Multidisciplinary Reviews

REVIEW ARTICLE
Published Online: March 15, 2025
https://doi.org/10.31893/multirev.2025265

Role of financial stress in the financial well-being of small business owners

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Abstract Financial stress adversely impacts well-being by affecting mental and emotional health, decision-making, physical health, relationships, work performance, and long-term planning. It leads to anxiety, poor choices, health issues, strained relationships, reduced productivity, and hindered future planning. Addressing financial stress through financial planning and financial education can improve overall financial well-being. This study investigates how digital financial inclusion (DFI) acts as a mediator between financial vulnerability (FV) and financial wellbeing (FWB) for small business owners in Bangalore, India. The research identifies important factors that cause differences in FV including marital status, education, and business type. Conversely, gender, age, and income have no significant statistical relevance in explaining the differences in FV. The DFI is significantly explained by age, income, and business characteristics, whereas gender, marital status, and education have no significant effect on the DFI. Furthermore, age, income, business type, and nature cause differences in FWB, whereas gender and education do not. The research reveals a significant positive relationship between FV and DFI (0.263), suggesting that higher levels of digital financial inclusion can slightly decrease financial vulnerability slightly. A moderate relationship (0.314) between FWB and FV indicates that enhanced financial well-being results in reduced financial vulnerability. The DFI is also strongly correlated (0.780) with FWB, emphasizing its crucial role in improving financial well-being. DFI plays a significant mediating role between FV and FWB, with a total effect of 0.4872 and an indirect effect of 0.3449. The study emphasizes the significant role of DFI in enhancing the financial stability and prosperity of small business proprietors, with a VAF of 70.79%.

Keywords: financial vulnerability, financial wellbeing, digital financial inclusion, small business owners

1. Introduction

Small enterprises are crucial in promoting economic development, generating employment opportunities, and encouraging creativity, especially in developing countries. Medium businesses, small companies, and corporations form the backbone of the Indian economy. Recent data indicate that small firms are significant contributors to job creation, serving as key drivers of economic growth, national prosperity, and innovation (Tambe & Jain, 2024). In the Indian economy, 96% of industrial units are composed of small companies. These businesses contribute 40% of the nation's overall industrial output and account for 42% of all Indian exports. Small companies also create opportunities in both rural and urban areas, playing a vital role in addressing unemployment. By providing increased employment opportunities, they significantly contribute to improving the nation's job market (Tambe & Jain, 2024). As per information provided by the Ministry of Micro, Small & Medium Enterprises (MSME), by March 2024, there are 4,00,42,875 MSMEs registered on the Udyam portal, which also includes the Udyam Assist Platform (UAP), showing ongoing growth. Among these numbers, 3,93,18,355 constitute microenterprises, accounting for approximately 97.7% of the total amount. Approximately 1.5% of registered entities are small enterprises, totaling 608,935, whereas medium-sized enterprises make up approximately 0.8%, with 55,488 in total (Indian Brand Equity Foundation, 2024). However, many small business owners often face significant financial challenges that threaten the sustainability of their ventures. Obtaining financial support from institutional sources for MSMEs in India is more challenging (Sharma, 2016). As small businesses in India face challenges in obtaining loans from financial institutions or lack information, they mostly depend on short-term financing instead of long-term financing. Because of challenges in obtaining funding from banks, numerous small businesses in India rely on informal sources for financing (Kent Baker et al., 2020). Many SMEs in India face challenges when starting their business because of a high number of regulations and a lack of financial opportunities (Rajamani et al., 2022). Small business owners face significant challenges when they lack financial stability, struggle with unexpected expenses and find reliable financial support. Earnings volatility, loan application difficulties, and fluctuating markets heighten financial risk. These vulnerabilities adversely affect entrepreneurs' ability to manage both personal and business finances, often stemming from issues such as low income, high debt, or inadequate financial literacy (Hoffmann et al., 2020). A

minor financial crisis can worsen for the poor and indebted due to changes in financing sources, spending habits, income patterns, and product choices (Hasler et al., 2022).

