Financial Education and Financial Health: The Mediating Role of Financial Knowledge

Van Dinh[1] & Sonya Lutter[2]

Abstract: This study analyzed how financial education impacts financial health, a composite score based on spending, saving, borrowing, and planning behaviors, and how financial knowledge mediates this relationship. Data from the National Financial Capability Study waves of FINRA Foundation in 2015, 2018, and 2021 revealed generally positive financial health among respondents with significant differences in demographic groups. In addition, financial health among groups with or without financial education in the past is significantly different, with higher scores for individuals having financial education. Propensity scores matching analysis further confirmed a positive association between financial education and financial health scores (on average, 0.017 points higher for groups with financial education). Objective and subjective financial knowledge both partially mediated this relationship, respectively, in both traditional and causal mediation analyses. The full regression models, including financial education, financial knowledge, and demographic controls, explained 34 to 37% of the variation in financial health. While individual effects are small, there is practical value in understanding the directional influence of indicators, which also provide guidance on areas to focus on for financial planners, counselors, and educators.

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I. INTRODUCTION

Financial health and well-being are vital for individuals to achieve financial success, withstand economic shocks, and accomplish their goals (Financial Health Network, 2024). Terminology is ever evolving, though the term 'health' typically references quantifiable elements, whereas well-being is typically reserved for subjective elements like feeling good about one's situation. The term "wellness" is the combined quantitative and qualitative piece. Longitudinal research commissioned by the CFP Board uses the definition of "…behaving, thinking, and feeling content and fulfilled with one's financial situation" for financial wellness (Koochel et al., 2023, p. 5).

To improve one's financial situation, it is generally assumed that financial education improves financial knowledge, which then influences one's ability to achieve optimal financial conditions (e.g., Huston, 2010; Warmath & Zimmerman, 2019). Financial literacy grows from the combination of formal education and experiential life moments (Huston, 2010); however, it is less well understood how well education alone impacts financial health or if financial literacy (knowledge plus application, i.e., a person's confidence in applying what they have learned) is the key to financial health. This lack of understanding might inhibit the development of more effective and targeted interventions and financial education strategies to enhance individuals' financial health and wellness. As noted by Fernandes et al. (2014), financial education efforts are expensive and yet explain less than 1% of the variance in financial behavior outcomes.

This study aimed to examine the mediating role of subjective and objective financial knowledge in the relationship between receipt of financial education and one's financial health. Understanding the mediating role of financial knowledge in the relationship between financial education and financial health continues to be important for policymakers, educators, and financial institutions seeking to develop effective financial education strategies that promote financial health, reduce economic disparities, and improve overall financial wellness. With limited resources, the more targeted interventions to improve the human condition can be, the better. The specific research questions include:

1. How is financial education associated with differences in financial health?

2. To what extent does financial knowledge mediate the relationship between financial education and financial health?

II. LITERATURE REVIEW

A. *Financial Health*

Being healthy generally refers to one's actual condition that is free of pain, injury, disease, or another undesirable trait, though financial health terminology is more nuanced (see, for example, the summary by Riitsalu et al., 2024). The World Health Organization (2024) extended the definition of health to include more than the absence of disease to a state in which a person experiences "complete physical, mental, and social well-being" (p. 1). Specific to financial health, researchers tend to measure financial health objectively (e.g., Brevoort et al., 2017; Ksendzova et al., 2017) or with a combination of objective indicators with feelings of financial strain (e.g., Dobbie et al., 2017). The current study used the financial health definition by the Financial Health Network (2024), which measured one's ability to succeed financially, endure shocks, and achieve goals. As noted by Netemeyer et al. (2018), this definition of financial health incorporates more objective elements of how a person is doing financially, which differs from subjective perceptions of how a person is feeling about his or her situation.

B. *Financial Knowledge and Effectiveness of Financial Education*

Financial knowledge is often categorized into two distinct types: objective and subjective. Objective financial knowledge can be measured through tests or assessments to evaluate individuals' level of knowledge based on their correct responses to specific financial questions (Lee et al., 2020). Subjective financial knowledge, on the other hand, reflects how confident people feel about their financial knowledge and decision-making abilities (Alba & Hutchinson, 2000). Subjective financial knowledge is self-perceived and may not always align perfectly with one's objective financial knowledge (Lee et al., 2023).

Both objective and subjective financial knowledge could be a representation of financial literacy since literacy accounts for objective knowledge and the ability to apply the knowledge in practice, though formal financial education, personal financial experience, and parents' financial experience all positively influence young adults' financial knowledge, with individual experience and parental experience helping to reduce the gaps from limited financial education (Tang & Peter, 2015).

The effect of financial education on financial knowledge and behaviors has been a subject of debates among researchers for years. Researchers have found no strong evidence of a positive correlation between formal financial education, financial knowledge, and financial behaviors (Fernandes et al., 2014; Gale & Levine, 2011; Willis, 2008; 2011; 2013). For instance, West et al. (2021) observed that income and age, rather than financial literacy, are stronger predictors of financial well-being among university students - challenging the assumption that financial education alone is sufficient. Similarly, Clark et al. (2025) showed that while short, story-based online programs can temporarily improve knowledge - particularly around risk diversification-they have limited effects on long-term behavior change. Other research emphasizes the multidimensional nature of financial capability, shaped by factors such as behavior, attitudes, socialization, and demographic characteristics (Muat et al., 2024), while Filbeck and Zhao (2023) noted that financial literacy programs effectively improved knowledge and confidence across delivery formats, especially among women during the pandemic.

Other studies have shown that participation in financial education programs is correlated with improved financial literacy levels (Huston, 2010) and impacts healthy and desirable financial behaviors (Gibson et al., 2022; Kaiser et al., 2022; Lusardi & Mitchell, 2014; 2023), leading to better financial outcomes (Burke et al., 2020). However, some studies suggest a more complex relationship. For example, Warmath and Zimmerman (2019) showed slightly different causality where behavior preceded financial knowledge, indicating that individuals learned through personal experience and enhancements in their self-efficacy. This inconsistency suggests a need to examine not just if financial education works, but how and through what mechanism it produces better financial outcomes.

Many studies have focused on specific financial behaviors, such as budgeting, saving, or investing, as intermediate outcomes. For example, Kaiser et al. (2022) found the most robust effects for budgeting and saving behaviors, while other behaviors (e.g., credit or insurance) showed weaker or inconsistent results due to fewer studies or smaller effect sizes. Kim et al. (2023) revealed the nuanced role of investment literacy: subjective literacy and overconfidence increased cryptocurrency investment, while objective literacy reduced it. Similarly, Zhang and Fan (2022) found financial education related to better student loan outcomes, though paradoxically, objective knowledge reduced satisfaction and formal education increased delinquency. Lusardi and Streeter (2023) reinforced that U.S. financial literacy remains low, especially among vulnerable groups, but is linked to retirement planning and debt management. Further, studies highlight that when and how often financial education is delivered matters, early and repeated exposure tends to promote better behaviors (Augustin & Martin, 2023), and parental teaching influences short-term habits while formal education shapes long-term behaviors (Yeh, 2023).

