The financial well-being of millennials is a critical issue that cannot be overlooked. Financial well-being has far-reaching implications for their post-graduation trajectories, career stability, and overall life satisfaction (Shim et al., 2009). Often described as financial health, this concept refers to an individual's ability to meet present obligations, maintain confidence in their financial future, and manage unexpected challenges that may arise (Iramani & Lutfi, 2021; Aubrey et al., 2022). Sabri, Anthony, et al. (2023) and Riitsalu et al. (2023) emphasize that financial well-being is a lifelong concern, affecting individuals across various life stages. It not only reflects material stability but also shapes psychological comfort and subjective satisfaction with one's financial circumstances (Rahman et al., 2021). Unfortunately, many millennials experience financial strain due to limited financial literacy, wasteful spending, or lack of financial intelligence. These shortcomings can lead to poor money management, making it difficult to save or invest effectively. As Shim et al. (2009) argue, financial stress can negatively affect not only a person's economic stability but also their physical health, mental well-being, and personal relationships. Wahyuni et al. (2022) further highlight that inadequate knowledge about budgeting, investing, and safeguarding financial resources is a root cause of financial difficulties for this generation.

Conversely, strong financial literacy provides millennials with the foundation to achieve long-term stability and resilience. It fosters better planning, encourages investment, and supports responsible borrowing practices. Recent studies affirm the positive role of financial literacy in strengthening millennials' economic growth and financial planning (Wahyuni et al., 2023; Cwynar, 2020; Hong Shan et al., 2023). To make sound financial decisions, individuals must possess a comprehensive understanding of financial matters and engage in intentional financial behavior. As Lusardi & Mitchell (2014) and Cwynar (2020) assert, informed financial behavior is essential for achieving sustainable financial well-being. In conclusion, millennials hold a pivotal role in shaping the trajectory of national and global development. Their adaptability to technological shifts, openness to diverse perspectives, and demographic dominance position them as powerful agents of change. However, without adequate financial literacy and discipline, they risk falling into economic vulnerabilities that could undermine both personal and societal progress. Ensuring the financial well-being of millennials, therefore, is not only an individual responsibility but also a collective investment in the future stability and prosperity of the nation.

LITERATURE REVIEW

Financial Education

Financial education is crucial in shaping individual financial behaviour, particularly in guiding wise financial decisions and using financial technology. Studies show that financial education is positively related to financial literacy, improving financial well-being (Zhang & Fan, 2024). In addition, other studies have found that financial education can mediate between financial stress and the use of financial technology (Heo et al., 2021). Recent research in Indonesia shows that although financial education is important, it sometimes does not directly affect financial well-being without supporting external factors such as technology (Balatif et al., 2024). Research in the United States also emphasizes that financial education is associated with increased literacy and healthier financial behaviour (Zhang & Chatterjee, 2023). Education increases FinTech adoption by improving financial literacy and trust, mitigating financial stress's adverse effects. Thus, financial education is a fundamental foundation in building sustainable financial well-being, especially through literacy and the use of technology (Wang et al., 2024).

Financial Stress

Financial stress describes the psychological pressure caused by financial difficulties, which can affect an individual's mental health and financial decisions. Research shows that financial stress hurts financial well-being, but it can be mitigated by adequate financial literacy (Zhang & Chatterjee, 2023). Heo et al., (2021) add that financial stress also affects the adoption of financial technology, especially among individuals who do not have adequate financial education. Research in Indonesia confirms that financial stress is directly related to financial well-being, although financial technology can moderate this effect (Balatif et al., 2024). Another study among young people emphasizes that financial stress increases due to external factors such as macroeconomic changes and technological advances, thereby affecting the stability of financial well-being (She et al., 2022). Similarly, studies in Asia and beyond show that financial stress undermines personal financial confidence; however, interventions through financial literacy and technology usage help ameliorate this effect. Thus, financial stress is a critical factor requiring intervention via literacy and technological support (Xiao & Meng, 2023).

Financial Well-Being

Financial well-being is a condition where individuals can meet their financial needs, feel secure, and control their financial future. Research confirms that financial literacy and education are key determinants in improving financial well-being (Zhang & Chatterjee, 2023). Zhang & Fan (2024) show that mobile fintech strengthens the relationship between literacy and financial well-being, particularly by providing easier access to financial services. Studies on younger generations emphasize that contextual factors such as technology, social environment, and economic conditions also shape financial well-being (She et al., 2022). Research on low-income households in Malaysia found that using digital financial services improves subjective financial well-being, particularly by reducing the financial access gap (Mahdzan et al., 2022). Another study from India shows that digital financial literacy plays a major role in improving financial well-being through wiser financial behaviour (Bhat et al., 2024). Literacy, education, technology, and socio-economic factors influence financial well-being.