Financial inclusion refers to access to financial services for excluded individuals and businesses (Gammage et al., 2017). Digital financial inclusion integrates unbanked individuals into financing via smartphones for essential services (Ozili, 2022). The rise in digital financial inclusion presents a viable way to mitigate financial vulnerability today. Small business owners can now access digital services such as e-payments, mobile banking, and online lending, empowering them with options for payments and loans. This enhances financial stability, which is crucial for individual well-being and societal health. However, as economic pressures increase, individuals face greater demands for managing finances amid the higher costs and complexities of financial products, which also introduce additional risks (Ribar et al., 2020). Financial stress decreases with improved financial position (Ozyuksel, 2022). Financial wellness and mental health are closely interconnected and mutually influential (Hassan et al., 2021). This study investigates how digital financial inclusion affects the financial vulnerability and well-being of small business owners. It aims to show how the use of digital financial tools can enhance stability in the digital economy, providing valuable insights for leaders and entrepreneurs in promoting financial well-being.

2. Review of the Literature

This review examines studies on financial vulnerability, wellness, and digital access, aiming to understand how digital financial tools enhance small businesses' stability and mitigate financial risk through past research synthesis. Small enterprises form India's economic backbone, comprising over 99% of businesses and employing 80% of workers. Small businesses play a crucial role in the Indian economy by providing goods and services to both individuals and companies. The definition of a small business differs depending on the country. In India, a small business is any business that has fewer than 50 employees. However, there are additional elements that can be utilized to determine a small business, including the annual revenue and asset count (Singh, 2023). There are many government schemes for providing financial assistance to micro- and small enterprises in rural and urban areas (Ministry of MSMEs, 2024). Over the years, the MSME sector in India has shown impressive resilience and adaptability, making a significant contribution to the country's GDP (Press Information Bureau, 2024). Small businesses frequently struggle to obtain financing. This is because they are often perceived as being riskier borrowers than large corporations are. Banks and other lenders might hesitate to provide loans to small businesses due to their lack of collateral and established track records compared with those of larger businesses (Singh, 2023). MSMEs face their greatest challenges related to finances. Small businesses frequently face a challenge in accessing adequate funds, and securing affordable loans is still a major obstacle. Numerous MSMEs depend on alternative financing choices because they have restricted access to formal financial institutions. Nonetheless, these substitute sources come at a relatively high cost, leading to reduced profits for MSMEs (Maheshkar, 2021). Accessing financing in a timely manner is crucial for the survival and expansion of MSMEs. Many countries rely on their federal or state governments to play a significant role in providing support for foster MSMEs with different programs and efforts (Rajamani et al., 2022).

The examination of financial vulnerability among households is receiving increased focus, particularly in underdeveloped and developing nations (Singh & Malik, 2022). The majority of previous research on financial vulnerability has focused on absolute metrics. For example, measurements such as debt-to-income, debt-to-asset, and debt-service-to-income ratios are used to evaluate factors such as debt levels, income, and wealth. Studying behavioral and psychological biases is necessary to make measuring financial vulnerability through these measures more meaningful (K. N. Singh & Malik, 2022). Financial vulnerability is commonly described as the condition faced by households or consumers with significant debt compared to their income, particularly in terms of consumer debt and unsecured loans, and/or a restricted capacity to settle debts (Fernández-López, Álvarez-Espiño, Rey-Ares, et al., 2023). There is a growing emphasis on financial vulnerability, as individuals and families face many financial challenges in today's demanding financial environment, with costly consequences for mistakes. The term "vulnerability" refers to a household's capacity to handle risk, unexpected events, and their willingness to take on risks (Lee & Sabri, 2017). Twenty-five percent of households managed to cover unexpected costs by using their saved wealth (Singh & Malik, 2022). Highly financially vulnerable households are those that have suffered from both low income and unemployment. Low income and being unemployed are strongly linked to financial vulnerability and impact households' current financial situation. Low-income households are more likely to struggle with emergencies and pay for their basic living expenses (Lee & Sabri, 2017). Not every aspect of financial literacy has the same effect on reducing financial vulnerability. Governments and financial institutions should encourage individuals to assess their own financial knowledge and skills, as self-perceived financial knowledge is shown to be more significant than objective financial knowledge (Fernández-López, Álvarez-Espiño, & Rey-Ares, 2023). The potential of the FinTech revolution in India could significantly transform the country's financial landscape and elevate its financial sector to a global level of significance (Sreenu & Verma, 2024). Financial inclusion is a recent aspect of financial progress, commonly described as the effort to provide affordable access to basic formal financial services for everyone. In developing countries, governments initially focused on expanding the physical network of financial intermediaries to encourage financial inclusion (Inoue, 2024). As mobile technology continues to grow and spread, there has been a notable focus on financial inclusion through digital devices, known as "digital financial inclusion" (DFI), in developing countries (Inoue, 2024). The aim of digital financial inclusion is to provide financial services through digital platforms, including individuals,