Financial education significantly improves the consistency of students' intertemporal choices, helping to shape better decision-making skills that may contribute to improved long-term financial well-being (Sconti et al., 2024). In a similar study, Fan and Henager (2022) found that while financial knowledge influences behavior and satisfaction, subjective perceptions play a stronger role than objective measures in directly predicting financial well-being. Choung et al. (2023) also found that digital financial literacy, particularly the ability to avoid digital fraud, has a stronger impact on financial well-being than traditional financial knowledge alone. Other studies emphasize the mediating role of financial self-efficacy (Lone & Bhat, 2024) and the importance of financial inclusion alongside digital skills (Kamble et al., 2024) impacting financial well-being.

Prior studies have generally focused on either subjective well-being or isolated financial behaviors such as saving or investing, rather than examining a comprehensive measure of objective financial health. The current study

adds to the literature by evaluating financial health as a composite index including four key financial behavior outcomes (spending, saving, borrowing, and planning), while testing a dual mediation pathway involving both objective and subjective financial knowledge. This could help to understand a more nuanced and theory driven analysis of how financial education can translate into tangible financial behavior outcomes.

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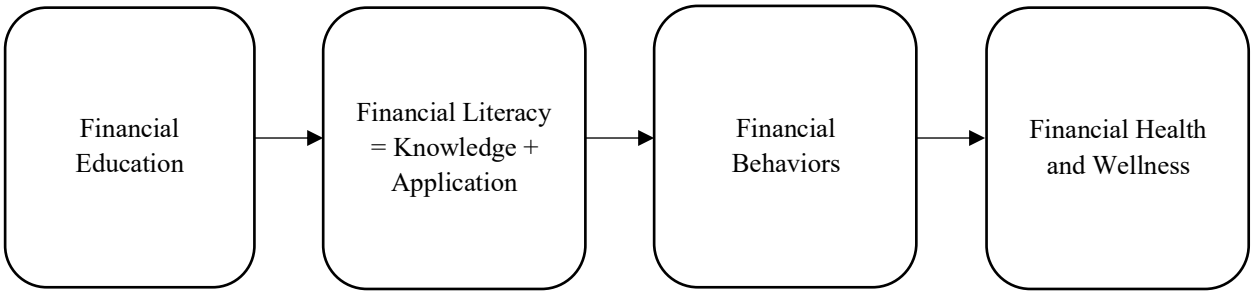

Fig. 1 Conceptual Framework

C. *Conceptual Model*

Conceptually, financial literacy as a critical input, acquired through financial education and experiences, should positively impact financial behaviors and consequently contribute to overall financial health and wellness based on Huston's (2010) framework. In addition, demographic factors such as income, gender, ethnicity, education, age, marital status, and others are hypothesized to influence financial behaviors and well-being. Huston (2015) introduced a financial health model, suggesting that financial literacy is an input in a multi-stage process to achieve financial health, with financial education helping to acquire essential knowledge and skills. Within this framework, various systemic components, in addition to the single input of financial literacy from the production process (financial education), appear to account for variances in financial health status. The current framework (see Figure 1) is an interpretation of Huston's (2010) framework, which is focused on building human capital through personal finance education to modify personal finance behaviors and financial well-being. Here, the framework also shows how financial literacy is the combination of knowledge and application gained, in part, from financial education, which then influences financial behaviors and financial health and wellness, more broadly. Huston's original framework shows other influences, such as cultural/familial, economic conditions, time preference, behavioral biases, etc., impacting both behaviors and well-being.

The current study extends this model by introducing a dual mediation pathway, in which financial knowledge is measured both objectively and subjectively. While Huston (2015) demonstrated that systematic influences and personal characteristics can contribute to financial health, the original model did not distinguish between the two dimensions of financial knowledge as a separate mechanism. By incorporating both the financial knowledge components as parallel mediators, the model adds a more nuanced understanding of how financial education is associated with financial health. Five hypotheses were tested to answer research questions of the association between financial education and financial health and the extent to which objective and subjective financial knowledge mediate the relationship (see Figure 2). Huston's (2010) full framework with financial behaviors was not tested.

H1: Participating in financial education is positively associated with financial health (path c - direct effect).

H2: Financial education is positively associated with objective financial knowledge (path a1).

H3: Financial education is positively associated with subjective financial knowledge (path a2).

H4: Objective financial knowledge and financial education are positively associated with financial health (path c'1).

H5: Subjective financial knowledge and financial education are positively associated with financial health (path c'2).

This dual-mediator model enables a more precise investigation into how and why financial education is associated with financial health outcomes and allows for targeted implications for education design and policy.