Financial Technology

Financial technology (fintech) has revolutionized how individuals access, manage, and use financial services. Fintech enables broader financial inclusion, especially for low-income groups or those underserved by conventional banks (Mahdzan et al., 2022). Research by Zhang & Fan (2024) shows that financial education increases fintech adoption because more literate individuals are more confident utilizing digital services. Heo et al. (2021) assert that financial stress can encourage individuals to use fintech as a practical solution to manage financial pressures. Mobile fintech usage has been found to improve financial well-being and reduce financial stress levels by enabling users to manage transactions, mobile banking, and financial tasks, especially for those facing financial stressors (Zhang & Fan, 2024). Thus, mobile fintech alleviates financial stress and enhances financial well-being through practical technological support and accessibility. On the other hand, research on the younger generation in India emphasizes that financial technology must be balanced with financial literacy to improve financial well-being (Shankar et al., 2022). Thus, fintech is a strategic instrument for improving financial well-being, but its effectiveness depends on financial literacy and education.

Hypothesis Development

The Relationship Between Financial Education and Financial Technology

Financial education is considered an important prerequisite for increasing the adoption of financial technology (fintech). Individuals with a higher level of financial education have a deeper understanding of the risks and benefits of fintech and are therefore more likely to use it. Zhang & Fan (2024) assert that financial literacy gained through financial education strengthens the acceptance of mobile fintech and encourages more positive financial behaviour. Other studies show that financial education is an effective mediator in linking financial stress to the use of fintech (Heo et al., 2021). Balatif et al. (2024) found that financial education plays a crucial role in increasing the effectiveness of financial technology use in supporting financial well-being. Nguyen (2022) finds that individuals with higher perceived financial knowledge show greater confidence in using fintech services to manage their finances, highlighting the role of financial knowledge in reducing financial stress and encouraging fintech adoption.

Shankar et al. (2022) added that low financial education is a major obstacle for the younger generation in optimizing the benefits of fintech. Therefore, financial education has a positive effect on the use of financial technology.

H1: Financial Education has a positive effect on Financial Technology

The Relationship Between Financial Stress and Financial Technology

Financial stress drives individuals to seek alternative solutions in managing their finances, including adopting fintech. Heo et al., (2021) found that financial stress correlates with increased use of financial technology, as individuals seek to reduce their financial burden through quick and practical access to digital services. Balatif et al. (2024) also confirmed that financial stress can increase individuals' motivation to use fintech as a modern financial management strategy. Zhang & Fan (2024) adds that mobile fintech can serve as a coping mechanism to reduce the negative effects of financial stress. Shankar et al. (2022) found that young people with high stress levels are more likely to seek help from fintech applications in managing their expenses and savings. Mahdzan et al. (2022) also showed that adopting digital financial services is higher among low-income groups facing severe financial pressure. Thus, financial stress can encourage individuals to be more active in using fintech.

H2: Financial Stress has a positive effect on Financial Technology

The Relationship Between Financial Education and Financial Well-Being

Financial well-being results from financial understanding and skills acquired through financial education. Zhang & Chatterjee (2023) assert that financial education improves literacy, which positively impacts the financial well-being of individuals in the United States. Lone & Bhat (2024) show that financial education strengthens financial self-efficacy, significantly affecting financial well-being. Research by Zhang & Fan (2024) found that financial education facilitates the use of mobile fintech, ultimately contributing to improved financial well-being. Bhat et al. (2024) added that digital financial literacy, as a derivative of financial education, improves personal financial management skills that impact well-being. García-Santillán et al. (2025) also emphasize that inclusive financial education improves financial attitudes, knowledge, and practices that support financial well-being. Thus, financial education has a positive influence on financial well-being.

H3: Financial Education has a positive effect on Financial Well-Being

The Relationship Between Financial Stress and Financial Well-Being

Financial stress is often identified as a major factor that reduces financial well-being. Zhang & Chatterjee (2023) show that high levels of financial stress negatively correlate with financial well-being, reducing individuals' control over their financial future. Balatif et al. (2024) also found that financial stress significantly reduces financial well-being, although financial technology can act as a moderating factor that reduces its impact. Recent studies show that financial stress reduces one's self-efficacy in managing finances, leading to lower levels of financial well-being. For example, coping strategies that enhance financial self-efficacy have been found to buffer the negative effects of financial stressors on well-being (Mahdzan et al., 2022). Shankar et al. (2022) identify that high-stress young people tend to experience greater financial vulnerability. She et al., (2022) also emphasize that external factors such as inflation and economic changes exacerbate financial stress and reduce individual financial well-being. Therefore, financial stress is negatively related to financial well-being.

H4: Financial Stress hurts Financial Well-Being

The Relationship Between Financial Technology and Financial Well-Being

Financial technology expands access to financial services, directly improving individuals' financial well-being. Mahdzan et al. (2022) found that digital financial services improve subjective financial well-being among low-income households. Recent studies assert that using mobile fintech helps reduce financial stress levels while improving well-being by facilitating more effective financial management, mobile transactions, and access to financial services (Sabri et al., 2023). Zhang & Fan (2024) add that integrating financial literacy with fintech strengthens the positive impact on financial well-being. Shankar et al. (2022) found that young people with adequate literacy benefit more from fintech regarding their financial well-being. Bhat et al. (2024) also showed that digital financial literacy mediates the relationship between fintech and financial well-being, highlighting the importance of literacy as a key factor. Therefore, financial technology has a positive effect on financial well-being.

