



Regular Article

The association between subjective and objective financial knowledge: Path analysis to savings behavior by age

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ABSTRACT

Backgrounds: The transition from defined benefit to defined contribution retirement plans, coupled with the introduction of stock options as part of employee retirement benefits, has significantly complicated the retirement planning process. This study aims to explore the roles of objective financial knowledge and subjective financial skills in navigating these complexities, particularly focusing on their impact across different generational cohorts.

Methods: Utilizing a national sample of Americans, this research investigates the direct and indirect effects of subjective financial skills on the relationship between objective financial knowledge and various retirement savings products. Special attention is given to the generational difference between young and old to understand how these dynamics play out among those at the early and later stages of their retirement planning.

Results: The study finds that among the younger generation, subjective financial skills not only act as protective factors but also enhance the relationship between objective financial knowledge and participation in the stock market. In contrast, older generations, regardless of their current status of finance-related knowledge and skills, tend to utilize traditional retirement plans such as 401 (k)s and pensions. This highlights the significance of subjective financial skills in enhancing engagement with complex savings options.

Discussion: The results emphasize the necessity of fostering both financial knowledge and confidence in financial decision-making processes. There is a clear need for financial education interventions that not only impart objective knowledge but also bolster individuals' subjective financial skills, thereby equipping them with the comprehensive capabilities required to make informed decisions about their retirement savings.

1. Introduction

In recent decades, the economic landscape governing personal savings behavior has undergone significant transformations. A pivotal shift has been the transition from traditional defined benefit (DB) plans, which employer sponsored safety nets like social security benefits and pensions, to more individual centered defined contribution (DC) plans, such as 401(k) programs and personal investment accounts (Lusardi & Mithell, 2020). This shift reflects a broader trend towards placing the onus of retirement planning squarely on individuals, necessitating a deeper understanding and engagement with a variety of investment options. Parallel to the phasing out of DB pensions, there has been a notable increase in employers offering stock options as either a substitute or a supplement to traditional retirement plans. Coupled with the democratization of the stock market, which has made investing more accessible to the general public (Farrell et al., 2016), individuals are encouraged more to participate in the equity markets. This shift aims to

provide employees with a vested interest in the company's future success (Besley & Prat, 2003; Muller & Turner, 2011). Coupled with the democratization of the stock market, which has made investing more accessible to the general public (Welch, 2020), individuals are encouraged more to participate in the equity markets. However, the inherent volatility and the lack of guaranteed returns associated with equity investments often lead to a cautious approach, with many employees holding only a minimal stake in their company's stock (Meulbroek, 2002). Despite these risks, the allure of potentially high return leads more individuals to consider company stock options as a critical component of their retirement strategy (Dybvig & Liu, 2009; Siegel, 2014).

This paradigm shifts in retirement planning, marked by the transition from DB to DC plans and the inclusion of stock options, has expanded the range of choice available to individuals, necessitating a more sophisticated approach to financial decision making. This transition had devastating consequences for a notable portion of the American

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population, particularly affecting those with lower incomes, less education, and individuals living independently (Morrissey, 2019). Most recent study indicated the challenges of average workers and their limited savings to secure finances after their retirement, the challenges of average workers and their limited savings to secure finances after their retirement (Bond et al., 2021). It emphasizes the importance of financial literacy, as well as objective knowledge of finance-related matters and subjective financial skills, such as confidence and competence in financial decision-making. The interplay between these facets of financial literacy and their impact on savings behavior, particularly in the context of the varying financial challenges and opportunities faced by different generations is key to the current study. By examining the broader effects of objective and subjective financial knowledge on retirement planning across generational lines, this study aims to focus on the protective role of subjective financial skills and the critical need for enhanced financial education that empowers individuals to navigate the complex landscape of modern retirement savings options effectively.