families, businesses, and governments, to reduce poverty, increase financial activity, and help achieve sustainable development objectives. The goal of digital financial inclusion is to offer various digital financial services that enable people to access, transfer, save, and invest funds while also minimizing risk (Ozili, 2022). Banks, nonbank financial institutions, financial technology (Fintech) companies, and technology companies can offer digital financial services (Ozili, 2022). FinTech refers to a modern age of global digital finance, incorporating artificial intelligence and machine learning with big data and utilizing biometric identification along with blockchain technology. Which fintech innovations make the greatest difference for individuals still experiencing financial exclusion? The clearest choice is mobile banking (AFI, 2018). The growth of fintech is closely linked to the advancement of the digital economy (Sreenu & Verma, 2024). This research seeks to identify the factors influencing digital financial inclusion (DFI) and its impact on the ease of conducting business for small enterprises. DFI assists in overcoming challenges in business regulations and managing market externalities. Additionally, predictions from the logistic regression model and marginal effects indicate that internet access, education, and owner experience play crucial roles in the digital financial inclusion of microenterprises (Johri et al., 2024). Progress in digital financial inclusion and higher remittance flows has the potential to alleviate poverty in developing nations (Inoue, 2024).

In light of growing inequality and poverty, there is a renewed focus on wellbeing in popular media and social policy (Bowman et al., 2017). Happiness and well-being are vital to individuals, both overall and within the workplace, and can impact mental and physical health (Fisher, 2014). The health and financial status of businesses are the main sources of stress for businesspeople (Ozyuksel, 2022). Having a higher income has the greatest and most constant effect on financial well-being (West et al., 2020). The economic stability of households relies on both income and socioeconomic conditions, which influence financial capacity and impact economic activity (Voznyak et al., 2022). Financial strain is linked to lower workplace productivity, as shown by increased absence, reduced on-the-job performance, and decreased overall health. These impacts rely heavily on a variety of moderating factors (Chartered Institute of Personnel and Development, 2021). Despite a considerable amount of research on the link between financial vulnerability and financial well-being, there is a lack of exploration of how digital financial inclusion affects this relationship. Furthermore, existing studies have focused mainly on advanced economies, resulting in a limited comprehension of these dynamics in developing economies. Therefore, this study aims at bridging the gap identified by focusing on this topic.

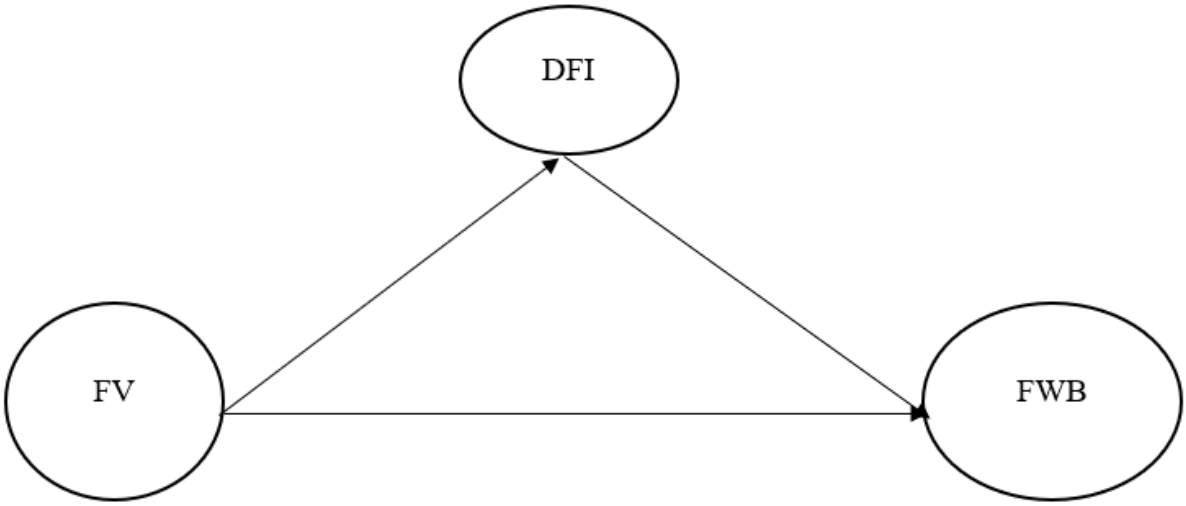

Figure 1 Proposed research model.