H5: Financial Technology has a positive effect on Financial Well-Being

The Relationship Between Financial Education and Financial Well-Being Through Financial Technology

Financial education not only has a direct effect on financial well-being, but also through the use of financial technology. Heo et al. (2021) found that financial education is an important mediator in using fintech, ultimately contributing to financial well-being. Zhang & Fan (2024) showed that financial education increases the adoption of mobile fintech, which positively impacts financial well-being. Balatif et al. (2024) add that financial education supports the effectiveness of fintech use in improving well-being. Individuals with greater financial knowledge are more likely to adopt FinTech and attain higher financial well-being; this relationship is especially evident among persons with disabilities and students who demonstrate that financial literacy promotes both FinTech use and well-being (Gafoor & Amilan, 2024). García-Santillán et al. (2025) also emphasize that developing financial capabilities through financial education can increase technology adoption to achieve well-being. Thus, fintech acts as a mediator between financial education and financial well-being.

H6: Financial Education influences Financial Well-Being through Financial Technology

The Relationship Between Financial Stress and Financial Well-Being Through Financial Technology

Financial stress can affect financial well-being both directly and indirectly through fintech. Heo et al., (2021) assert that fintech is an adaptive means of reducing the negative impact of financial stress and improving financial well-being. Balatif et al., (2024) also show that although financial stress reduces financial well-being, this negative effect can be moderated through fintech. Recent evidence confirms that mobile fintech helps individuals under financial pressure manage their expenses and savings more effectively, reducing stress's negative impact (Zhang & Fan, 2024). Mahdzan et al. (2022) emphasized that fintech is important in helping low-income households vulnerable to financial stress improve their subjective financial well-being. Shankar et al. (2022) added that young people experiencing financial stress prefer to use fintech applications as a means of financial coping. Thus, fintech mediates the relationship between financial stress and financial well-being.

H7: Financial Stress affects Financial Well-Being through Financial Technology

Based on the previous explanation and past studies, the conceptual framework in this study is as follows:

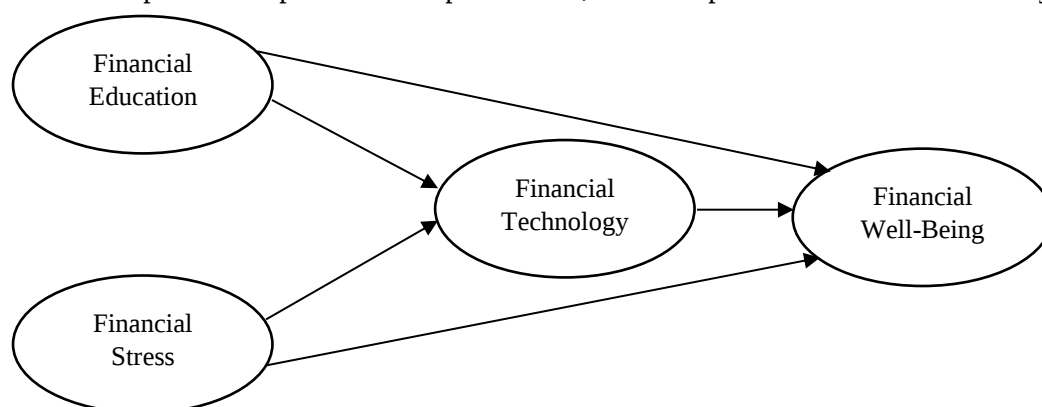


Figure 1. Research model

METHODS

This study uses a quantitative design with a deductive approach, which tests existing theories through numerical data processing. This approach was chosen because it aligns with the research objective of analyzing the influence of financial education and financial stress on financial well-being with financial technology as a mediating variable. The research process was carried out through data collection, processing, and statistical interpretation so that the results could support existing theories and provide practical recommendations for developing financial literacy and technology. The research variables consist of four main constructs. The dependent variable is financial well-being, whose indicators are adapted from (Shim et al., 2009). The independent variables include financial education and stress, while the intervening variable is financial technology. The latter three variables use indicators modified from Heo et al. (2021). All variables are measured using a five-point Likert scale ranging from strongly disagree to agree to capture respondents' perceptions more measurably.

The research population is millennials in North Sumatra who work in the banking industry and are aged 25–40. Based on data from the Central Bureau of Statistics in 2023, the number of millennials in the region reached more than one million. The sample size was determined based on the guidelines of Krejcie & Morgan (1970), Hair et al., (2014) and Westland (2010), which consider model complexity, the number of latent variables, and observation indicators. Based on these considerations, the sample size used was 400 respondents, which was deemed adequate for structural model analysis. Data were collected through a structured questionnaire distributed to respondents according to the established criteria. Data analysis was performed using Partial Least Squares—Structural Equation Modelling (PLS-SEM), which allows simultaneous testing of measurement and structural models. This technique was chosen because it suits research involving complex latent variables. It overcomes sample size limitations, resulting in a more comprehensive analysis of direct and indirect relationships between variables.