1.1. Relevant literature review

The exploration of individuals' savings behaviors within the current research has frequently been conducted through the analytical framework of financial knowledge, which is divided into objective and subjective dimensions of financial literacy. Objective financial literacy is not merely an assessment of mathematical aspects but extends to a comprehensive understanding of financial principles and concepts, such as risk diversification, inflation, and interest rates (Lusardi & Mitchell, 2014; Nicolini, 2021, pp. 110–123). The work of Lusardi and Mitchell has been pivotal in delineating the impact of financial literacy on savings behaviors, positing that an enhancement in financial literacy is imperative for augmenting individual financial well-being (Lusardi, 2012; Lusardi & Mitchell, 2008). The literature consensus converges on the notion that a deficit in financial knowledge can significantly diminish the perceived necessity of savings, thereby impeding prudent financial planning (Angrisani, Kapteyn, & Lusardi, 2016; M. Despard, Friedline, & Martin-West, 2020; Dhawan & Mehta, 2019; Gulati & Singh, 2024; Teichman & Zamir, 2022). This has precipitated the widespread institution of financial education initiatives targeted at the youth, aiming to inculcate robust financial habits from an early age across various global contexts (Berry et al., 2015; Bruhn et al., 2013, 2016; Khalil, 2020; Loke et al., 2015; M. S. Sherraden, 2010; Zhu, 2020).

Moreover, the correlation between higher educational attainment and the propensity to engage in sophisticated defined contribution (DC) investment strategies for retirement planning is well-documented, underscoring the positive relationship between financial literacy and pension ownership (Dulebohn & Murray, 2007; Gallery et al., 2011; Khalil, 2020; Zhu, 2020). Financial knowledge considered as a most predominant predictor of diverse savings behavior, including stock market participations, which has evolved from being perceived as a speculative venture to a long-term investment strategy (Dhawan & Mehta, 2019; Li et al., 2020; Long et al., 2020; Siegel, 2014). The propensity to engage in the stock market is increasingly recognized as being intertwined with an individual's level of financial literacy, emphasizing the significance of comprehensive financial education in facilitating informed investment decisions (Kadoya et al., 2017; Li et al., 2020; Long et al., 2020; van Rooij et al., 2011).

In contrast, subjective financial knowledge is often equated with self-efficacy, entails a broad spectrum of self-assessments including knowledge, competence, confidence, and perceived financial skills (Farrell et al., 2016; Lind et al., 2020; Nadeem et al., 2020; Robb et al., 2015; Rothwell et al., 2016; Rothwell & Wu, 2019). This multifaceted construct, herein referred to as subjective financial skills, has garnered increasing recognition within the realm of financial research, transcending the traditional emphasis on objective knowledge. These subjective dimensions are pivotal in shaping financial behaviors, exerting a distinct influence that often-predictive factor of objective financial

literacy. Indeed, subjective financial skills have been identified as potent determinants of savings practices (Chong et al., 2021; Danes & Brewton, 2014; Lone & Bhat, 2024; Xiao et al., 2014), particularly accentuating their predictive validity in relation to investment behaviors among younger cohorts (Hilgert et al., 2003; Lusardi et al., 2010, pp. 358–380).

Furthermore, the presence of subjective financial skills a positive correlation with the propensity to maintain emergency savings, emphasis their role in prudent financial management (Babiarz & Issues, 2014). Intriguingly, individuals who perceive themselves as adept in financial matters often demonstrate more predominantly to make more cost-effective financial decisions, even when compared to counterparts with higher levels of objective knowledge (Allgood & Walstad, 2016). Emerging research, predominantly conducted with Canadian cohorts suggested that subjective evaluations of financial skill and efficacy might serve as mediators in the nexus between objective knowledge and savings behavior, albeit with a noted lack of clarity in the operationalization of savings behaviors (Rothwell et al., 2016; Rothwell & Wu, 2019). This arguable finding highlights the imperative to delineate the intricate interplay between subjective financial skills and objective knowledge, particularly in the context of generational differences in savings behaviors and the evolving landscape of financial decision makings.

Despite this ongoing interest in financial literacy and its impact on savings behavior, the literature reveals a gap in the literature to understand how self-perceived financial skills, particularly subjective financial skills, influence savings behavior across different generational cohorts. The dynamic nature of financial markets and the evolution of retirement savings options underscore the necessity of a nuanced examination of these relationships. This study aims to bridge this gap by examining the potential moderating and mediating factors of subjective financial skills in the relationship between financial knowledge and savings patterns, with a keen focus on generational distinctions.

1.2. Theoretical framework

This study is grounded in the framework of financial literacy and self-efficacy, emphasizing both direct and indirect effects of subjective financial skills. Financial literacy includes objective knowledge, meaning factual understanding of financial concepts, and subjective financial skills, which encompass confidence and perceived competence in financial decision-making (Allgood & Walstad, 2016; Farrell et al., 2016).