3. Research Methods

3.1. Research framework

The study examines financial vulnerability as the independent variable, digital financial inclusion as the mediating variable, and financial wellbeing as the dependent variable for small business owners. As a descriptive study, it evaluates and examines the connection between "financial vulnerability (FV), digital financial inclusion (DFI), and financial wellbeing (FWB)". Additionally, this research investigated how the DFI acts as a mediator in the relationship between FVs and FWB. This research used causal inquiry to gather primary data from small business proprietors in Bangalore, who are the focus of the study. The study was conducted from February 2024 to July 2024 and is cross-sectional in nature. The study was carried out in a natural setting without any involvement from the researchers. Bangalore has been selected as the target population because it is a hub for more than 2.6 lakh MSMEs (Tejaswi & Gurani, 2020). The application of judgmental sampling, a nonprobability sampling method, has been implemented. The interview questions were asked in English, and the researchers interviewed the respondents in English, Kannada, and Tamil, depending on the small business owners' preferred language.

3.2. Sample framework

The research gathered primary information through a structured interview approach, utilizing a survey research method. The sample size is 384 on the basis of the formula developed by Krejcie and Morgan in 1970 (Krejcie & Morgon, 1970). The researchers contacted 654 small business owners and received feedback from 410 of them. A total of 410 responses were received, but only the initial 384 responses with full information were included in the study. Small enterprises refer to slightly larger businesses such as local manufacturers, small-scale service providers, or businesses with a small number of employees.

3.3. Measurement of variables

Financial vulnerability is measured via the definition of (He & Zhou, 2022). Financially vulnerable small business owners face negative financial margins and lack enough liquid assets to handle unexpected expenses. This highlights their financial distress and lack of liquid wealth. Typically, unforeseen expenses arise from expenditures during business emergencies. To consider the ability of small business owners to deal with this shock, business owners with negative financial margins and less liquid assets than unexpected business expenditures are vulnerable (He & Zhou, 2022). Twelve statements are used to measure FV. Digital financial inclusion is measured via dimensions such as access, use, and quality of digital financial products and services (Mapurita & Mayoukou, 2024). A total of fifteen statements on a five-point Likert scale are employed to measure the DFI. Additionally, the 2017 assessment conducted by the Consumer Financial Protection Bureau evaluated financial wellness. The FWB scale includes ten items that evaluate control, resilience in the face of adversity, and achievement of objectives (Consumer Financial Protection Bureau, 2017).

3.3. Analysis of results

The initial research produced acceptable Cronbach's α results for the measures, with scores of 0.924 for financial vulnerability, 0.946 for digital financial inclusion, and 0.921 for financial wellbeing. After these findings were obtained, the primary research was conducted. Normality tests were performed on three variables: financial vulnerability, digital financial inclusion, and financial well-being. Normality was assessed via two tests: the Kolmogorov–Smirnov (K–S) test and the Shapiro–Wilk (S–W) test. With respect to financial vulnerability, a Kolmogorov–Smirnov test reveals a statistic of 0.102 for financial vulnerability, with a significance value of 0.000, indicating a notable deviation from a normal distribution. Similarly, the Shapiro–Wilk test indicated a statistic of 0.951 and a significance value of 0.000, further supporting the idea that the financial vulnerability data are not normally distributed. The K-S statistic is 0.127 for the distribution of digital financial inclusion, with a significance level of 0.000, indicating a significant deviation from normality. Both the Shapiro–Wilk test and the Kolmogorov–Smirnov test indicate a significant deviation from a normal distribution for the variables Financial Vulnerability, Digital Financial Inclusion, and Financial Wellbeing. The Shapiro–Wilk test produced a statistic of 0.935 with a significance value of 0.000, whereas the Kolmogorov–Smirnov test yielded a statistic of 0.124 and a significance value of 0.000, confirming the findings that all the significance levels are below 0.05. This finding indicates that nonparametric statistical tests may be more appropriate for further analysing these variables, as they do not meet the normality assumption required for parametric tests.