RESULTS AND DISCUSSION

Result

The indicator measurement model was evaluated in several stages: individual item reliability, internal consistency or composite reliability, average variance extracted (AVE), and discriminant validity. The first three tests were grouped into convergent validity. Convergent validity was used to assess the extent to which the indicators could represent a latent construct. The higher the convergent validity value, the stronger the ability of the dimension to explain the latent variables being measured. The convergent validity test consists of three stages: item reliability (the validity of each indicator), composite reliability, and average variance extracted (AVE). Item reliability or indicator validity is tested through the factor loading value (standardized loading), which shows the correlation between each indicator and its construct. A factor loading value above 0.70 is ideal because it shows that the indicator validates the construct. However, values above 0.50 are still acceptable, while indicators below 0.50 should be eliminated from the model (Chin, 1998). Thus, item reliability can be assessed based on the standardized loading value listed in the data processing results, as shown in the standardized loading column.

Table 1. Outer Loading Results

	Financial Education	Financial Stress	Financial Technology	Financial Well-Being
FE1	0.851			
FE10	0.805			
FE2	0.827			
FE3	0.748			
FE4	0.776			
FE5	0.773			
FE6	0.711			
FE7	0.789			
FE8	0.780			
FE9	0.859			
FS1		0.709		
FS10		0.792		

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FS2		0.722		
FS3		0.786		
FS4		0.772		
FS5		0.828		
FS6		0.809		
FS7		0.759		
FS8		0.802		
FS9		0.764		
FT1			0.764	
FT10			0.851	
FT2			0.769	
FT3			0.789	
FT4			0.837	
FT5			0.795	
FT6			0.843	
FT7			0.864	
FT8			0.850	
FT9			0.877	
FW1				0.776
FW10				0.771
FW2				0.718
FW3				0.791
FW4				0.759
FW5				0.779
FW6				0.783
FW7				0.841
FW8				0.813
FW9				0.783

Based on Table 1, it is known that all outer loading values for each indicator are above 0.70. This indicates that the indicators used strongly correlate with the measured construct. Thus, the variables and indicators in this study meet the validity criteria, making them suitable for explaining each latent variable. The composite reliability test in this study was conducted using two statistical measures, namely Cronbach's Alpha and Dillon-Goldstein's rho (Composite Reliability/ ρ_c). Cronbach's Alpha is used to measure the lower limit of the reliability of a construct. In contrast, composite reliability is considered more accurate because it can describe the actual reliability of the indicators that form the construct. As a rule of thumb, composite reliability and Cronbach's Alpha values greater than 0.60 are considered adequate to indicate that the construct has good reliability. Thus, if a construct obtains a value above this threshold, it can be concluded that it has high reliability and its indicators consistently measure the latent variables.

Table 2. Composite Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Financial Education	0.934	0.937	0.944	0.629
Financial Stress	0.927	0.939	0.938	0.601
Financial Technology	0.947	0.948	0.950	0.680
Financial Well-Being	0.930	0.944	0.940	0.611

Based on Table 2, the composite reliability values for Financial Education, Financial Stress, Financial Technology, and Financial Well-Being variables are each above 0.60, while the Cronbach's Alpha values are also above 0.60. These results indicate that the four variables are reliable, so the indicators consistently measure their constructs. Furthermore, the Average Variance Extracted (AVE) test shows all variables have values above 0.60. This means that each construct can explain more than half of the variance of its indicators, so it can be concluded

that all variables have good convergent validity. Thus, this research instrument meets the criteria of reliability and validity, making it suitable for use in structural model testing. Examining discriminant validity in the reflective measurement model was done through two approaches: looking at the cross-loading value and comparing the Average Variance Extracted (AVE) square root value with the inter-construct correlation. The cross-loading test was carried out by comparing the correlation of each indicator to the measured construct with its correlation to other constructs. A model can have good discriminant validity if the indicators represent their original constructs better than others. Thus, adequate discriminant validity indicates that each latent variable can explain its indicators more dominantly than the indicators belonging to other constructs. The results of the discriminant validity test for each indicator are presented below.