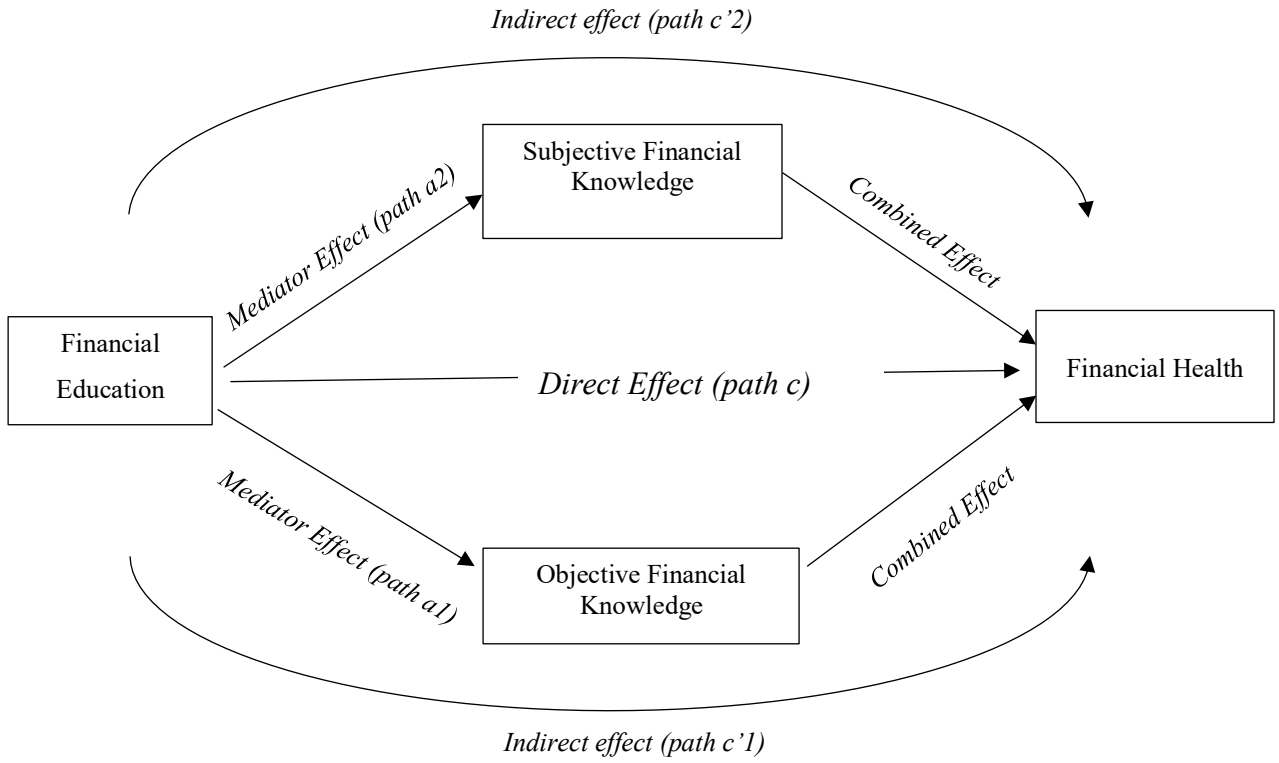

Fig 2 Tested Model

III. METHODS

A. *Data and Sample*

Data were sourced from the National Financial Capability Study (NFCS) State-by-State survey, conducted by the FINRA Investor Education Foundation in 2015, 2018, and 2021. The NFCS State-by-State survey is a comprehensive, nationally representative survey of U.S. adults, offering insights into various aspects of financial capability. In 2021, the State-by-State survey included 27,118 participants, while in 2018, the sample size consisted of 27,091 participants, and in 2015, the sample consisted of 27,564 participants across the U.S. (FINRA, 2021). All analyses apply the national survey weight (wgt_n2) provided by the FINRA Investor Education Foundation. This weight adjusts for age, gender, ethnicity, education, and Census Division within each survey year to align the sample with the U.S. adult population. This approach is consistent with prior studies using pooled NFCS data (Chatterjee & Chang, 2025; Noman et al., 2023; Xiao et al., 2024).

Listwise deletion techniques removed missing data since observed cases represented a random sample of the initially targeted sample. Dropping incomplete responses aligned with the requirements of regression methods for analysis and participants who responded with 'Don't know' or 'Prefer not to say' were excluded. This process aimed to maintain the integrity of the data, as responses from ambivalent participants might introduce noise and uncertainty, and retaining these responses might introduce bias or compromise the reliability of the results (Newman, 2014). Simultaneously, omitting missing values, "Don't know" and "Prefer not to say" answers might create limitations for this research in terms of reducing the representation of diverse responses in the study (Pigott, 2001).

B. *Dependent Variable*

Financial health was quantified based on eight indicators suggested by the Center for Financial Services Innovation (see Parker et al., 2016), belonging to four dimensions: spend, save, borrow, and plan. The items were normalized to a 0-1 scale, averaged within each domain, and then equally weighted to compute a composite financial health score ranging from 0 to 1 (with good reliability with Cronbach's alpha of 0.70). See Appendix 1 for detailed item mapping with NFCS datasets similar to previous study by Dinh and Lutter (2026).

TABLE I

MEAN FINANCIAL HEALTH DIMENSIONS AND TOTAL SCORE ACROSS TIME

Dimension Means	**2015**	**2018**	**2021**
Spend	0.67	0.67	0.69
Save	0.72	0.71	0.69
Borrow	0.64	0.65	0.66
Plan	0.71	0.73	0.75
Total Financial Health	0.68	0.69	0.70

Table 1 shows the means of the four dimensions and total financial health in 2015, 2018, and 2021. Overall, financial health was stable during 2015 and 2018 (0.68 to 0.69), before improving slightly in 2021 (0.70). From 2015 to 2021, spending is stable (0.67 to 0.69), while borrowing improved modestly (0.64 to 0.66). Planning showed the improvement over time from 0.71 to 0.75, suggesting that American long-term financial planning improved across these years. However, saving declined from 0.72 in 2015 to 0.69 in 2021, showing increased financial pressures on household savings during these years.

In addition, the mean total financial health scores for all 50 states and the District of Columbia across three years are presented in Appendix 2. Variations in total financial health existed across states. Colorado (+0.06) and Rhode Island (+0.06) showed the largest improvements from 2015 to 2021. Mississippi (-0.05) and North Dakota (-0.04) showed the largest declines. Hawaii consistently showed the highest financial score across three years, while Mississippi reported the lowest scores. These state level differences showed the geographic variation in financial health scores across the United States and therefore, state of residence was controlled in later regression and mediation analyses.

C. *Financial Education (predictor)*

Financial education was coded as a binary variable based on the past self-reported participation in financial education programs. Participants were asked if financial education was offered by a school or college they attended or a workplace where they were employed. Respondents who reported participation were coded as 1, and those who either did not attend or were not offered a program were coded as 0.

D. *Subjective and Objective Financial Knowledge (mediators)*

Participants were asked to rate their perceived level of financial knowledge on a scale from 1 to 7, where 1 means very low and 7 means very high. Objective financial knowledge was assessed through scores obtained through correct responses to six multiple-choice questions, covering various aspects of financial knowledge (compound interest, inflation, investment assets, and so on), with scores ranging from 0 (no correct answers) to 6 (100% accuracy).

E. *Control Variables*

Demographic variables, including age, gender, ethnicity, education, marital status, income, and employment status, served as control variables, consistent with previous studies (Gibson et al., 2022; Kaiser et al., 2022). Age was recorded into six groups (i.e., 18-24, 25-34, 35-44, 45-54, 55-64, 65 or more); gender was categorized as female or male; race was categorized into two groups (i.e., White non-Hispanic and non-White); education was categorized into three levels (i.e., less than bachelor's degree, bachelor's degree, post-graduate degree); marital status was categorized into five groups (i.e., married, single, separated, divorced, widowed/widower), income was categorized into five groups (i.e., less than $50,000; at least $50,000 but less than $75,000; at least $75,000 but less than $100,000; at least $100,000 but less than $150,000; $150,000 or more); and employment status was categorized into four groups (i.e., work full-time, self-employed, retired, and not employed full-time). The study also controlled the financial health differences in years (2015, 2018, 2021) and state of residence (50 states and District of Columbia).

F. *Financial Education Effects*

In analyzing the association between financial education and financial health across states in 2015, 2018, and 2021, two main statistical techniques were employed: the t-test and propensity score matching (PSM). The t-test was utilized to compare the financial health of individuals who had received financial education in high schools, colleges, and workplaces against those without formal financial education. This test evaluated whether these two groups have a statistically significant difference in average financial health. A significant result from the t-test would suggest that financial education is significantly associated with individual financial health, providing insights into the policy's impact.