The demographic and business characteristics of the participants are provided. A total of 384 participants were surveyed, with their data categorized on the basis of gender, age, marital status, education level, annual income, place of business, and nature of business. The data show an almost equal split between male and female participants, with slightly more males. Males account for 53.6% of the total, whereas females make up 100%. The majority of the participants were aged between 25 and 40 years, accounting for 68% of the study group. This suggests that a respondent group is composed mainly of young to middle-aged individuals, with 94.3% of respondents being 56 years or younger. Most of the participants were in a marital relationship (71.1%), whereas approximately one-third (28.9%) were not married. A total of 57.3% of the participants had a bachelor's degree, whereas 28.9% had a school education. A total of 11.2% of the respondents held a master's degree, whereas only 2.6% noted other qualifications. Most of the participants stated that they earn less than ₹2,00,000 per year (58.9%), whereas 30.5% mentioned earning between ₹2,00,001 and ₹5,00,000 annually. Just 10.7% of participants earn more than ₹5,00,000, indicating that the majority fall within the lower- to middle-income category. There is a fairly even distribution between rural and urban businesses, with slightly more businesses situated in urban areas (51.6%). Trade makes up the majority of represented businesses at 52.1%, with service-based businesses coming in second at 36.5%. Overall, 11.5% is the share of manufacturing businesses, which is the smallest. In short, the survey data include a variety of participants, mainly middle-aged, married people with a college education. A considerable number of individuals in the sample make fewer than ₹2,00,000 a year and work in either trade or service industries, with a nearly equal distribution between rural and urban areas. This information provides an important understanding of the demographic and economic characteristics of the group being surveyed.

Owing to the violation of the normality assumption in Financial Vulnerability, Digital Financial Inclusion, and Financial Wellbeing, nonparametric tests are employed for additional analysis. Differential analysis is used to compare the means of different groups, such as examining financial vulnerability across gender or income levels, via the Mann–Whitney U test (for two groups) and the Kruskal–Wallis H test (for more than two groups). The results are displayed below.

The results of the statistical tests analysing the variations in financial vulnerability across demographic and business factors are displayed in Table 1. Marital status, education, and business type have significant effects on financial vulnerability, whereas gender, age, annual income, and business type do not. These findings could be beneficial for creating strategies or actions to decrease financial vulnerability, especially by prioritizing marital status, education, and the business climate.

Table 1 Variations in financial vulnerability.

Factors	P value	Result
Gender	0.941	No Variance exists
Age	0.262	No Variance exists
Marital status	0.000	Variance exists
Education	0.002	Variance exists
Annual income	0.527	No Variance exists
Type of business	0.157	No Variance exists
Nature of business	0.000	Variance exists

Source: Primary data.

Table 2 displays the p values from tests examining whether there is a statistically significant difference in digital financial inclusion among different factors. Age, annual earnings, type of business, and business characteristics play crucial roles in digital financial inclusion. Nevertheless, there are no significant differences in digital financial inclusion based on gender, marital status, or education. These results suggest that demographic factors such as income and the business environment play crucial roles in the adoption of digital financial services, whereas factors such as gender and education have less impact.

Table 2 Variations in digital financial inclusion.

Factors	P value	Result
Gender	0.819	No Variance exists
Age	0.003	Variance exists
Marital status	0.426	No Variance exists
Education	0.180	No Variance exists
Annual income	0.001	Variance exists
Type of business	0.006	Variance exists
Nature of business	0.002	Variance exists

Source: Primary data

Table 3 displays the results of the statistical analyses investigating whether there are significant differences in financial well-being across various demographic and business-related variables. The findings show that age, annual income, business type, and business nature all significantly differ in terms of financial well-being. Nonetheless, there was no significant difference in financial well-being based on gender, marital status, or education. This shows that economic and business factors have greater effects on financial well-being, whereas demographic factors such as gender and education do not significantly influence financial well-being outcomes.

Table 3 Variations in financial wellbeing.

Factors	P value	Result
Gender	0.841	No Variance exists
Age	0.001	Variance exists
Marital status	0.992	No Variance exists
Education	0.279	No Variance exists
Annual income	0.008	Variance exists
Type of business	0.002	Variance exists
Nature of business	0.007	Variance exists

Source: Primary data

Table 4 displays the findings from Kendall's tau correlation analysis regarding financial vulnerability, digital financial inclusion, and financial well-being. Kendall's tau coefficient is used to evaluate the magnitude and orientation of correlations between variables. A strong and important link exists between financial vulnerability and digital financial inclusion. The correlation coefficient of 0.263 indicates a moderate positive relationship, implying that as people's digital financial inclusion increases, their financial vulnerability tends to decrease slightly, although this relationship is not very strong. There is a noticeable and important relationship between financial vulnerability and financial well-being. A correlation coefficient of 0.314 suggests a moderate positive correlation, indicating that as financial well-being improves, financial vulnerability decreases. The

relationship between digital financial inclusion and financial vulnerability is not as robust as assumed. There is a strong link between digital financial inclusion and financial well-being because they are positively correlated. A strong correlation of 0.780 indicates a solid connection, suggesting that those with greater digital financial access also experience better financial health. This finding indicates that enhancing the utilization of digital financial services is directly linked to enhanced financial stability and security. A modestly positive correlation exists between financial vulnerability and digital financial inclusion as well as financial well-being, with financial well-being showing a slightly greater connection. Digital financial inclusion is closely linked to financial well-being, suggesting that those who are digitally included also have improved financial well-being.