Subjective financial skills are critical as they influence how effectively individuals apply their objective financial knowledge. They directly impact savings behavior by boosting confidence in financial decisions and indirectly by enhancing the relationship between objective knowledge and saving behavior. For example, Rothwell et al. (2016, 2019) found that higher subjective skills enable better navigation of complex financial products.

This study posits that subjective financial skills play a dual role in the relationship between objective financial knowledge and savings behavior. They facilitate the direct application of financial knowledge and also enhance the overall effect of financial knowledge on savings behavior. This dual role aligns with self-efficacy theory, which suggests that belief in one's capabilities significantly influences actions and decision (Bandura, 1997).

By examining these direct and indirect effects, this study aims to enhance financial education programs that boost both objective knowledge and subjective financial skills, equipping individuals to make informed and confident financial decisions. The current study model is presented in Fig. 1.

2. Methods

Building on the identified need for a generational perspective in understanding the relationship between financial knowledge, subjective financial skills, and savings behaviors, this study employed data from

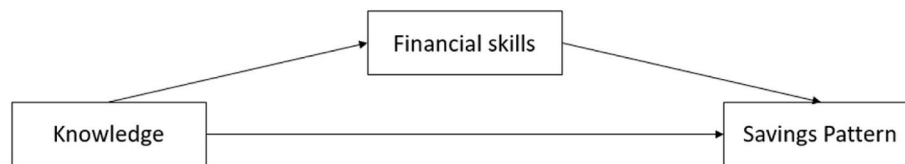


Fig. 1. Theoretical path model for the current study.

the National Financial Well-being Survey (NFWBS), facilitated by the Consumer Financial Protection Bureau (CFPB). The NFWBS is meticulously designed to capture the financial well-being of a representative cross-section of American adults, with its parameters rooted in the hypothesized determinants of financial well-being in adulthood. It comprehensively captures a dimension of individual and household characteristics, including income, employment status, savings, financial safety nets, and an array of financial experiences, behaviors, skills, and attitudes.

Data collection for the NFWBS was conducted in 2016, utilizing telephone interviews to gather insights. The survey successfully garnered responses from 6394 participants, encompassing both English and Spanish speakers. A deliberate oversampling strategy was employed for adults aged 62 and older, ensuring an accurate representation of the adult demographic exceeding 50 years within the United States and the District of Columbia. The resultant dataset is made publicly available for research.

2.1. Variables

Demographic Variables. Demographic information on the samples were including, Generation (1 = Pre-Boomer, age ≥ 71 ; 2 = Boomer, age between 52 and 70; 3 = Gen X, age between 36 and 51; 4 = Millennial, age between 18 and 35); Gender (1 = Male; 2 = Female); Education level (1 = Less than high school; 2 = High school degree/GED; 3 = Some college/Associates' 4 = Bachelor's degree; 5 = Graduate/Professional degree); Race and Ethnicity (1 = White, non-Hispanic; 2 = Black, non-Hispanic; 3 = Other, non-Hispanic; 4 = Hispanic); Household size (measured in ordinal, range between 1 and 5); Household income (1 = Less than \$20,000; 2 = \$20,000 to \$29,999; 3 = \$30,000 to \$39,999; 4 = \$40,000 to \$49,999; 5 = \$50,000 to \$59,999; 6 = \$60,000 to \$74,999; 7 = \$75,000 to \$99,999; 8 = \$100,000 to \$149,999; 9 = \$150,000 or more); Marital status (1 = Married; 2 = Widowed; 3 = Divorced/Separated; 4 = Never Married; 5 = Living with partner).

Subjective Financial Skills Scale. To assess individual subjective financial skills, the total Financial Skill Scale Score was used (range between 5 and 85). Questionnaires are included, 1) I know how to get myself to follow through on my financial intentions; 2) I know where to find the advice I need to make decisions involving money; 3) I know how to make complex financial decisions; 4) I am able to make good financial decisions that are new to me; 5) I am able to recognize a good financial investments; 6) I know how to keep myself from spending too much; 7) I know how to make myself save; 8) I know when I do not have enough info to make a good decision involving my money; 9) I know when I need advice about my money; 10) I struggle to understand financial information.

