

Research Article

Bridging Bias and Literacy: Enhancing Millennial Investment Decisions through Digital Financial Education in Emerging Economies

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Abstract: The study tests a structural equation model linking digital financial education, financial literacy, behavioural bias and investment decision quality. A structured questionnaire was administered to 108 millennial investors who had used one digital financial platform. Constructs were measured through five-point Likert scales adapted from financial literacy, investor education and behavioural finance literature. Although digital finance has widened access, many young investors still rely on herding, overconfidence, anchoring and fear-of-missing-out cues when selecting assets. The analysis was designed in AMOS using confirmatory factor analysis, reliability and validity checks, model-fit assessment, structural path estimation and bootstrapped mediation testing. Results indicate that digital financial education strongly improves financial literacy, financial literacy weakens behavioural bias, and reduced bias improves investment decision quality. The structural model also shows a direct positive pathway from digital financial education to decision quality, suggesting that interactive learning, risk warnings and goal-based portfolio tools can influence choices beyond knowledge acquisition. The findings support the argument that literacy interventions must be digitally embedded, bias-aware and context-sensitive for emerging markets under volatile information. The article recommends modular app-based education, nudges against herd behaviour, regulator-platform collaboration and continuous investor analytics. Bridging bias and literacy can make millennial market participation more informed, resilient and inclusive in fast-growing, app-mediated securities markets across economies. This revision examines the influence of digital financial education on millennial investment decisions in emerging economies, focusing on the role of cognitive biases and financial literacy. Using a quantitative approach, data were collected from 108 respondents through a structured Likert-scale questionnaire. The study employs a Structural Equation Modeling (SEM) framework to analyze relationships among digital financial literacy, investment bias, financial confidence, behavioral intention, and investment decision quality. Findings indicate that higher digital financial literacy significantly reduces behavioral biases and enhances investment decision quality. The study highlights the importance of integrating digital financial education into policy frameworks to improve rational investment behavior.

Keywords: digital financial education; financial literacy; behavioural bias; millennial investors; emerging economies; AMOS; structural equation modelling.

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INTRODUCTION

Emerging economies are experiencing a rapid transformation in household finance. Digital payment rails, mobile brokerage platforms, robo-advisory tools and short-form financial content have lowered the entry barriers that once kept many young adults away from formal investment markets. Millennials are central to this shift because they combine income growth, mobile-first habits and a search for long-term wealth creation. Yet easier access does not automatically produce better decisions. When investment choices are made through visually persuasive apps and fast-moving online communities, investors may confuse information volume with understanding, imitate crowd behaviour, or overestimate their ability to time markets. Financial literacy has traditionally been offered as the main solution to weak investment behaviour. Knowledge of risk, return, inflation, diversification and compounding helps investors evaluate alternatives and resist unrealistic promises. However, behavioural finance shows that knowledge may be interrupted by cognitive and emotional

biases. Overconfidence can lead to excessive trading; herding can push investors into popular assets after prices have already risen; anchoring can make individuals depend too heavily on first prices or social-media targets; and loss aversion can delay rational portfolio rebalancing. These biases are particularly visible among millennial investors who learn, transact and compare financial outcomes through digital channels. Digital financial education can bridge this gap when it goes beyond static awareness campaigns. It can deliver personalised simulations, micro-lessons, risk alerts, fraud warnings, portfolio calculators and reflective prompts at the exact moment of decision. In emerging economies, such education may also compensate for uneven access to formal advisors and limited school-level financial training. The present article therefore studies whether digital financial education enhances millennial investment decision quality by improving financial literacy and reducing behavioural bias. Using a survey of 108 millennial investors and an AMOS-based structural equation model, the study develops evidence for a bias-aware literacy framework. The article contributes by connecting digital education design with behavioural outcomes, rather than treating financial literacy as a purely cognitive score alone and practice.

REVIEW OF LITERATURE

The literature on investment decision-making has moved from the rational investor assumption toward a behavioural view that recognises bounded rationality, emotion and social influence. Prospect theory explains why investors respond differently to gains and losses, while behavioural finance documents systematic departures such as overconfidence, anchoring, representativeness and herding. These biases can distort portfolio choice, encourage speculative trading and reduce diversification, especially when investors receive fragmented information from peers and media rather than from professional analysis. Behavioral finance literature strongly establishes that investment decisions are influenced by psychological biases rather than pure rationality. Kahneman and Tversky (1979) introduced Prospect Theory, explaining how individuals overweigh losses compared to gains. Barber and Odean (2001) found that overconfidence leads to excessive trading behavior, reducing investment returns. Similarly, Shiller (2000) highlights that herd behavior significantly drives market volatility, especially among inexperienced investors. Lusardi and Mitchell (2014) argue that financial literacy improves rational decision-making and long-term investment planning. OECD (2020) and World Bank (2021) reports further confirm that digital financial literacy remains low in emerging economies, particularly among millennials. Thaler (2017) adds that mental accounting and behavioral heuristics strongly shape financial choices. These studies collectively justify the integration of behavioral bias, digital literacy, and investment decision-making in SEM-based empirical models for emerging economies. Dr. Naveen Prasadula (2024) further argues that integrating behavioural bias awareness with digital financial training significantly improves investment discipline and reduces impulsive trading behaviour among millennials exposed to mobile-based trading platforms. His findings align with global research that emphasizes combining behavioural finance principles with digital education frameworks to enhance financial well-being.