Table 4 Kendall's tau correlations.

	FV	DFI	FWB
Financial Vulnerability (FV)	1		
Digital Financial Inclusion (DFI)	0.263	1	
Financial Wellbeing (FWB)	0.314	0.780	1

Source: Primary data.

The mediation analysis examines how digital financial inclusion mediates the relationship between financial vulnerability and financial wellbeing for small business owners. The study examines how financial vulnerability affects financial well-being and the role of digital financial inclusion in mediating this relationship via the PROCESS model – 4 (Hayes, 2013). Tables 5 and 6 contain the results that show the impact of financial vulnerability on digital financial inclusion.

There is a moderate positive correlation between financial vulnerability and Digital Financial Inclusion. The model accounts for 13.9% of the variation in Digital Financial Inclusion. The F statistic and p value indicate that the model is statistically significant (Table 5).

Table 5 Model summary.

r	r^2	MSE	F	P
0.3729	0.1390	0.7565	61.6804	0.000

Dependent variable: Digital financial inclusion.

The results of a regression model featuring digital financial inclusion as the response variable and financial vulnerability as the predictor variable are shown in Table 6. The model indicates a strong and positive correlation between financial vulnerability and digital financial inclusion. Digital financial inclusion increases by 0.4067 units with every one-unit rise in financial vulnerability. Both the intercept and the independent variable (Financial Vulnerability) have extremely significant p values, indicating that the model effectively accounts for some of the variation in Digital Financial Inclusion. This finding indicates that financially vulnerable individuals might seek out digital financial services, possibly as a strategy to address or mitigate their financial problems.

Table 6 Model.

Particulars	Coefficients	SE	t	P
Constant	1.6559	0.1257	13.1748	0.000
Financial Vulnerability	0.4067	0.0518	7.8537	0.000

Dependent variable: Digital financial inclusion.

The mediating effect of digital financial inclusion is presented in Table 7 and Table 8. A strong correlation exists between the independent variables (financial vulnerability and digital financial inclusion) and financial well-being. The model accounts for 80.41% of the variation in financial well-being, suggesting that it encompasses the majority of the critical factors impacting financial wellbeing. The significance of the model is confirmed by the F statistic and p value, indicating the validity of the regression model (Table 7).

Table 7 Model summary.

r	r^2	MSE	F	P
0.8967	0.8041	0.1757	781.9475	0.000

Dependent variable: Financial well-being.

Table 8 displays the outcomes of a regression model with financial well-being as the dependent variable and financial vulnerability and digital financial inclusion as the independent variables.

Experiencing financial vulnerability strongly influences financial well-being, indicating that individuals dealing with financial vulnerabilities might make choices to sustain or enhance their financial health. Having access to digital financial services significantly enhances financial stability and overall well-being, showing that digital financial inclusion greatly impacts financial well-being more than financial vulnerability. Both variables show significant statistical relevance, indicating that digital

financial inclusion improves financial well-being, with better digital financial access correlating with enhanced financial health and security.

Table 9 highlights the strong relationship between financial vulnerability (FV) and financial well-being (FWB), with a positive effect size of 0.1423. The model indicates that greater financial vulnerability can lead to enhanced financial well-being, suggesting that individuals use effective strategies to navigate financial challenges. The significance of the t value and p value reinforces the reliability of this link, underscoring that those facing financial insecurity can increase their well-being through various coping methods, including digital financial services.

Table 8 Model.

Particulars	Coefficients	SE	t	P
Constant	3.1264	0.0730	23.731	0.008
Financial Vulnerability	0.1423	0.0269	5.2903	0.000
Digital Financial Inclusion	0.8481	0.0247	34.392	0.000

Dependent Variable: Financial Wellbeing

Table 9 Direct effects of FVs on FWB.

Effect	SE	t	P
0.1423	0.0269	5.2903	0.000

Dependent Variable: Financial Wellbeing.