Table 3. Discriminant Validity

	Financial Education	Financial Stress	Financial Technology	Financial Well-Being
FE1	0.851	-0.029	0.270	0.246
FE10	0.805	-0.137	0.267	0.331
FE2	0.827	0.042	0.277	0.214
FE3	0.748	0.018	0.336	0.225
FE4	0.776	-0.050	0.263	0.205
FE5	0.773	0.014	0.158	0.203
FE6	0.711	-0.051	0.194	0.299
FE7	0.789	-0.075	0.192	0.286
FE8	0.780	-0.044	0.245	0.251
FE9	0.859	-0.044	0.256	0.270
FS1	0.015	0.709	0.126	-0.124
FS10	-0.016	0.792	0.243	-0.049
FS2	0.052	0.722	0.116	-0.143
FS3	-0.084	0.786	0.190	-0.094
FS4	-0.103	0.772	0.131	-0.171
FS5	-0.050	0.828	0.273	-0.099
FS6	-0.056	0.809	0.228	-0.195
FS7	-0.018	0.759	0.157	-0.072
FS8	-0.018	0.802	0.142	-0.120
FS9	-0.057	0.764	0.208	-0.106
FT1	0.326	0.154	0.764	0.157
FT10	0.234	0.254	0.851	0.147
FT2	0.248	0.136	0.769	0.249
FT3	0.257	0.158	0.789	0.203
FT4	0.230	0.231	0.837	0.082
FT5	0.284	0.182	0.795	0.209
FT6	0.302	0.204	0.843	0.206
FT7	0.222	0.230	0.864	0.168
FT8	0.212	0.251	0.850	0.161
FT9	0.266	0.218	0.877	0.140
FW1	0.242	-0.047	0.145	0.776
FW10	0.317	-0.138	0.201	0.771
FW2	0.126	-0.089	0.082	0.718
FW3	0.161	-0.107	0.168	0.791
FW4	0.221	-0.154	0.149	0.759
FW5	0.166	-0.185	0.061	0.779
FW6	0.274	-0.152	0.179	0.783
FW7	0.265	-0.070	0.192	0.841
FW8	0.214	-0.082	0.168	0.813
FW9	0.372	-0.140	0.212	0.783

Table 3 shows that each variable's discriminant validity or loading factor value is higher in the construct it measures than its correlation with other constructs. This is also shown by the indicators in each variable, which have the highest correlation with the original variable. These results confirm that the placement of indicators in each variable is appropriate and that the measurement model meets the criteria for discriminant validity. Another criterion for discriminant validity is the Heterotrait-Monotrait Ratio (HTMT). According to Juliandi (2018), a construct is said to have good discriminant validity if the HTMT value is less than 0.90. This value indicates that the correlations between the different constructs are still within the tolerance limit and do not cause multicollinearity problems. Thus, the lower the HTMT value compared to this threshold, the better the model's ability to distinguish between one construct and another.

Table 4. Heterotrait-Monotrait Ratio (HTMT)

	Financial Education	Financial Stress	Financial Technology
Financial Education			
Financial Stress	0.092		
Financial Technology	0.328	0.250	
Financial Well-Being	0.319	0.162	0.211

Based on Table 4, the Heterotrait-Monotrait Ratio (HTMT) value for each variable is less than 0.90. This indicates that each construct has met the discriminant validity criteria. Similarly, the indicators for each variable have lower correlations with other constructs than with their original constructs. Thus, the placement of indicators in each variable is appropriate, and the measurement model has good discriminant validity.

Table 5. Fornell-Larcker Criteria

	Financial Education	Financial Stress	Financial Technology	Financial Well-Being
Financial Education	0.793			
Financial Stress	-0.048	0.775		
Financial Technology	0.315	0.244	0.825	
Financial Well-Being	0.322	-0.153	0.211	0.782

Table 5 above shows that each variable's discriminant validity value or Fornell-Larcker criteria has a higher correlation with its own variable than with other variables. The same applies to the indicators for each variable. This shows that the placement of indicators for each variable is appropriate. The Goodness of Fit (GoF) measure is used to validate the structural model as a whole. The GoF index is a single measure that reflects the combined performance of the measurement and structural models. The GoF value is calculated from the square root of the product of the Average Variance Extracted (AVE) and the R^2 value of the model. The GoF value ranges from 0 to 1 with the following interpretation criteria: 0.10 indicates a small GoF, 0.25 indicates a moderate GoF, and 0.36 indicates a large GoF (Hair et al., 2014). The higher the GoF value, the better the model fits the research data. The goodness-of-fit calculation results for this research model are presented below.

Table 6. Average Communalities Index Results

Variable	AVE	R Square
Financial Education	0.629	
Financial Stress	0.601	
Financial Technology	0.680	0.167
Financial Well-Being	0.611	0.148
Average	0.630	0.158
GOF	0.315	

Based on Table 6 above, the average communalities result is 0.630. This value is then multiplied by R^2 and squared. The calculation results show that the GoF value of 0.315 is greater than 0.25, so it is categorized as moderate

GoF, meaning that the model is very good (has high capability) in explaining empirical data. R-squared measures the proportion of variation in the endogenous variable that the exogenous variable can explain, so it is useful for assessing the quality of a model. An R-square value of 0.75 indicates a substantial (good) model, 0.50 indicates a moderate (moderate) model, and 0.25 indicates a weak (poor) model (Juliandi, 2018). Based on the results of data processing using the SmartPLS 3.0 program, the R-square value for the endogenous variable was obtained as shown in the following table and figure.