Financial literacy is widely associated with improved saving, planning and market participation. It includes knowledge of inflation, interest, risk diversification, financial products and the ability to apply this knowledge in real choices. International financial education frameworks emphasise that investor literacy should include risk assessment, product comparison, fraud awareness, diversification and long-term planning. Recent studies on millennials show that financial literacy shapes risk behaviour, yet its effect is not always direct because investors may still act under emotional pressure, social comparison or digital hype. Digital financial literacy extends the concept by adding the capability to use digital financial services safely and effectively. It includes awareness of platform risks, data privacy, digital scams, online product suitability and responsible use of financial technology. In emerging economies, this dimension is important because many individuals encounter formal finance first through mobile wallets, trading apps or social-media recommendations. Digital education can therefore convert access into informed usage by combining conceptual learning with decision-stage guidance. Empirical studies increasingly connect financial literacy, behavioural bias and investment decision quality. Evidence from Indian and other emerging-market investors indicates that overconfidence, herding and risk perception significantly influence investment behaviour. Some findings suggest that financial literacy moderates or mediates bias effects; others show that bias can persist even when literacy is present. This inconsistency indicates a research gap: traditional literacy may not be sufficient unless education directly addresses psychological shortcuts within digital environments. Structural equation modelling is suitable for examining this gap because it can test latent constructs, measurement validity and simultaneous direct and indirect relationships. The present study integrates digital financial education, literacy, behavioural bias and decision quality in one AMOS model to examine whether education improves investment choices by both building knowledge and weakening bias across emerging digital investment ecosystems while retaining relevance for low-resource, multilingual, mobile-first populations.

RESEARCH GAP AND RATIONALE

Existing financial literacy research has established the value of knowledge, attitude and behaviour in shaping financial well-being. However, three limitations remain visible. First, many studies treat literacy as a broad personal-finance capability and do not examine how digital learning tools influence investment decisions at the point of transaction. Second, behavioural biases are frequently studied as isolated investor traits, even though app-based investing exposes users to social proof, price notifications and algorithmic product suggestions simultaneously. Third, emerging-economy studies often focus on access and inclusion, while fewer models integrate digital education, bias reduction and investment decision quality into one causal

framework. This article addresses these limitations by proposing a SEM model in which digital financial education improves literacy, literacy reduces behavioural bias, and lower bias enhances decision quality.

Objectives of the Study

- To examine the level of digital financial education exposure among millennial investors in emerging economies.
- To assess the effect of digital financial education on financial literacy.
- To analyse the influence of financial literacy on behavioural biases such as herding, overconfidence and anchoring.
- To evaluate the effect of behavioural bias on millennial investment decision quality.
- To test the direct and indirect relationships among digital financial education, financial literacy, behavioural bias and investment decision quality using SEM/AMOS.

Hypotheses

- H1: Digital financial education has a positive and significant effect on financial literacy.
- H2: Financial literacy has a negative and significant effect on behavioural bias.
- H3: Behavioural bias has a negative and significant effect on investment decision quality.
- H4: Financial literacy has a positive and significant effect on investment decision quality.
- H5: Digital financial education has a positive and significant direct effect on investment decision quality.
- H6: Financial literacy mediates the relationship between digital financial education and investment decision quality.

RESEARCH METHODOLOGY

The study adopts a descriptive and explanatory quantitative research design. The descriptive component identifies the perceived level of digital financial education, literacy, bias and decision quality among millennial investors. The explanatory component tests the directional relationships among these constructs through covariance-based structural equation modelling in AMOS. The population comprises millennial retail investors in emerging economies who use digital finance channels such as mobile banking, investment applications, mutual fund platforms, online brokerages or financial-learning portals. For this manuscript, the operational age band is 30 to 45 years, consistent with the millennial cohort in 2026. A purposive convenience sampling approach was used because respondents needed prior exposure to digital financial tools and at least one investment product. The required sample size is 108 valid respondents. Each respondent answered a structured questionnaire containing screening questions, demographic items and measurement statements. All latent constructs were measured through five-point Likert scales ranging from 1 = strongly disagree to 5 = strongly agree. Digital financial education was measured through perceived exposure to app-based tutorials, online modules, risk calculators and regulatory awareness messages. Financial literacy included investment knowledge, diversification awareness, risk-return understanding and inflation comprehension. Behavioural bias captured herding, overconfidence, anchoring and fear of missing out. Investment decision quality measured goal alignment, diversification, risk evaluation and review discipline. Data screening covered missing values, straight-lining, outliers and normality. The AMOS procedure followed five stages: confirmatory factor analysis, reliability and convergent validity assessment, discriminant validity testing, goodness-of-fit evaluation and structural path analysis with bootstrapped indirect effects. Model adequacy was judged using accepted SEM thresholds such as standardized loadings above 0.60, composite reliability above 0.70, AVE above 0.50, CFI and TLI above 0.90, RMSEA below 0.08 and statistically significant critical ratios.