To improve the robustness of the findings, Propensity Score Matching (PSM) was used to address potential selection bias in estimating the effect of financial education on financial health. In observational data where random assignment is not possible, confounding variables may influence both treatment selection and outcomes. PSM mitigates this issue by matching individuals who received financial education with similar individuals who did not, based on a set of covariates. Specifically, logistic regression was used to estimate propensity scores for receiving financial education based on covariates such as age, gender, ethnicity, education, marital status, income, employment status, survey year, and state of residence. These covariates were found to influence participation in financial education programs in previous studies (e.g., Kaiser et al., 2022; Xiao et al., 2024). Based on the propensity score, individuals who had financial education in the past and individuals without financial education are matched. The balance of covariates between the treated (with financial education) and control (without financial education) groups was compared to the outcomes of interest (i.e., financial health).

G. *Mediating Role of Financial Knowledge*

To examine how financial knowledge mediates the relationship between financial education and financial health, a traditional mediation analysis was conducted following the approach outlined by Baron and Kenny (1986) and utilized by previous researchers (Chen et al., 2022; Xiao & Porto, 2017). This method typically employs regression models to capture the direct effect of treatment or intervention on an outcome while accounting for the mediator's influence. Here, to examine the mediating role of financial knowledge (operationalized with both subjective and objective financial knowledge) in the relationship between financial education and financial health (See Figure 2), three regression models were used as follows:

Model 1: Financial Health = f (Financial Education, Control Variables)

Model 2: Subjective/Objective Financial Knowledge = f (Financial Education, Control Variables)

Model 3: Financial Health = f (Financial Education, Subjective/Objective Financial Knowledge, Control Variables)

To further analyze the underlying effect of financial education, causal mediation analysis was employed. This framework estimates both direct and indirect effects, confirming whether financial knowledge serves as a pathway through which financial education impacts financial health. Specifically, the analysis considers potential outcomes such as $Y[1, M(0)]$ and $Y[0, M(1)]$, hypothetical contexts that represent counterfactual outcomes had the mediator been at its untreated or treated state, respectively. While these cross-world outcomes are unobservable in practice, the decomposition of total effects into direct and indirect components provides a powerful method for evaluating mediation in non-experimental data. The essence of this approach was to explore what would happen to financial health if

financial education, treatment, or intervention (denoted as $T \in \{0,1\}$) had been applied to individuals, as opposed to what would have happened if it had not been used.

IV. RESULTS

A. *Descriptive Data*

All descriptive statistics are unweighted in Table 2. Participants reported a high average financial health score of 0.70 on a scale of 0 to 1 (see Table 2). Of the 60,515 participants, 24% had financial education in the past. Subjective financial knowledge among participants was, on average, 5.26 on a scale of 1-7, while objective financial knowledge averaged a score of 2.65 on a scale of 0-6.

The age distribution was even, with 21% aged 65 and above, 19% aged 55-64, and smaller percentages in younger age groups. The gender composition was more male (53%) than female (47%) and 75% identified as White non-Hispanic, and 25% as non-White. Half of the sample had less than a bachelor's degree (62%), 25% held a bachelor's degree, and 14% possessed more advanced education. In terms of marital status, 55% were married, 27% were single, with the other category (separated, divorced, widowed) being at 17%. Income distribution indicated that 44% earned less than $50,000 annually, while 8% had incomes of $150,000 or more. Employment status showed that 42% were working full-time, 8% were self-employed, 23% were retired, and 28% were recoded into the not employed full-time group (which included homemakers, disabled persons, students, part-time employees, or unemployed). The sample was evenly distributed across the years 2015 (35%), 2018 (32%), and 2021 (33%), with participants residing in 50 states and Washington, District of Columbia.

TABLE II

SUMMARY OF STATISTICS (N = 60,515)

Variable	**Frequency**	**Std. Dev.**	**Min**	**Max**
Financial Health	0.70	0.24	0	1
Financial Education				
Not Received Financial Education	0.76	0.43	0	1
Received Financial Education	0.24	0.43	0	1
Subjective Financial Knowledge				
1 Very Low	0.01	0.12	0	1
2	0.01	0.12	0	1
3	0.05	0.21	0	1
4	0.14	0.35	0	1
5	0.33	0.47	0	1
6	0.29	0.45	0	1
7 Very High	0.16	0.36	0	1
Objective Financial Knowledge				
0 None correct	0.08	0.27	0	1
1	0.15	0.36	0	1
2	0.22	0.42	0	1
3	0.24	0.43	0	1
4	0.20	0.40	0	1
5	0.10	0.30	0	1

6 All correct	0.00	0.05	0	1
Age				
18-24	0.08	0.27	0	1
25-34	0.17	0.38	0	1
35-44	0.17	0.38	0	1
45-54	0.18	0.38	0	1
55-64	0.19	0.39	0	1
65+	0.21	0.41	0	1
Gender				
Female	0.47	0.50	0	1
Male	0.53	0.50	0	1
Ethnicity				
White non-Hispanic	0.75	0.43	0	1
Non-White	0.25	0.43	0	1
Education				
Less than bachelor	0.62	0.49	0	1
Bachelor's degree	0.25	0.43	0	1
More than bachelor	0.14	0.35	0	1
Marital status[3]				
Married	0.55	0.50	0	1
Single	0.27	0.45	0	1
Other (Separated, divorced, widowed)	0.17	0.38	0	1
Income				
Less than $50,000	0.44	0.50	0	1
At least $50,000 but less than $75,000	0.20	0.40	0	1
At least $75,000 but less than $100,000	0.15	0.35	0	1
At least $100,000 but less than $150,000	0.14	0.35	0	1
$150,000 or more	0.08	0.27	0	1
Employment status				
Working full-time for an employer	0.42	0.49	0	1
Self-employed	0.08	0.26	0	1
Not employed full-time[4]	0.28	0.45	0	1
Retired	0.23	0.42	0	1
Year				
2015	0.35	0.48	0	1
2018	0.32	0.47	0	1
2021	0.33	0.47	0	1

Note. Descriptive statistics are unweighted. Survey weights are applied in all regression and mediation analyses.

B. *Financial Education Effects Analysis*

In analyzing the effects of financial education on financial health across states in 2015, 2018, and 2021, two main statistical techniques were employed: a survey-weighted group comparison and propensity score matching (PSM). The results consistently showed that individuals who received financial education reported higher financial health scores compared to those who did not. A mean comparison revealed a statistically significant difference of 0.04 points in financial health scores between the two groups. Propensity score matching (PSM) further confirmed this association, with

[3] Dichotomized marital status groups (married versus not married) were also tested with no meaningful changes to the results.
[4] Includes students, homemakers, part-time employees, disabled persons, and unemployed individuals.

both the average treatment effect (ATE) and the average treatment effect on the treated (ATET) showing a 0.017 point higher financial health score for those who received financial education, even after controlling for demographic and socioeconomic variables.