Objective Financial Knowledge Scale. To evaluate individuals' objective financial knowledge, three different knowledge scale was used. First, the study employed the Lusardi and Mitchell Financial Knowledge Scale (LM Score) (Lusardi & Mitchell, 2006), which assesses individuals' understanding of key financial concepts, specifically interest rates, inflation, and risk diversification. The LM Score consists of three questions, each correct answer coded as 1, resulting in a total score of 0–3.

Additionally, the Knoll and Houts Financial Knowledge Scale, an unpublished but broad assessment of financial knowledge covering various topics essential for informed financial decision-making (Knoll &

Houts, 2012). This scale includes 10 items that measure aspects such as understanding long-term returns on investment, the volatility of stock versus bonds versus savings, the benefits of diversification, the possibility of stock market losses, life insurance, housing market losses, credit card minimum payments, the relationship between bonds and interest rates, and the impact of mortgage term length on total interest paid. Each correct answer is coded as 1, with a total score range of 0–9.

The total score for each participant is calculated by summing the scores from both the LM Score and the Knoll and Houts Financial Knowledge Scale. This composite score provides a comprehensive measure of an individual's objective financial knowledge, ranging from 0 to 12. By combining these two scales, this study aimed to capture a wide range of financial knowledge elements, ensuring a robust and thorough assessment of objective financial knowledge.

Savings Behaviors. Three items described typologies of individuals' saving behaviors, 1) Retirement Account (such as a 401K or IRA); 2) Pension; 3) Non-Retirement Investments (such as stocks, bonds, or mutual funds. Response options to all times were dichotomous (0 = No, 1 = Yes).

2.2. Data analysis

The analysis employed in this study was designed to comprehensively assess the direct and indirect effects of subjective financial skills in the relationship between objective financial knowledge and various types of future investments. For the initial phase of data analysis, SPSS (Version 25) were used to generate descriptive statistics, frequencies, and percentages, providing a foundational understand of the dataset characteristics.

Mplus8 was used to perform path analysis. Path analysis was applied for its capability to examine both direct and indirect relationships among variables within a structural framework. The application of delta parameterization and the maximum likelihood (ML) estimation method enabled the analysis to accommodate both continuous and categorical variables, reflecting the diverse nature of the dataset. This approach was particularly pertinent given the substantial sample size ($n = 6385$), where considerations related to statistical power and the potential for over-parameterization were meticulously addressed (Bandalos, 2014; Kane, 2011; Muthén & Muthén, 1998; Stride et al., 2017). Throughout the analysis, both Unstandardized (β) and standardized ($StdYX$, β^*) coefficients are reported using 10,000 biased corrected bootstraps, 95% confidence intervals.

3. Result

As Table 1 demonstrated, a large portion of the current samples was reported Boomer generation (35.2%), followed by Millennial (25%), GenX (22.4%), and Pre-Boomer (17.4%). There were slightly more female participants ($n = 3352$, 52.4%), the majority of them reported being married at the time of the survey ($n = 3826$, 59.8%). 17.4% reported making \$100,000 to \$149,000 a year, and 13.5% reported making more than \$150,000 a year, and approximately 40% were working full-time.

3.1. Path analysis with whole sample

The findings of a priori path analysis model with the whole sample

Table 1
Demographic information for sample (N = 6394).

	M (SD)	Range	n (%)
Age by generation			
Pre-Boomer			1112 (17.4%)
Bommer			2253 (35.2)
Gen X			1430 (22.4)
Millennial			1599 (25.0)
Gender			
Male			3042 (47.6)
Female			3352 (52.4)
Marital status			
Married			3826 (59.8)
Widowed			360 (5.6)
Divorced/Separated			689 (10.8)
Never married			1151 (18.0)
Living with partner			368 (5.8)
Household income			
Less than \$20,000			719 (11.2)
\$20,000 - \$29,000			506 (7.9)
\$30,000 - \$39,999			614 (9.6)
\$40,000 - \$49,000			467 (7.3)
\$50,000 - \$59,000			505 (7.9)
\$60,000 - \$74,999			651 (10.2)
\$75,000 - \$99,999			955 (14.9)
\$100,000 - \$149,000			1115 (17.4)
\$150,000 or More			862 (13.5)
Employ ¹			
Self-employed			418 (6.5)
Full-time			2483 (39.0)
Part-time			433 (6.8)
Homemaker			358 (5.6)
Full-time student			225 (3.5)
Permanently sick, disabled or unable to work			269 (4.2)
Unemployed or temporarily laid off			245 (3.8)
Retired			1837 (28.7)
Education			
Less than high school			429 (6.7)
High school degree/GED			1622 (25.4)
Some college/Associate			1933 (30.2)
Bachelor's degree			1312 (20.5)
Graduate/Professional degree			1098 (17.2)
Types of Investments			
Retirement account (401(k), IRA)			3686 (42.4)
Pension			2173 (34.0)
Non-retirement investments (Stocks, bonds, or mutual funds)			2012 (64.5)
Financial Well-being score	56.08 (14.06)	14, 95	
Financial Skills score	50.78 (12.53)	5, 85	
LM score ²			
1			613 (9.6)
2			1520 (23.8)
3			4124 (64.5)
KH score	6.30 (1.87)	0, 9	