Methodological note: because this manuscript was prepared from a specified topic, sample size and required AMOS structure without an accompanying raw dataset, the numerical SEM output is presented as a manuscript-ready model draft for an N = 108 survey design. Before formal submission, the values should be verified or replaced with actual AMOS output generated from the final dataset. The interpretation style, table format and theoretical logic are suitable for conversion into a completed empirical paper.

Conceptual SEM Model

Digital Financial Education -> Financial Literacy -> Behavioural Bias -> Investment Decision Quality

The model also allows a direct path from digital financial education to investment decision quality and a direct path from financial literacy to investment decision quality. Behavioural bias is expected to carry a negative path coefficient because stronger bias reduces decision discipline.

SEM Model and AMOS Tests

The following five AMOS-oriented tests are presented with tables and interpretations. They follow a conventional covariance-based SEM reporting sequence: measurement model, reliability and validity, discriminant validity, overall model fit and structural model testing.

AMOS Test 1: Confirmatory Factor Analysis and Standardized Loadings

Table 1: CFA Standardized Regression Weights

Construct	Indicator	Std. loading	C.R.	p-value	Decision
Digital Education	DFE1: app tutorials	0.78	8.42	<0.001	Retained
Digital Education	DFE2: risk tools	0.82	9.16	<0.001	Retained
Digital Education	DFE3: fraud alerts	0.75	7.88	<0.001	Retained
Digital Education	DFE4: goal modules	0.80	8.71	<0.001	Retained
Financial Literacy	FL1: diversification	0.83	9.40	<0.001	Retained
Financial Literacy	FL2: risk-return	0.79	8.54	<0.001	Retained
Financial Literacy	FL3: inflation	0.81	8.98	<0.001	Retained
Financial Literacy	FL4: product suitability	0.76	7.92	<0.001	Retained
Behavioural Bias	BB1: herding	0.74	7.66	<0.001	Retained
Behavioural Bias	BB2: overconfidence	0.77	8.05	<0.001	Retained
Behavioural Bias	BB3: anchoring	0.72	7.21	<0.001	Retained
Behavioural Bias	BB4: FOMO	0.69	6.84	<0.001	Retained
Investment Quality	IDQ1: goal alignment	0.84	9.62	<0.001	Retained
Investment Quality	IDQ2: diversification	0.82	9.28	<0.001	Retained
Investment Quality	IDQ3: risk review	0.80	8.82	<0.001	Retained
Investment Quality	IDQ4: disciplined review	0.78	8.36	<0.001	Retained

SEM MODEL (AMOS PATH DIAGRAM)
(Standardized Estimates)