TABLE III

GROUP MEAN COMPARISON OF FINANCIAL HEALTH SCORES

Group	N	Weighted Mean	Std. Error	95% CI [Lower, Upper]
No Treatment	45,794	0.671	0.0013	[0.668, 0.673]
Treatment	14,721	0.708	0.0022	[0.704, 0.712]
Combined	60,515	0.679	0.0012	[0.677, 0.682]
Difference		-0.037	0.0026	[-0.042, -0.032]

Note. N = number of observations; CI = Confidence Interval.

Specifically, Table 3 shows a survey-weighted mean comparison of the financial health of individuals who had not received financial education (no treatment) and those with financial education from high school, college, or the workplace (treatment). The results indicate a statistically significant difference between the two groups, ($F(1, 60514) = 208.08$, $p < .001$). Participants in the treatment group ($M = 0.708$, $SE = 0.002$) have significantly higher financial health than those in the no treatment group ($M = 0.671$, $SE = 0.001$) with a mean difference of -0.04 (95% *CI* [-0.042, -0.032]).

To further review the results and draw a potential causal relationship, the effect of financial education on financial health scores utilized propensity score matching (see Table 4). The analysis included 60,515 participants, with one-to-one matching based on the propensity score (see Table 6). The Average Treatment Effect (ATE) was significant, with a coefficient of 0.017 ($z = 6.72$, $p < .001$). On average, individuals having financial education had financial health scores that were 0.017 points higher than those without financial education, controlling for age, gender, ethnicity, education, marital status, income, employment status, survey year, and state of residence. The 95% confidence interval for the ATE ranged from 0.012 to 0.022.

The Average Treatment Effect on the Treated (ATET) was also analyzed and found to be statistically significant, with a coefficient of 0.017 ($z = 6.51$, $p < .001$). This indicated that, on average, treated individuals (those with financial education) had financial health scores that were 0.017 points higher than those without financial education. The ATET focuses on the effect for those who received the treatment (had financial education in the past), while the ATE provides an average effect across the entire sample, including both treated and untreated individuals. The 95% confidence interval for the effect ranged from 0.012 to 0.022, confirming a positive impact of financial education on financial health.

Post-matching covariate balance was assessed using standardized mean differences (SMDs), following recommendations from Shipman, Swanquist, and Whited (2017). An SMD below 0.10 was used as the threshold for acceptable balance. The matching procedure demonstrated strong post-matching balance across covariates, with a mean standardized bias of 1.2%, Rubin's $B = 3.9$, and Rubin's $R = 1.02$. In addition, only five observations fell outside the region of common support and were excluded from the matched sample. Propensity-score matching analysis produced approximately 14,716 matched treated observations and 14,716 matched control observations (29,432 total matched observations). The matched observations are applied in the mediation analysis to improve consistency between the mediation and treatment-effect analyses (see Appendix 3).

TABLE IV

PROPENSITY-SCORE MATCHING ESTIMATION OF TREATMENT EFFECTS ON FINANCIAL HEALTH

Method	Variable	Coefficient	Std. Error	Z	p-value	95% CI [Lower, Upper]
Propensity-Score Matching (ATE)	Treated (1 vs 0)	0.017	0.0025	6.72	0.000	[0.012,0.02 2]
Propensity-Score Matching (ATET)	Treated (1 vs 0)	0.017	0.0026	6.51	0.000	[0.012, 0.022]

Note. Full sample N = 60,515; Matched sample N = 29, 432 after applying common support restrictions. Estimator: propensity-score matching with one-to-one matching and 0.05 caliper scale. Treatment model: logit. Outcome model: matching. Controlled for age, gender, ethnicity, education, marital status, income, employment status, survey year, and state of residence.

C. *Mediating Role of Financial Knowledge*

Both traditional and causal mediation analyses showed that objective and subjective financial knowledge mediated the relationship between financial education and financial health. Specifically, Table 5 shows the results from traditional mediation analysis. Financial education was significantly and directly associated with financial health (path c, $b = 0.021$, $p < .001$), consistent with the results with propensity score matching in the previous part. When objective financial knowledge was considered as a mediator, financial education significantly enhanced objective financial knowledge (path a1, $b = 0.405$, $p < .001$). In addition, financial education retained a positive effect on financial health (path c'1, $b = 0.015$, $p < .001$) with objective financial knowledge as a mediator in the model. This indicated a partial mediation in the relationship.

For subjective financial knowledge as a mediator, financial education was significantly associated with subjective financial knowledge (path a2, $b = 0.602$, $p < .001$). Subjective financial knowledge, in turn, was positively associated with financial health (path c'2, $b = 0.032$, $p < .001$). After accounting for subjective financial knowledge, the direct effect of financial education on financial health remained small but significant ($b = 0.008$, $p = .002$), indicating partial mediation. This suggested that the impact of financial education on financial health is partially mediated through subjective financial knowledge.

The regression models controlled for covariates including age, gender, ethnicity, education, marital status, income, employment status, survey year, and state of residence. These covariates were significant across different models, confirming their important roles in the relationship between financial education, financial knowledge, and financial health. For example, those who are older, married, higher educated, have higher income, and work full-time have higher financial health. State of residence was not significantly associated with financial health. Sobel's tests confirmed the mediation findings, showing that both objective financial knowledge ($z = 12.402$, $p < .001$) and subjective financial knowledge ($z = 17.180$, $p < .001$) were significant mediators in the relationship between financial education and financial health.

TABLE V

TRADITIONAL MEDIATION ANALYSIS (N = 29,432)