Table 10 shows the relationships among Digital Financial Inclusion (DFI), Financial Vulnerability (FV), and Financial Wellbeing (FWB), indicating a notable impact with a measurement of 0.3449. The standard error effectively reflects the indirect effect, as the confidence interval confirms statistical significance by excluding zero. Enhancing access to digital financial services can improve financial well-being for those experiencing instability, emphasizing the role of digital finance in mitigating financial challenges and fostering stability in vulnerable communities.

Table 10 Indirect effect of DFI on the FV and FWB relations.

Mediator	Effect	SE	BootLLCI	BootULCI
Digital Financial Inclusion	0.3449	0.0384	0.2677	0.4171

Dependent Variable: Financial Wellbeing.

The effect value (0.4872) suggests that a higher DFI positively influences the relationship between FVs and FWB, increasing FWB. The standard error assesses the level of inconsistency or imprecision in the estimation of the effect. A lower standard error implies greater confidence in the estimate. The t statistic value is used to assess the significance of the impact. A t value over 2 (or under -2) usually signifies that the impact is statistically significant. A low p value indicates substantial evidence of the statistically significant effect of the DFI on the relationship between FV and FWB. Bootstrapped confidence intervals indicate the range of the confidence interval for the effect estimate derived from bootstrapping. Both limits being greater than zero provide additional evidence for a statistically significant conclusion. The analysis indicates a significant, positive impact of the DFI on financial well-being, with high confidence in this finding (Table 11).

Table 11 Total effect of DFI on the FV and FWB relations.

Effect	SE	t	P	BootLLCI	BootULCI
0.4872	0.0505	9.6482	0.000	0.3879	0.5864

Dependent Variable: Financial Wellbeing.

Table 12 provides an overview of how digital financial inclusion (DFI) impacts the relationship between FVs and FWB. The DFI has a notable effect on how financial vulnerability relates to financial well-being. The considerable impact of 0.4872 is highlighted by the significant influence, especially in this case, where the indirect impact of 0.3449 highlights the significance of DFI. The research emphasized that a large part of the link between financial vulnerability and financial wellness is due to the existence of digital financial inclusion, as shown by a VAF of 70.79%. Therefore, the DFI is essential in regulating both the FV and FWB. Merging digital finance enhances financial health for those facing insecurities, supporting the strategic use of digital services to increase resilience and well-being.

4. Discussions

This research examines the influence of digital financial inclusion (DFI) on financial well-being (FWB) and financial vulnerability (FV) among small business owners. Significant insights reveal that financial vulnerability varies based on marital status, education, and business type, with gender, age, income, and business nature showing no notable statistical effects. Marriage tends to increase financial obligations, impacting stability and overall financial well-being; higher education enhances financial knowledge, facilitating better money management and stability; and the type of business involved also presents

unique risks affecting financial stability. This underscores the need for tailored strategies from policymakers and financial institutions, particularly in education and industry-specific interventions, to mitigate financial risk. The study also indicates that financial well-being is heavily influenced by age, income, business type, and industry, whereas marital status and education are less significant. The findings that highlight the impact of age on financial wellbeing are validated by the research conducted by Hasler et al (2022). Economic factors such as higher income and specific business engagements greatly contribute to enhanced financial health, suggesting that real financial circumstances play a more crucial role than demographic factors in determining financial well-being.

Table 12 Mediating effect of digital financial inclusion.

Path	Path Value	Remarks
FV → FWB	0.1423	
FV → DFI	0.3729	
DFI → FWB	0.8967	
Direct Effect (DE)	0.1423	
Indirect Effect (IDE)	0.3449	= FV → DFI * DFI → FWB = 0.1390 *0.8481
Total Effect	0.4872	= DE + IDE = 0.1423 + 0.3449
VAF computed	70.79%	= IDE/TE = 0.3449/0.4872 = 70.79

Source: Primary Data.

A slight positive correlation (0.263) exists between FV and DFI, indicating that greater adoption of digital financial services minimally reduces vulnerability, but it is not the sole factor. There is a moderate correlation (0.314) between FVs and FWB, indicating that improved financial stability is correlated with lower financial risk. Notably, a strong correlation (0.780) exists between DFI and FWB, highlighting that improved access to digital financial services significantly promotes better financial management and stability. This research highlights the crucial role of digital financial inclusion (DFI) in bridging the gap between financial vulnerability (FV) and financial wellbeing (FWB). This finding was vouched by the study conducted by Ozili (2022).