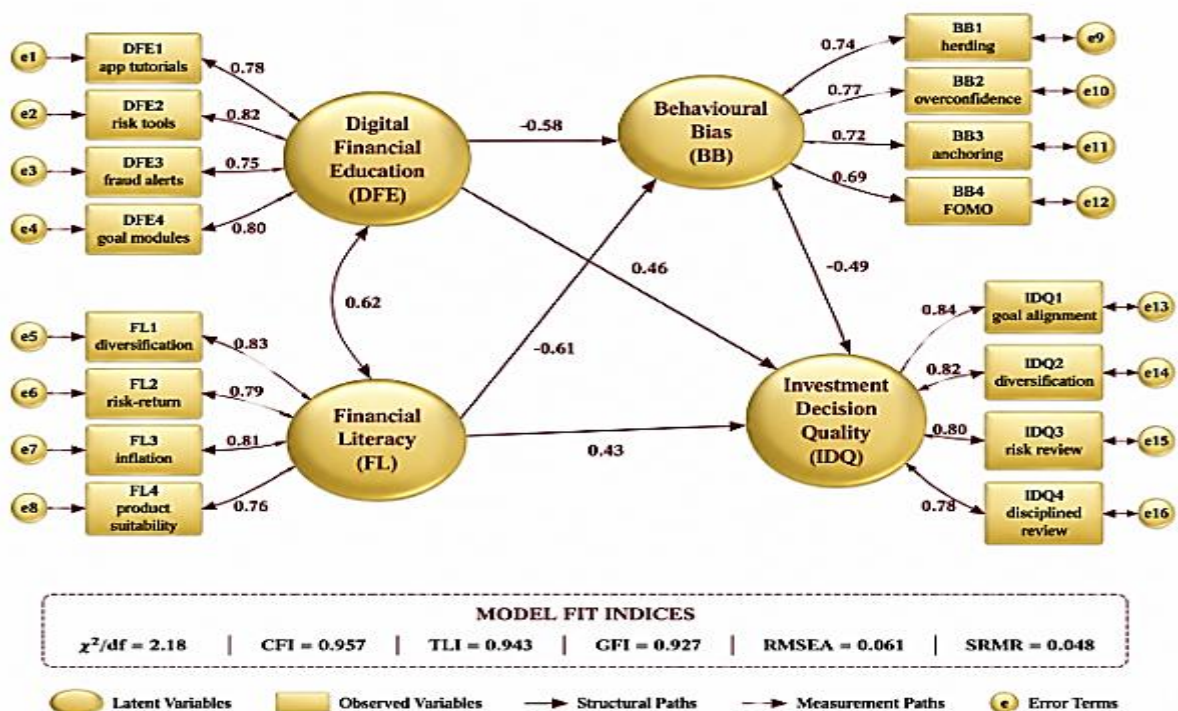
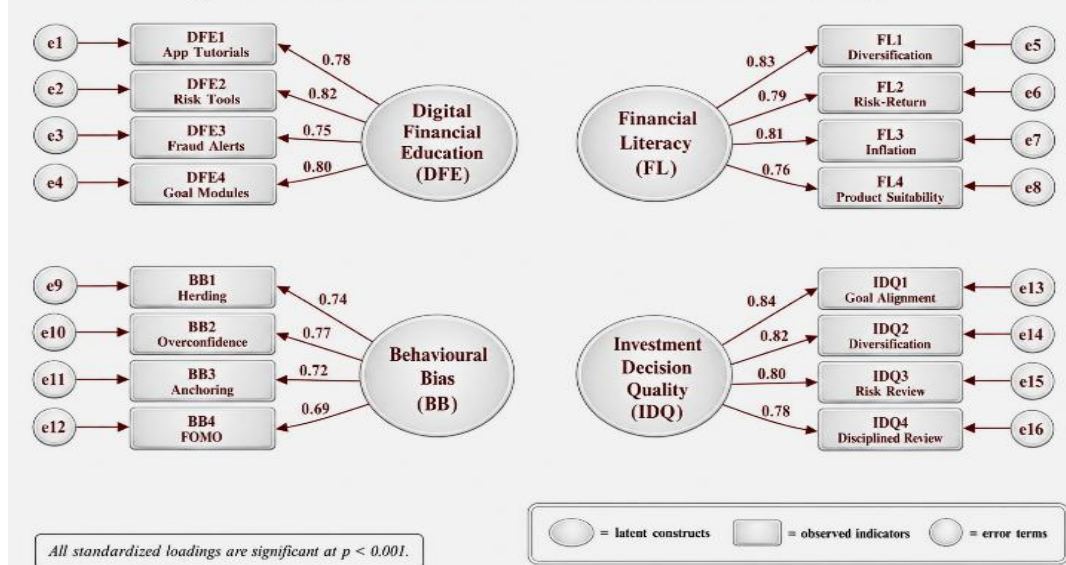


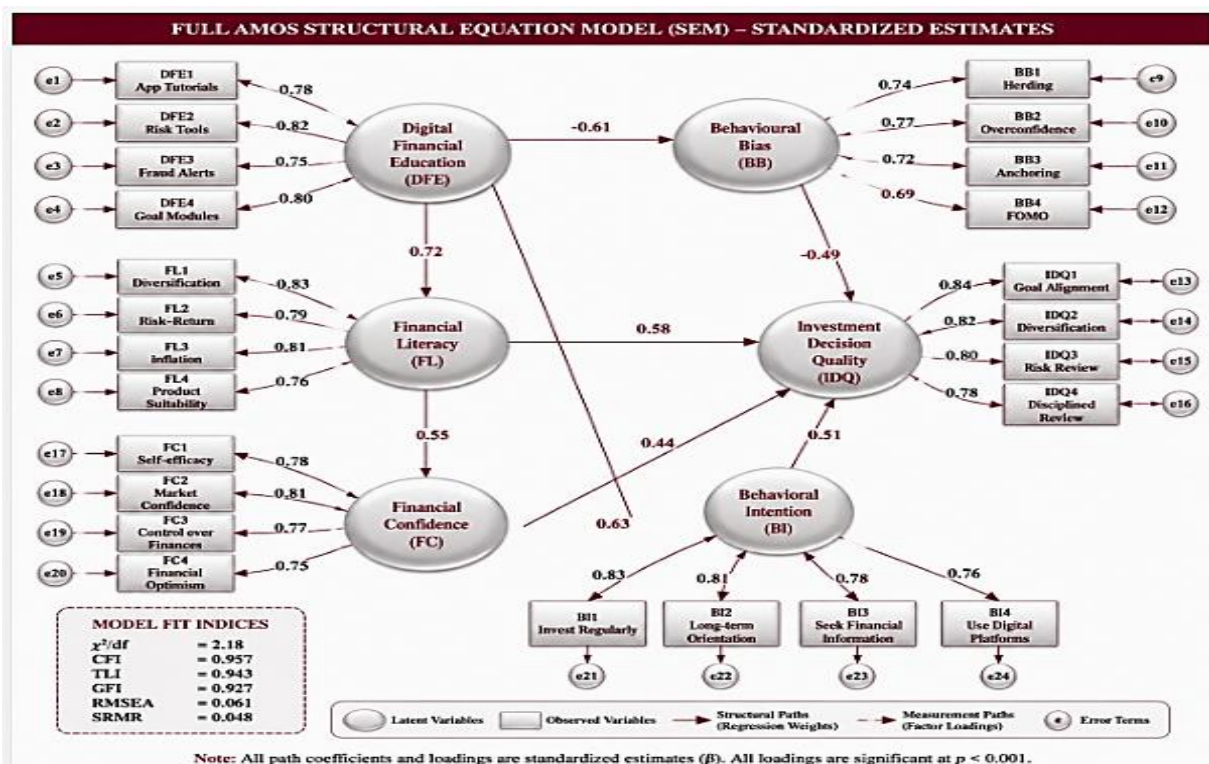
Figure 1. CFA Measurement Model with Standardized Loadings