Regression models		**Direct Effect**	**Objective Knowledge as Mediator**		**Subjective Knowledge as Mediator**	
Dependent Variables		**Financial Health - Path c**	**Objective Knowledge - Path a1**	**Financial Health - Path c'1**	**Subjective Knowledge - Path a2**	**Financial Health - Path c'2**
Financial Education		0.021***	0.405***	0.015***	0.602***	0.008**
Objective Knowledge				0.021***		
Subjective Knowledge						0.032***
Age	25-34	-0.039***	-0.187***	-0.036***	0.174***	-0.042***
	35-44	-0.049***	0.048	-0.050***	0.111*	-0.051***
	45-54	-0.027***	0.489***	-0.035***	0.013	-0.027***
	55-64	0.037***	0.794***	0.025***	0.283***	0.031***
	65+	0.085***	0.930***	0.071***	0.514***	0.074***
Gender	Male	-0.005*	-0.670***	0.005	-0.436***	0.003
Ethnicity	Non-White	-0.014***	-0.289***	-0.010***	0.055*	-0.015***
Education	Bachelor's	0.057***	0.757***	0.046***	0.112***	0.055***
	> Bachelor’s	0.054***	0.847***	0.042***	0.241***	0.049***
Marital status	Single	-0.022***	-0.010	-0.021***	-0.133***	-0.019***
	Other	-0.060***	-0.025	-0.060***	-0.047	-0.058***
Income	$50-74,999	0.119***	0.352***	0.113***	0.287***	0.112***
	$75-99,999	0.156***	0.308***	0.151***	0.581***	0.144***
	$100-149,999	0.190***	0.661***	0.181***	0.605***	0.178***
	$150,000+	0.221***	0.865***	0.209***	0.839***	0.205***
Employment	Self-employed	-0.043***	0.024	-0.044***	0.341***	-0.049***
	Not employed	-0.070***	-0.038	-0.070***	-0.181***	-0.066***
	Retired	0.011***	0.138**	0.009*	0.190***	0.008
Year	2018	-0.006*	-0.188***	-0.004	-0.145***	-0.003
	2021	0.005	-0.346***	0.010***	-0.251***	0.010***
State		-0.000	-0.000	-0.000	-0.000	-0.000
	Constant	0.614***		0.567***		0.451***
	R-squared	0.342		0.354		0.366

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Reference categories were age of 18-24, female gender, White non-Hispanic race/ethnicity, less than bachelor’s education, married marital status, income of less than $50,000, employed full-time status, 2015-year reference, and state of residence was included as a categorical variable to control for state of residence only - not all states are shown on the table (Alabama is the base state). Beta (b) is unstandardized coefficient for OLS models (paths c, c'1, c'2) and log-odds for ordered logistic regression models (paths a1, a2).

The causal mediation analysis results showed that financial education had significant indirect and direct associations with financial health through objective financial knowledge (see Table 6). The Natural Indirect Effect (NIE) showed that financial education was positively associated with financial health through higher objective financial knowledge ($b = 0.006$, $p < .001$). This indicated that part of the association between financial education and financial health operated through higher levels of objective financial knowledge. The Natural Direct Effect (NDE) of the relationship between financial education and financial health remained significant ($b = 0.015$, $p < .001$), suggesting that financial education remained positively associated with financial health. The Total Effect (TE) of financial education on financial health was significant as well ($b = 0.021$, $p < .001$), highlighting the overall positive association between financial education and financial health.

For subjective financial knowledge as a mediator, the analysis also showed significant indirect and direct association between financial education and financial health. The Natural Indirect Effect (NIE) demonstrated that financial education was positively associated with financial health through higher subjective financial knowledge ($b = 0.011$, $p < .001$). This suggested that part of the relationship between financial education and financial health was mediated through individuals' subjective perceptions of their financial knowledge. Furthermore, the Natural Direct Effect (NDE) of financial education on financial health was significant ($b = 0.010$, $p < .001$), indicating that financial education remained positively associated with financial health. The Total Effect (TE) highlights the overall positive association between financial education and financial health ($b = 0.021$, $p < .001$).

This analysis showed that both objective and subjective financial knowledge mediated the relationship between financial education and financial health. Baseline mediation models were first estimated without covariates and then re-estimated including covariates such as age, gender, ethnicity, education, marital status, income, employment, survey year, and state of residence. Models using robust standard errors, bootstrapped with 1,000 replications still obtained similar results. This consistency supports the association between financial education and financial health through the mediating roles of both subjective and objective financial knowledge.

V. DISCUSSION

The findings of this study align with existing literature, showing significant mediating effects of financial literacy on the relationship between financial education and financial health (Gibson et al., 2022; Lusardi & Mitchell, 2014). Specifically, propensity score matching analysis suggested that individuals having received financial education had significantly higher financial health indices compared to those who did not have financial education in high school, college, or the workplace. This result aligns with the work of Burke, Collins, and Urban (2023), who found that state-mandated financial education positively influences financial behaviors and financial well-being, but contrasts with the findings by Fernandes et al. (2014), who reported that financial education has a limited long-term impact on financial behaviors. This discrepancy might be due to differences in financial education program implementations and variations in the methodological approaches of the studies.

The traditional mediation analysis demonstrated that both objective and subjective financial knowledge serve as mediators in the relationship between financial education and financial health. The ability to distinguish content knowledge is important in predicting financial behavior and health, as other researchers have noted (e.g., Fernandes et al., 2014), yet perceived ability to act on that knowledge needs to be an equal, if not greater, focus of educational programs to have a more significant impact on financial health. The current results confirmed that financial education enhances both objective and subjective financial knowledge, which positively influences financial health. This dual pathway highlights the impact of financial education programs, suggesting that these programs are effective not only in imparting concrete financial skills and knowledge but also in boosting individual perceptions of their financial decision-making abilities.

TABLE VI

CAUSAL MEDIATION ANALYSIS WITH COVARIATES (N = 29,432)

Financial Health	Coefficient (b)	Robust SE	z	p-value	95% Conf. Interval	
Objective Knowledge as a Mediator						
NIE						
Financial Education (1 vs 0)	0.006	0.000	10.00	0.000	0.005	0.007
NDE						
Financial Education (1 vs 0)	0.015	0.003	5.41	0.000	0.010	0.021
TE						
Financial Education (1 vs 0)	0.021	0.003	7.65	0.000	0.016	0.026
Subjective Knowledge as a Mediator						
NIE						
Financial Education (1 vs 0)	0.011	0.001	13.12	0.000	0.010	0.013
NDE						
Financial Education (1 vs 0)	0.010	0.003	3.48	0.000	0.004	0.015
TE						
Financial Education (1 vs 0)	0.021	0.003	7.61	0.000	0.016	0.026

Notes. NIE = Natural Indirect Effect (the portion of the total effect of financial education on financial health operating through the mediator); NDE = Natural Direct Effect (the effect of financial education on financial health not operating through the mediator); TE = Total Effect = NIE + NDE. Estimates were obtained using causal mediation analysis (*mediate* command, Stata) with robust standard errors, bootstrapped with 1,000 replications. Outcome model: linear. Mediator model: Poisson (objective financial knowledge) and linear (subjective financial knowledge). All models control for age, gender, ethnicity, education level, marital status, income, employment status, survey year, and state of residence, with survey weights applied. Coefficient (b) is unstandardized marginal effect on financial health (0-1 scale).

This finding is consistent with studies by Xiao and Porto (2017) and Gibson et al. (2022), who also reported that financial education improves both objective measures of financial literacy and subjective financial well-being.

The causal mediation analysis showed significant indirect and direct effects of financial education on financial health. The significant direct effects of financial education on financial health suggest that financial education remained positively associated with individuals' financial health, regardless of changes in financial knowledge. This finding highlights the importance of financial education as a tool for enhancing perceptions. As a topic that is not discussed in public settings, financial education can provide the venue to normalize financial topics and thereby help people grow their confidence.