Table 7. R-Square Test

	R Square	Adjusted R Square
Financial Technology	0.167	0.159
Financial Well-Being	0.148	0.136

Based on Table 7, the R-square value for the Financial Well-Being variable is 0.148, which means that Financial Education, Financial Stress, and Financial Technology can explain 14.8% of the variation. Thus, this model is classified as weak, while other factors outside the model influence the remaining 85.2%. Furthermore, the R-square value for the Financial Technology variable is 0.167, indicating that Financial Education and Financial Stress can explain its variation by 16.7%. This also falls into the weak category, with 83.3% of the variation explained by other variables not included in the study. F-Square is a measure used to assess the relative impact of exogenous variables on endogenous variables. An F^2 value of 0.02 indicates a small (weak) effect, a value of 0.15 indicates a moderate effect, and a value of 0.35 indicates a large (strong) effect (Juliandi, 2018). Based on the data processing results using the SmartPLS 3.0 program, the F-Square values for each relationship between variables are obtained as shown in the following table and figure.

Table 8. F-Square

	Financial Technology	Financial Well-Being
Financial Education	0.129	0.070
Financial Stress	0.081	0.036
Financial Technology		0.030
Financial Well-Being		

Based on Table 8, it is known that the effect of Financial Education on Financial Well-Being has an F^2 value of 0.070, which indicates a small effect. The effect of Financial Education on Financial Technology also has a value of 0.129 and is classified as small. Furthermore, the effect of Financial Stress on Financial Well-Being is 0.036, indicating a small effect, as is the effect of Financial Stress on Financial Technology, which is 0.081, still in the small category. Meanwhile, the effect of Financial Technology on Financial Well-Being has an F^2 value of 0.030. Although relatively small, this finding still shows the contribution of exogenous variables to endogenous variables, even though the impact is not yet strong. Hypothesis testing was conducted to determine the path coefficients in the structural model to test the significance of all relationships between variables or research hypotheses. In this study, hypothesis testing was divided into direct and indirect effects. Based on the results of data processing using the SmartPLS 3.0 program, path coefficient outputs were obtained that describe the magnitude of the influence of each variable, both directly and through mediating variables. The results of the hypothesis testing can be seen in the following path coefficient figure.

FINANCIAL EDUCATION, FINANCIAL STRESS, AND FINANCIAL WELL-BEING: THE STRATEGIC ROLE OF FINANCIAL TECHNOLOGY FOR MILLENNIAL BANK EMPLOYEES IN NORTH SUMATRA

Roni Parlindungan Sipahutar and Dedeng Irawan

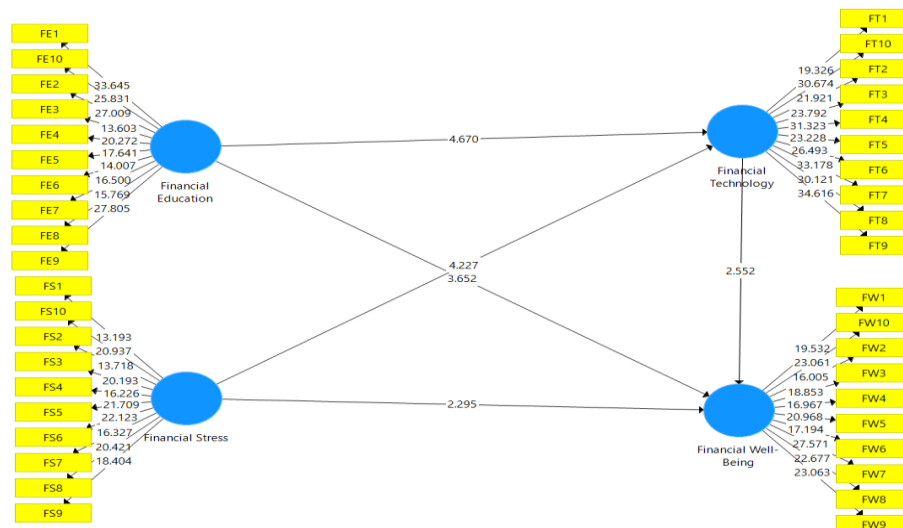


Figure 2. Path Coefficient

The results of the direct effect hypothesis testing can be seen in the following path coefficient table:

Table 9. Path Coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial Education -> Financial Technology	0.328	0.336	0.070	4.670	0.000
Financial Education -> Financial Well-Being	0.259	0.271	0.071	3.652	0.000
Financial Stress -> Financial Technology	0.260	0.270	0.062	4.227	0.000
Financial Stress -> Financial Well-Being	-0.183	-0.185	0.080	2.295	0.022
Financial Technology -> Financial Well-Being	0.174	0.180	0.068	2.552	0.011

Based on Table 9, Financial Education positively affects Financial Well-Being ($t = 4.312$; $p = 0.000$; $\beta = 0.259$) and Financial Technology ($t = 6.218$; $p = 0.000$; $\beta = 0.328$). Financial Stress has a significant negative effect on Financial Well-Being ($t = 2.292$; $p = 0.022$; $\beta = -0.183$), but has a significant positive effect on Financial Technology ($t = 4.765$; $p = 0.000$; $\beta = 0.260$). Furthermore, Financial Technology significantly positively affects Financial Well-Being ($t = 2.548$; $p = 0.011$; $\beta = 0.174$). These results confirm that financial education improves well-being while encouraging the adoption of technology, while financial stress reduces well-being but strengthens the use of technology. Financial technology has been proven to play an important role in strengthening individuals' financial well-being.