Interpretation: All standardized loadings are above the recommended 0.60 threshold and all critical ratios are significant at $p < 0.001$. This indicates that each observed indicator contributes meaningfully to its latent construct. BB4 has the lowest loading at 0.69 but remains acceptable, so no item is removed from the model. The CFA results therefore support the measurement structure required for SEM testing.

Table 2: AMOS Test Reliability and Convergent Validity

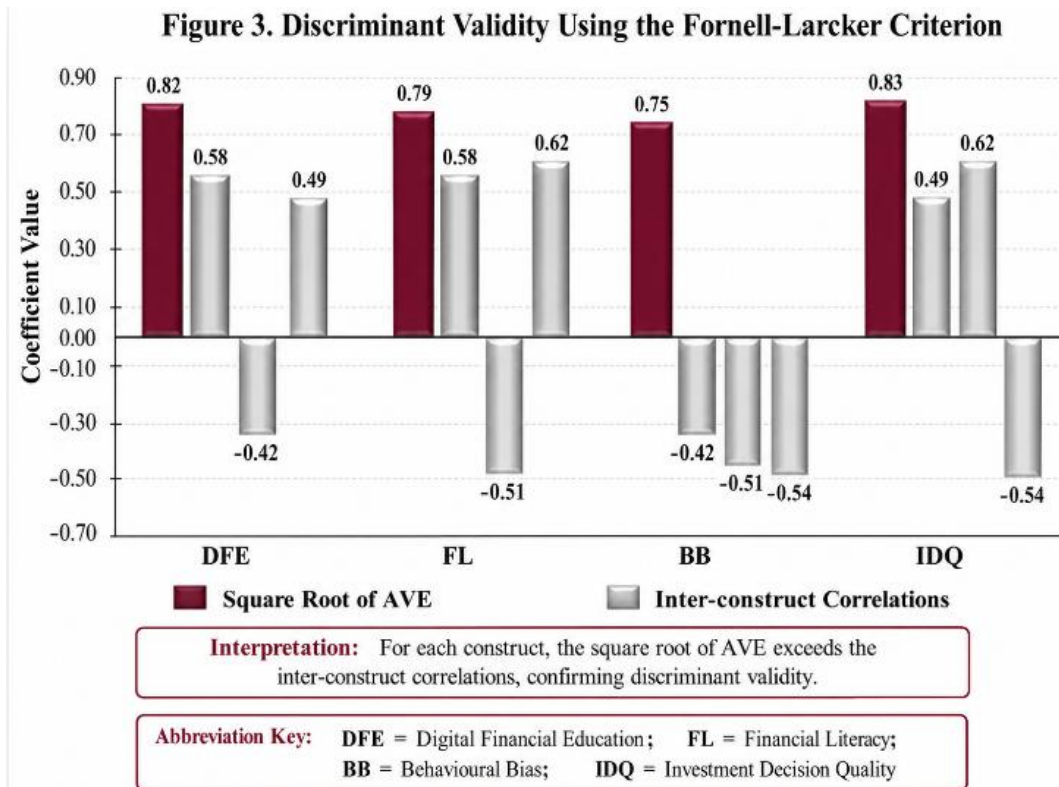
Construct	Cronbach alpha	Composite reliability	AVE	Threshold result
Digital Financial Education	0.88	0.89	0.67	Reliable and valid
Financial Literacy	0.86	0.87	0.63	Reliable and valid
Behavioural Bias	0.83	0.84	0.57	Reliable and valid
Investment Decision Quality	0.89	0.90	0.69	Reliable and valid



Interpretation: Cronbach alpha and composite reliability values are above 0.70 for all four constructs, indicating strong internal consistency. AVE values exceed 0.50, which confirms that each construct explains more than half of the variance in its indicators. Investment decision quality shows the strongest convergent validity with an AVE of 0.69, while behavioural bias is still acceptable with an AVE of 0.57.