Even though the effects are modest in magnitude, the consistency of these results across different analytical approaches suggests reliable associations between financial education and financial health. At the population level, even small average effects can accumulate to meaningful outcomes when applied across many individuals in high schools, workplaces, or national programs. The educational component should include an application element, however, to see improvement in financial behaviors and outcomes (Huston, 2010; Lusardi & Mitchell, 2014). Applying financial knowledge in a safe environment builds confidence and perceived

competence, so programs that incorporate experiential learning, practical simulations, and reinforcement of self-efficacy may help to bridge the gap between knowledge acquisition and behavior change more quickly. The current results show that subjective knowledge partly mediated the education-health relationship and suggest that incorporating behavioral and psychological dimensions into financial education programs is not only recommended, but necessary.

These findings bridge theoretical perspectives with empirical evidence, offering a more comprehensive view of how knowledge, confidence, and behavior interact in shaping financial well-being. Namely, the results support Huston's (2010) framework in that behavioral change is driven both by knowledge and application of knowledge. When people feel confident, i.e., they gain self-efficacy, they begin to demonstrate improved behaviors. Traditional models of feeding information to consumers are not enough. There is an opportunity to expand upon human-driven and AI-driven financial education programs to incorporate "what if" scenarios or case studies to help individuals put their knowledge to the test. This is better than no application at all, although "real-time" application, as it directly impacts their personal financial situation, is likely to yield better-retained knowledge and improved behaviors. Policy efforts that require demonstration of experiential learning are necessary when supporting new financial education programs.

VI. CONCLUSION

To answer the initial question, does education alone impact financial health or is the combined knowledge and application needed, it all matters. In the decade since Fernandes et al. (2014) published their meta-analysis showing that effective financial literacy programs must incorporate elements of self-efficacy and other subjective elements, the bulk of financial education still seems to be focused on content knowledge. The current results update and confirm the need to enhance individuals' confidence in personal finances to show measurable differences in their financial health. Recommendations were provided for how financial education could be modified to include experiential learning and opportunities to grow self-efficacy, though additional research, particularly qualitative analyses, is needed to assess the efficacy of these approaches.

When subjective financial knowledge (feeling like one can apply their financial education) is used as a mediator, the direct association between financial education and financial health was reduced but remained statistically significant, indicating partial mediation (see Table 5). In other words, the effect of financial education on financial health is partly channeled through an increase in subjective financial knowledge. In addition, the current results showed that objective financial knowledge partially mediates the relationship between financial education and health, suggesting that while financial education is associated with financial health through increases in objective financial knowledge, there is a direct effect of financial education on financial health that is not explained by objective financial knowledge alone. Ultimately, programs that integrate feelings of accomplishment and ability will serve consumers better.

VII. IMPLICATIONS

The dual pathway through which financial education impacts financial health suggests that educational programs should focus not only on imparting objective financial knowledge but also on boosting individuals' confidence in their financial abilities. This implication is reinforced by the finding that financial education is associated with both objective and subjective financial knowledge, which are critical for improving overall financial health. Tailoring programs to address both aspects can enhance their effectiveness. The mediating role of subjective financial knowledge implies that interventions should particularly focus on increasing individuals' financial self-efficacy, as this has a profound impact on financial health.

Within schools, case studies and role-play exercises could be incorporated as experiential activities. For instance, students could pretend to be newly employed and create a budget that balances to win points. This could be set up similar to "poverty simulation trainings[5]" where classmates have various positions in a mini society and gain firsthand insight into the financial realities and

[5] See https://www.povertysimulation.net/about/

emotional experience of living in poverty. The post-simulation discussion is oftentimes the most beneficial part of experiential learning opportunities. At the workplace level, financial education could show up in traditional workshop or platform programming with private internal group chats added for employees to submit anonymous questions about personal finances to gain perspective in a non-threatening format. Providers of financial education, such as banks or other financial institutions, can implement the findings by adding social elements to existing content. The ability for participants to add comments to existing online modules like a Reddit feed could be useful in participants gaining subjective and financial knowledge. The addition of this feature would increase costs for the provider through a social coordinator/mediator, but the payoff is expected to show up in improved financial health for participants.

As noted in the qualitative work of Riitsalu et al. (2024), the perceptions of achieving financial well-being are different based on age groups. Hence, financial education needs to be tailored based on age and just-in-time information. A one-size-fits-all approach will likely not be effective. Ultimately, financial education must incorporate opportunities for participants to practice their skills.

VIII. LIMITATIONS AND FUTURE RESEARCH

This study has some limitations. The self-reported financial education, participation and literacy may lead to recall bias, as participants may not report their experiences precisely. Additionally, the operationalization of the Financial Health Index is limited by the available survey questions, which may not fully capture the complexity of financial health. While propensity score matching reduces selection bias, the cross-sectional design limits causal inference. An underlying disposition, such as financial engagement, can drive both the decision to seek financial education and better financial health outcomes at the same time. In addition, propensity score matching accounts for observed differences between groups but does not resolve unmeasured confounding or determine whether financial education causes better financial health. The matching applies only to the financial education and financial health comparison; the paths through financial knowledge as a mediator rely on separate assumptions. Lastly, the exclusion of participants who answered, "Don't know" or "Prefer not to say" might limit the representativeness of the findings. Future research should explore longitudinal studies, which determine the sustainability of the knowledge and behaviors gained through financial education programs. Qualitative research methods would serve well to capture the nuanced aspects of financial literacy and health. Additionally, research should examine the specific components of financial education programs or strategies to implement to improve financial health effectively.

The findings suggest the importance of comprehensive and accessible financial education programs in promoting financial health and provide actionable insights for policymakers, educators, and financial practitioners. By focusing on the mediating roles of both objective and subjective financial knowledge, financial education programs can have a profound impact on individuals' financial health, contributing to greater economic stability and well-being.