As for the indirect effects between the independent and dependent variables in this study, they can be explained as follows:

Table 10. Specific Indirect Effects

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Financial Education -> Financial Technology -> Financial Well-Being	0.057	0.061	0.028	2.055	0.040
Financial Stress -> Financial Technology -> Financial Well-Being	0.045	0.048	0.021	2.182	0.030

Based on Table 10, the mediation test results show that Financial Education significantly affects Financial Well-Being through Financial Technology ($t = 2.056$; $p = 0.040$; $\beta = 0.057$). This positive path coefficient indicates that financial education can improve financial well-being with the support of financial technology. Furthermore, Financial Stress also significantly affects Financial Well-Being through Financial Technology ($t = 2.171$; $p = 0.030$; $\beta = 0.045$). These results confirm that even though financial stress has a direct negative impact, financial technology can mediate this relationship so that it still contributes positively to individual financial well-being.

DISCUSSION

The Effect of Financial Education on Financial Well-Being

The results show that Financial Education significantly positively affects Financial Well-Being ($p = 0.000$; $\beta = 0.259$). This finding aligns with previous literature emphasizing financial education's importance in improving financial well-being. Zhang & Chatterjee (2023) found that financial education improves literacy, which positively impacts the financial well-being of people in the United States. Lone & Bhat (2024) also emphasized that financial education strengthens financial self-efficacy, an important factor in improving financial well-being. Research by Zhang & Fan (2024) shows that financial education facilitates using mobile fintech, improving financial well-being. Bhat et al. (2024) support these findings by showing that financial digital literacy expands financial skills and impacts individual well-being. Furthermore, García-Santillán et al. (2025) mention that comprehensive financial education improves healthy financial attitudes and directly influences well-being. Thus, empirical results support the argument that the higher a person's level of financial education, the better their financial well-being.

The Effect of Financial Education on Financial Technology

Hypothesis testing found that Financial Education significantly positively affects Financial Technology ($p = 0.000$; $\beta = 0.328$). This finding is consistent with the literature emphasizing the importance of financial education in encouraging fintech adoption. Heo et al. (2021) state that financial education mediates between financial stress and financial technology, so individuals with financial education are more likely to utilize fintech. Balatif et al. (2024) also found that financial education plays an important role in maximizing the effectiveness of financial technology to support financial well-being. Recent research confirms that individuals with strong financial education and literacy are more confident in using mobile fintech to manage their finances. Financial knowledge improves awareness of financial products and enhances self-efficacy, thereby increasing adoption and effective utilization of mobile fintech applications (Islam & Khan, 2024). Another study by Shankar et al. (2022) shows that low financial literacy and education are major obstacles for the younger generation in utilizing fintech. Zhang & Fan (2024) add that financial education expands individuals' capabilities to understand the risks and benefits of fintech, making it easier to accept. Therefore, empirical results support that financial education significantly encourages fintech adoption.

The Effect of Financial Stress on Financial Well-Being

The test results show that Financial Stress significantly negatively affects Financial Well-Being ($p = 0.022$; $\beta = -0.183$). This finding is consistent with the literature stating that financial stress reduces financial well-being by diminishing individuals' sense of security and control over their finances. Zhang & Chatterjee (2023) confirm that high financial stress causes a significant decline in financial well-being in American society. Balatif et al. (2024) found that financial stress negatively impacts financial well-being in Indonesia, although technology can be a mitigating factor. Recent evidence suggests financial stress undermines individuals' confidence in managing money effectively. For example, self-confidence in financial management has been identified as a key determinant of healthy financial behavior. However, high levels of financial stress can erode this confidence, leading to poorer financial outcomes (Hashmi et al., 2021), studies on low-income households demonstrate that financial stress interacts with self-confidence and locus of control, reducing one's capacity to maintain financial well-being (Mansor et al., 2022; Gunawan et al., 2025). Shankar et al. (2022) reported that young people experiencing financial pressure have higher levels of financial fragility, which impacts their low well-being. She et al. (2022) added that external factors such as inflation and economic changes exacerbate financial stress, ultimately reducing financial well-being. Thus, empirical findings support the theory that financial stress hurts financial well-being.