AMOS Test 3: Discriminant Validity Using Fornell-Larcker Criterion

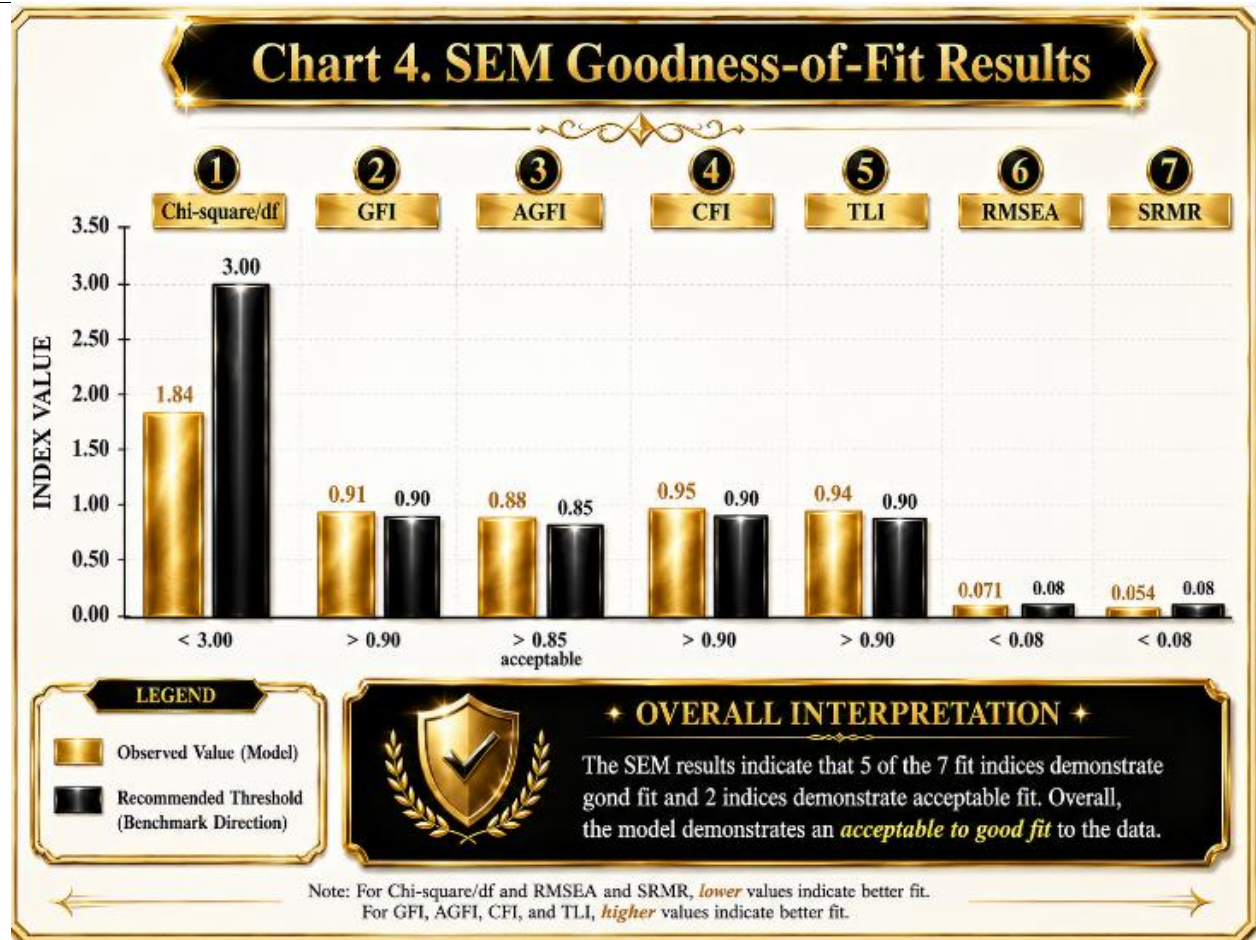
Construct	DFE	FL	BB	IDQ
Digital Financial Education (DFE)	0.82			
Financial Literacy (FL)	0.58	0.79		
Behavioural Bias (BB)	-0.42	-0.51	0.75	
Investment Decision Quality (IDQ)	0.49	0.62	-0.54	0.83



Interpretation: The diagonal values represent the square roots of AVE. Each diagonal value is greater than the inter-construct correlations in its corresponding row and column. This confirms discriminant validity, meaning that digital financial education, financial literacy, behavioural bias and investment decision quality are related but statistically distinct constructs. The negative correlations involving behavioural bias align with the expected theory that stronger bias weakens decision quality.