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APPENDIX

Appendix 1. Matching indicators of CFSI (see Parker et al., 2016) with NFCS variables

CFSI's Financial Health Dimension	Indicators from CFSI's Financial Health Index	NFCS State-by-State Survey Questions (Data Available) Proxies to measure FHI similar questions.	Treatment of Variables
SPEND	Spend less than income	**J3:** Over the past year, would you say your spending/your household spending was less than, more than, or about equal to your income/your household's income? Please do not include the purchase of a new house or car, or other big investments you may have made. Spending less than income (1) Spending more than income (2) Spending about equal to income (3) Don't know (98) Prefer not to say (99)	Listwise deletion Recode the variable to match from weak to good 1 changed to 3 2 changed to 1 3 changed to 2
	Pay bills on time and in full	**J4:** In a typical month, how difficult is it for you to cover your expenses and pay all your bills? Very difficult (1) Somewhat difficult (2) Not at all difficult (3) Don't know (98) Prefer not to say (99)	Listwise deletion B43 – Reverse coding from weak to good. 1-3 changed to 3-1
SAVE	Have sufficient living expenses in liquid savings	**B2:** Do you/Does your household have a savings account, money market account, or CDs? Yes (1) No (2) Don't know (98) Prefer not to say (99)	Listwise deletion Changed to dummy variable 2 changed to 0
	Have sufficient long-term savings or assets	**C1_2012:** Do you [or your spouse or your partner] have any retirement plans through a current or previous employer, like a pension plan, a Thrift Savings Plan (TSP),] or a 401(k)? Yes (1) No (2) Don't know (98) Prefer not to say (99)	Listwise deletion Changed to dummy variable 2 changed to 0
BORROW	Have a sustainable debt load	**G23:** How strongly do you agree or disagree with the following statement? Please, give your answer on a scale from 1 to 7 - where 1 "Strongly Disagree" to 7 "Strongly Agree" I have too much debt right now.	Reverse coding from weak to good 1-7 to 7-1 Listwise deletion
	Have a prime credit score	**J32)** How would you rate your current credit record? Very bad (1)	Listwise deletion

		Bad (2) About average (3) Good (4) Very good (5) Don't know (98) Prefer not to say (99)	
PLAN	Have appropriate insurance	**H1)** Are you covered by health insurance? Yes (1) No (2) Don't know (98) Prefer not to say (99)	Listwise deletion Changed to dummy variable 2 changed to 0
	Plan for expenses	**J5:** Have you set aside emergency or rainy-day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies? Yes (1) No (2) Don't know (98) Prefer not to say (99)	Listwise deletion Changed to dummy variable 2 changed to 0

Appendix 2. Mean Total Financial Health Score by State and Year

State	**2015**	**2018**	**2021**	**Change (2015-2021)**
Alabama	0.66	0.66	0.63	-0.03
Alaska	0.72	0.72	0.72	0.00
Arizona	0.67	0.68	0.69	+0.02
Arkansas	0.65	0.68	0.63	-0.02
California	0.69	0.71	0.72	+0.03
Colorado	0.67	0.69	0.73	+0.06
Connecticut	0.70	0.71	0.74	+0.04
Delaware	0.71	0.71	0.75	+0.04
District of Columbia	0.72	0.75	0.74	+0.02
Florida	0.66	0.66	0.70	+0.04
Georgia	0.65	0.65	0.64	-0.01
Hawaii	0.76	0.76	0.77	+0.01
Idaho	0.68	0.68	0.70	+0.02
Illinois	0.68	0.69	0.71	+0.03
Indiana	0.64	0.65	0.68	+0.04
Iowa	0.72	0.69	0.72	0.00

State	2015	2018	2021	Change (2015-2021)
Kansas	0.67	0.68	0.68	+0.01
Kentucky	0.67	0.64	0.65	-0.03
Louisiana	0.64	0.65	0.64	0.00
Maine	0.70	0.70	0.69	-0.01
Maryland	0.71	0.70	0.73	+0.02
Massachusetts	0.70	0.71	0.74	+0.04
Michigan	0.68	0.70	0.69	+0.01
Minnesota	0.71	0.71	0.74	+0.04
Mississippi	0.66	0.63	0.61	-0.05
Missouri	0.63	0.66	0.68	+0.04
Montana	0.68	0.70	0.69	+0.01
Nebraska	0.71	0.70	0.71	0.00
Nevada	0.68	0.67	0.69	+0.01
New Hampshire	0.72	0.71	0.74	+0.01
New Jersey	0.70	0.70	0.72	+0.02
New Mexico	0.70	0.72	0.67	-0.03
New York	0.69	0.71	0.72	+0.03
North Carolina	0.64	0.66	0.67	+0.03
North Dakota	0.75	0.73	0.71	-0.04
Ohio	0.67	0.67	0.68	+0.01
Oklahoma	0.64	0.65	0.63	-0.01
Oregon	0.67	0.68	0.70	+0.03
Pennsylvania	0.68	0.68	0.71	+0.03
Rhode Island	0.69	0.74	0.75	+0.06
South Carolina	0.67	0.66	0.66	-0.01
South Dakota	0.73	0.72	0.72	-0.01
Tennessee	0.65	0.64	0.64	-0.01
Texas	0.65	0.65	0.66	+0.01
Utah	0.71	0.71	0.72	+0.01
Vermont	0.71	0.70	0.72	+0.01
Virginia	0.68	0.67	0.71	+0.03

State	2015	2018	2021	Change (2015-2021)
Washington	0.70	0.69	0.73	+0.03
West Virginia	0.66	0.65	0.63	-0.03
Wisconsin	0.69	0.70	0.72	+0.03
Wyoming	0.71	0.68	0.68	-0.02

Notes. Financial Health Index (FHI) on a 0-1 scale (higher = better financial health). Values are state-level means on a 0-1 scale. Changes = 2021 values - 2015 values.

Appendix 3. Covariate Balance Before and After Propensity Score Matching

Covariate	Before Matching			After Matching			
	Treated Mean	Control Mean	SMD (%)	Treated Mean	Control Mean	SMD (%)	Var. Ratio
Age	3.642	3.921	-17.2	3.643	3.612	1.9	1.01
Gender	1.474	1.554	-16.2	1.474	1.476	-0.3	1.00
Ethnicity	1.282	1.242	9.1	1.282	1.277	1.1	1.01
Education	1.653	1.483	23.1	1.652	1.642	1.4	1.01
Marital status	1.582	1.630	-6.4	1.582	1.564	2.4	1.02
Income	2.423	2.151	20.2	2.423	2.429	-0.4	1.00
Employment	2.204	2.348	-11.8	2.205	2.189	1.3	1.00
Survey year	2017.9	2018.0	-1.9	2017.9	2017.9	0.7	0.99
Mean bias	13.2%			1.2%			
Median bias	14.0%			1.2%			
Pseudo R^2	0.022			0.000			
LR chi^2	1483.60 ($p < .001$)			10.94 ($p = .205$)			
Rubin's B	36.9 (> 25%)			3.9 (< 25%)			
Rubin's R	1.01			1.02			

Notes. Unmatched N = 60,515, Matched N = 29,432, 1:1 nearest-neighbor matching, caliper = 0.05, no replacement, common support enforced. SMD = standardized mean difference. Adequate balance is indicated by SMD < 10% after matching (Shipman et al., 2017). Rubin's B < 25% and Rubin's R within [0.5, 2.0] indicate satisfactory balance. Before matching, education, income, age, gender, and employment showed meaningful imbalance (SMD > 10%; Rubin's B = 36.9). After matching, all SMDs fell below 3%, mean bias reduced from 13.2% to 1.2%, Rubin's B = 3.9, and Rubin's R = 1.02, confirming adequate covariate balance.