The relationship between digital financial inclusion (DFI), financial vulnerability (FV), and financial well-being (FWB) reveals a multifaceted face of contemporary financial ecosystems. DFI and Financial Vulnerability have a slight positive correlation (0.263) which suggests that while digital financial services do contribute to reducing financial vulnerability, their impact is not paramount. This finding aligns with Kamble et al., (2024) who discuss how increased access to digital financial literacy can partially mitigate financial vulnerability. However, financial vulnerability is influenced by numerous other factors such as income level, employment stability, and economic policies, indicating that DFI alone cannot completely bridge the gap. The moderate correlation (0.314) between FVs and FWB underscores the relationship between financial stability and reduced financial risk. Ullah et al. (2024) highlight how good governance and stable macroeconomic conditions foster financial stability, subsequently lowering financial risks. This relationship suggests that as individuals achieve financial stability, their exposure to financial risk diminishes, promoting overall financial well-being. A strong correlation (0.780) between DFI and FWB emphasizes the significant role of digital financial services in enhancing financial management and stability. Ocharive and Iworiso (2024) express how the widespread adoption of digital financial services fosters financial inclusion, which in turn promotes better financial well-being. This strong correlation indicates that DFI plays a critical role in empowering individuals with tools and resources for effective financial management, thereby enhancing their financial well-being.

Thus, the research highlights the critical role of digital financial inclusion in bridging the gap between financial vulnerability and financial well-being. While DFI is a potent catalyst for improving financial well-being, it is not the sole factor in reducing financial vulnerability. A comprehensive approach that encompasses digital literacy, robust governance, and stable macroeconomic conditions is essential for achieving holistic financial health. This integrated approach can help individuals navigate the complexities of modern financial landscapes, ultimately promoting greater financial resilience and stability.

With a total effect of 0.4872, the DFI substantially influences financial well-being, whereas the indirect effect of 0.3449 underscores its importance in mitigating the impacts of financial vulnerability. The value added factor (VAF) of 70.79% indicates that a large part of the relationship between FVs and FWB is affected by the DFI, indicating that it is a vital strategy for tackling financial instability and promoting well-being. These findings are particularly relevant for stakeholders such as policymakers, financial institutions, and small business owners, guiding them in developing targeted initiatives to reduce financial risk and increase wellness.

The analysis reveals significant variations in financial vulnerability tied to marital status, education level, and business type, suggesting that tailored financial education and support programs could benefit distinct demographic groups. This targeting can especially focus on single individuals or vulnerable married couples. Additionally, improving financial literacy among small business owners through education investment can reduce their vulnerability. The study highlights the influence of age, income, and business characteristics on the DFI and financial well-being, indicating that financial institutions should increase access to digital financial services for small businesses, especially those with lower income or unconventional models.

It advocates for expanding digital financial infrastructure in both rural and urban settings to ensure equitable access, ultimately improving the financial outcomes for entrepreneurs. Integrating DFI within broader economic empowerment strategies is essential for enhancing financial security among small business owners.

5. Conclusions

This study explores digital financial inclusion, vulnerability, and well-being. The survey method was applied to collect primary data from small business owners. The outcomes highlight the importance of emphasizing marital status, education, and business type to decrease financial vulnerability, whereas age, income, and business elements are more crucial in improving digital financial inclusion and financial wellbeing. The significant impact of DFI highlights its potential to effectively enhance financial stability and wellbeing for small business owners. It is important for policymakers and financial service providers to focus on digital financial inclusion strategies, particularly for vulnerable groups, to promote stronger financial resilience and overall wellbeing. This study has certain limitations. The research focused on a particular group of small business owners, who may not accurately reflect all business owners across various industries, regions, or income levels. Thus, the results may not be readily applicable to different sets of business owners and larger companies. The research is based on survey data provided by individuals about themselves, which could be influenced by biases. Participants might respond that they think are socially appropriate or struggle to remember past financial actions correctly, possibly causing inaccuracies in the data. Future studies may conduct longitudinal studies to gain deeper insight into the relationships among digital financial inclusion, financial vulnerability, and financial wellbeing across time. Future research could consider incorporating a focus on digital literacy due to potential variations in the proficiency of utilizing digital financial tools among businesses and individuals.

Ethical Considerations

All participants were informed about the purpose of the study, and their consent was obtained before participation. Confidentiality is maintained on participants' data.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this research. This study was conducted without any financial or personal relationships that could potentially bias the interpretation or reporting of the results.

Funding

This research did not receive any financial support.

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