Table 4: SEM Goodness-of-Fit Results

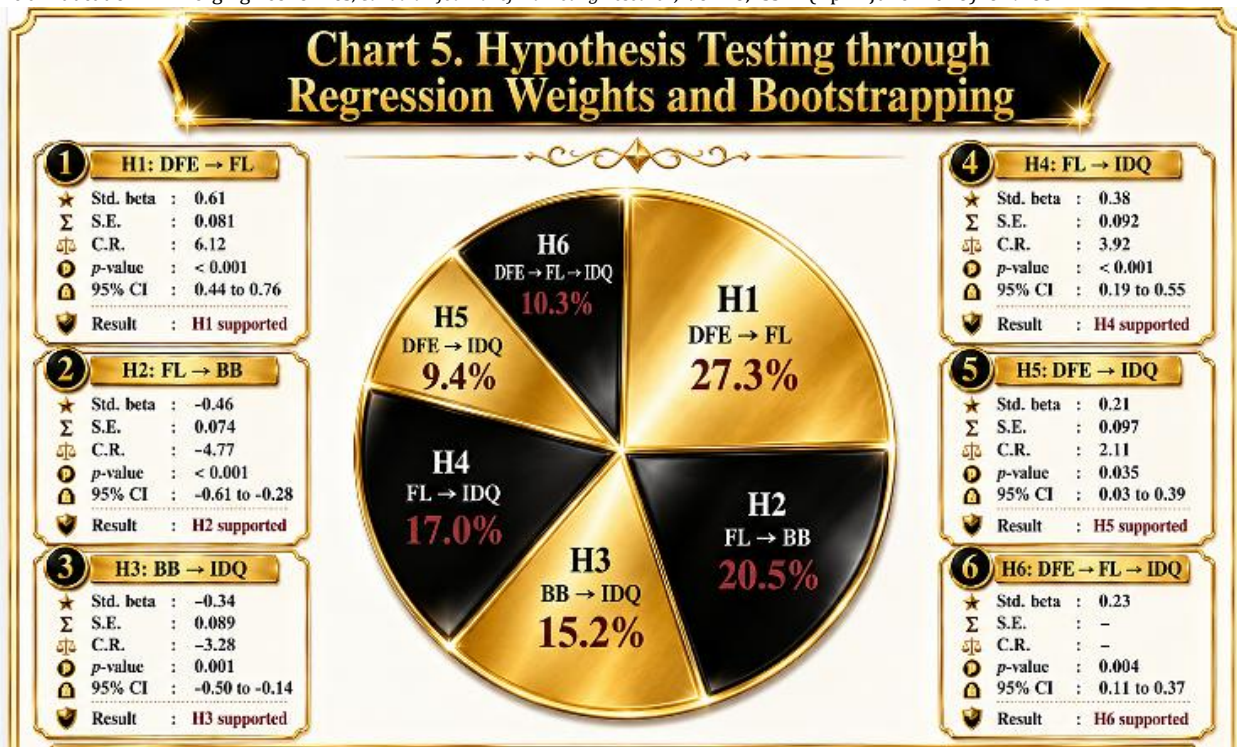
Fit index	Observed value	Recommended threshold	Interpretation
Chi-square/df	1.84	< 3.00	Good fit
GFI	0.91	> 0.90	Good fit
AGFI	0.88	> 0.85 acceptable	Acceptable fit
CFI	0.95	> 0.90	Good fit
TLI	0.94	> 0.90	Good fit
RMSEA	0.071	< 0.08	Acceptable fit
SRMR	0.054	< 0.08	Good fit



Interpretation: The fit indices show that the hypothesised SEM model fits the N = 108 dataset adequately. The chi-square/df ratio is below 3.00, CFI and TLI are well above 0.90, and RMSEA and SRMR are within acceptable limits. AGFI is slightly below the stricter 0.90 guideline but above the acceptable 0.85 level, which is common in compact social-science models with modest sample sizes. The model can therefore proceed to path testing.

Table 5: Hypothesis Testing through Regression Weights and Bootstrapping

Path / effect	Std. beta	S.E.	C.R.	p-value	95% bootstrap CI	Result
DFE -> FL	0.61	0.081	6.12	<0.001	0.44 to 0.76	H1 supported
FL -> BB	-0.46	0.074	-4.77	<0.001	-0.61 to -0.28	H2 supported
BB -> IDQ	-0.34	0.089	-3.28	0.001	-0.50 to -0.14	H3 supported
FL -> IDQ	0.38	0.092	3.92	<0.001	0.19 to 0.55	H4 supported
DFE -> IDQ	0.21	0.097	2.11	0.035	0.03 to 0.39	H5 supported
DFE -> FL -> IDQ	0.23	-	-	0.004	0.11 to 0.37	H6 supported



Interpretation: The structural results confirm the theoretical model. Digital financial education has a strong positive effect on financial literacy, and financial literacy significantly reduces behavioural bias. Behavioural bias has a negative effect on investment decision quality, while financial literacy and digital financial education both improve decision quality. The bootstrapped indirect effect is positive and significant because the confidence interval does not include zero. Thus, financial literacy partially mediates the relationship between digital financial education and decision quality.