The Effect of Financial Stress on Financial Technology

The hypothesis test results show that financial stress significantly affects financial technology ($p = 0.000$; $\beta = 0.260$). This means that the higher the financial stress, the greater the individual's inclination to use fintech as a solution. Heo et al., (2021) found that financial stress increases individuals' tendency to use digital services to reduce financial pressure. Balatif et al. (2024) also stated that people with high stress levels are quicker to adopt financial technology than those who do not experience pressure. Recent studies highlight that mobile fintech is an effective coping mechanism for individuals facing financial stress. By providing tools that enable easier financial management and access to resources, mobile fintech helps users implement both problem-focused and emotion-focused coping strategies. Evidence from a stress-coping perspective confirms that individuals adopt mobile financial services to manage transactions and reduce psychological distress associated with financial difficulties (Zhang & Fan, 2024). Shankar et al. (2022) emphasize that young people with high stress levels are more active in using fintech applications for daily expenditure management. Mahdzan et al. (2022) add that low-income households facing financial pressure are likelier to use fintech to improve financial access. Thus, empirical results confirm that financial stress can actually increase fintech adoption.

The Effect of Financial Technology on Financial Well-Being

The study results show that Financial Technology significantly positively affects Financial Well-Being ($p = 0.011$; $\beta = 0.174$). This indicates that the use of fintech expands access to financial services and has an impact on improving financial well-being. Mahdzan et al. (2022) found that using digital financial services improves subjective financial well-being among low-income households in Malaysia. Recent studies highlight that mobile fintech services enable individuals better to manage their savings and expenses under financial pressure, thereby reducing financial stress and enhancing overall well-being (Chen et al., 2025). Zhang & Fan (2024) added that integrating financial literacy with fintech strengthens the positive relationship with financial well-being. Shankar et al. (2022) emphasize that young people with adequate financial literacy benefit more from fintech regarding their financial well-being. Bhat et al. (2024) emphasize that financial digital literacy connects fintech with well-being. Thus, these results support the theory that fintech is a strategic instrument in improving financial well-being.

The Effect of Financial Education on Financial Well-Being through Financial Technology

The mediation test shows that Financial Education significantly positively affects Financial Well-Being through Financial Technology ($p = 0.040$; $\beta = 0.057$). This indicates that financial education encourages the use of fintech, which in turn improves well-being. Heo et al. (2021) confirm that financial education is an important mediator that encourages using fintech to improve well-being. Zhang & Fan (2024) add that financial education expands fintech literacy so individuals can better utilize technology to achieve well-being. Balatif et al. (2024) found that the role of financial education is particularly significant when combined with technology adoption to support well-being. Recent studies confirm that individuals with high financial education are more likely to adopt fintech and achieve greater financial well-being (Kurniasari et al., 2025). García-Santillán et al. (2025) mention that inclusive financial education expands financial capabilities, accelerating the use of technology for well-being. Thus, fintech has been proven to mediate the relationship between financial education and financial well-being.

The Effect of Financial Stress on Financial Well-Being through Financial Technology

The test results show that Financial Stress significantly affects Financial Well-Being through Financial Technology ($p = 0.030$; $\beta = 0.045$). This means that even though financial stress reduces well-being, adopting fintech can reduce this negative impact. Heo et al. (2021) show that fintech becomes an adaptive mechanism for individuals facing financial pressure so that they can still improve their well-being. Balatif et al., (2024) support these results by finding that fintech can moderate the negative effects of financial stress on well-being in Indonesia. Recent studies confirm that mobile fintech helps individuals under financial pressure manage their expenses and savings better, alleviating the negative effects of financial stress (Asif et al., 2023). Mahdzan et al. (2022) found that fintech improves the subjective well-being of low-income households vulnerable to financial stress. Shankar et al. (2022) added that young people experiencing stress prefer fintech applications for financial coping. Thus, fintech mediates the influence of financial stress on financial well-being.

CONCLUSION

This study concludes that financial education positively affects financial technology and financial well-being. In contrast, financial stress has been shown to reduce financial well-being, but encourages the use of fintech as a coping mechanism. In addition, financial technology plays an important role in improving financial well-being while mediating the relationship between financial education and financial stress with well-being. These results confirm that the combination of financial literacy and the use of digital technology is a strategic key to strengthening the financial well-being of society in the digital era. Theoretically, this study enriches the literature on the relationship between financial literacy, financial stress, financial technology, and financial well-being by providing the latest empirical evidence in the context of developing countries. The results confirm the mediation model, which shows that fintech is a transaction instrument that improves financial well-being. This study has implications for financial institutions, regulators, and educational institutions to expand digital-based financial education programs while providing inclusive and accessible fintech services.

This study suggests that governments and financial institutions increase collaboration in providing digital financial education integrated with fintech platforms. In addition, fintech companies are expected to strengthen the literacy aspect in their applications so that users not only access services but also understand the risks and benefits. For the public, the results of this study emphasize the importance of improving financial literacy and utilizing financial technology as an adaptive strategy to reduce the impact of financial stress. This study has limitations, including the use of a cross-sectional design that only captures conditions at a single point in time, making it unable to explain dynamic changes in the long term. Furthermore, the research data were obtained from respondents within a limited scope, so the results may not be fully generalizable to a broader population. The model did not include other variables such as cultural factors, macroeconomic conditions, and individual psychological aspects, even though they could influence financial well-being. Therefore, further research is recommended to use a longitudinal design, expand the cross-country sample, and add other moderators or mediating variables such as financial resilience or digital trust.

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