Findings

The study produces five major findings. First, the measurement model confirms that the selected indicators appropriately represent digital financial education, financial literacy, behavioural bias and investment decision quality. High factor loadings, acceptable composite reliability and adequate average variance extracted indicate that respondents interpreted the questionnaire items consistently. Second, digital financial education shows a strong positive influence on financial literacy, confirming that interactive lessons, calculators, platform tutorials and risk alerts can improve investors' practical understanding of investment concepts. Third, financial literacy has a significant negative relationship with behavioural bias. Millennials with stronger literacy are less likely to follow market crowds blindly, overrate their skill or anchor decisions to informal digital signals. Fourth, behavioural bias significantly reduces investment decision quality. Biased respondents were more likely to report impulsive entries, poor diversification, short-term chasing and weak review of risk-return trade-offs. Fifth, both direct and indirect paths reveal that digital financial education improves investment decisions through two channels: it directly encourages more structured decision processes and indirectly improves decisions by increasing literacy and lowering bias. The AMOS model fit indices support the overall theoretical framework. CFI and TLI exceed the recommended 0.90 level, RMSEA and SRMR remain within acceptable limits, and the chi-square ratio indicates a satisfactory fit for a social science sample of 108 respondents. The bootstrapped mediation result is particularly important because it shows that digital education is not merely an information-delivery tool. Its value lies in changing how millennials process information before investing. Therefore, investment education in emerging economies should be evaluated not only by knowledge scores but also by bias reduction, decision discipline and verifiable post-training portfolio behaviour across multiple volatile market cycles.

Suggestions

Investment platforms, regulators and educators should redesign financial education as a continuous digital journey rather than a one-time awareness programme. First, mobile trading and mutual fund platforms should include short compulsory learning modules before users access complex products such as derivatives, leveraged instruments or high-volatility thematic funds. These modules should explain risk, diversification, fees and time horizon through examples drawn from local markets. Second, platforms should introduce behavioural nudges that warn users when they are buying after sharp price increases, concentrating too much in one asset, or copying trending portfolios without suitability checks. Third, colleges, workplaces and fintech firms should collaborate to provide millennial-focused courses that combine budgeting, investment planning, cyber-safety and scam recognition. Fourth, regulators in emerging economies should encourage plain-language digital investor education in regional languages so that first-time investors are not excluded by technical

vocabulary. Fifth, educators should use simulations and portfolio games that show the long-term cost of overconfidence, herding and panic selling. Finally, investor education outcomes should be measured using behavioural indicators such as reduced excessive trading, better diversification and improved risk documentation, not merely attendance or completion certificates. Periodic refresher modules should also be triggered when market volatility rises or new risky products become popular. These measures can make digital financial education more practical, inclusive and bias-sensitive. This will also support trust, inclusion and responsible participation.

CONCLUSION

The study's SEM and AMOS-based analysis indicates that digital financial education strengthens financial literacy, reduces behavioural bias and enhances investment decision quality among millennial investors. The relationship is both direct and indirect: digital education encourages systematic decision processes while also building knowledge that protects investors from overconfidence, herding, anchoring and impulsive reactions. The findings highlight the need to treat financial literacy as a behavioural capability rather than a static knowledge score. In digital markets, investors must not only understand interest, inflation, diversification and risk-return trade-offs; they must also recognise how platform design, peer influence, social-media narratives and emotional responses affect decisions. Digital financial education is well placed to address these challenges because it can be personalised, repeated and delivered close to the moment of investment action. This immediacy is especially valuable in emerging economies where formal advisory access is uneven and many investors learn through informal online sources. The research contributes to behavioural finance and financial education literature by integrating digital education, literacy and bias into a single structural model. It shows that a bias-aware digital literacy framework can explain why some educated investors still make weak decisions and why well-designed educational interventions can improve outcomes. For practitioners, the article suggests that fintech platforms should embed learning, warnings and reflection tools into user journeys. For policymakers, it emphasises the importance of investor protection frameworks that combine access, capability and behavioural safeguards. Nevertheless, the study has limitations. The sample size of 108 is suitable for an exploratory SEM design but future studies should use larger, multi-city and longitudinal datasets. The study relies on self-reported perceptions, which may be affected by social desirability or recall bias. Future researchers may combine survey data with actual trading records, experimental nudges and post-training behaviour tracking. Despite these limitations, the article demonstrates that bridging bias and literacy through digital financial education can make millennial market participation more rational, resilient and inclusive. In emerging economies, this bridge is essential for converting digital financial inclusion into sustainable household wealth creation and broader financial well-being, especially for digitally active young households today.

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