Note: Valid percentages are reported.

^a116 (1.8%) refused to answer.

^b137 (2.1%) missingness.

are reported in Table 2. The fit indices of this a priori path analysis suggested perfect fit, $\chi^2 = 3492.29$, $df = 12$, $p < .01$; CFI = 1.00 and TLI = 1.00, RMSEA = .04. The CFI and TLI for the overall model were both 1.00. While this indicates a perfect fit, it is important to interpret these values cautiously, as perfect fit indices are rare and could suggest overfitting or a just-identified model (Browne & Cudeck, 1992).

As shown in Table 2, similar to the previous literatures, individuals scored higher on objective financial knowledge were likely to participate in formal forms of retirement funding ($StdYX = .25$, 95% CI [.18, .32]; $p < .01$) and pension ($StdYX = .16$, 95% CI [.08, .23]; $p < .01$). We did not anticipate seeing the negative association between stock market participation and subjective financial skills, but the current result suggested otherwise, ($StdYX = -.12$, 95% CI [-.18, -.05]; $p < .01$). However, there were mediation effects of financial skills on the relationship between objective knowledge and investment ($StdYX = .48$, 95% CI [.38, .58]; $p < .01$). There were also an indirect effect on the positive association between knowledge and formal retirement savings by subjective financial skills ($StdYX = .19$, 95% CI [.09, .29]; $p < .01$).

There were several additional notable correlations among the outcome variable. While 401K was positively correlate with participating in investment ($r = .24$; 95% CI [.20, .29], $p < .05$), pension was negatively correlate with participating in non-retirement investment ($r = -.13$; 95% CI [-.17, -.08], $p < .05$).

3.2. Multi-group path analysis

A multigroup test of the path analysis was conducted to further examine the potential for variation in the effects across the different generations. As shown in Table 3, Figs. 2 and 3, There were notable mediation effects of subjective financial skills on the relationship between financial knowledge and investment patterns.

For the pre-boomer generation ($n = 1112$), there was a significant positive association between the financial knowledge and retirement savings ($StdYX = .33$; 95% CI [.15, .51], $p < .01$). While there was no direct effect of financial skills and financial knowledge on non-retirement investment (e.g., stock market), there was significant interaction with financial skills and knowledge on non-retirement investment ($StdYX = .41$; 95% CI [.15, .66], $p < .01$). Within this group, there were significant correlation between formal retirement funding and investment ($r = .24$; 95% CI [.18, .37], $p < .01$).

For the boomer generation ($n = 2253$), similar to the pre-boomer, individuals' financial knowledge positively associated with retirement

Table 2
Results of multiple regression analyses (N = 6386).

	Estimate	95% CI	StdYX	95% CI
Subjective Financial Skill → 401K	.001	-.002, .003	.01	-.04, .07
Subjective Financial Skill → Pension	.001	-.002, .004	.02	-.04, .08
Subjective Financial Skill → Investments	-.005	-.007, -.002	-.12 ^a	-.18, -.05
Knowledge score → 401 K	.05	.03, .07	.25 ^a	.18, .32
Knowledge score → Pension	.03	.01, .05	.16 ^a	.08, .23
Knowledge score → Investment	.001	-.001, .002	.002	-.06, .07
Knowledge → Subjective financial skills → 401K	.001	.00, .003	.19 ^a	.09, .29
Knowledge → Subjective financial skills → Pension	.001	.00, .001	.09	-.01, .19
Knowledge → Subjective financial skills → investments	.001	.001, .002	.48 ^a	.38, .58

^a $p < .05$

Table 3
Multi-group path analysis by generation.

Path	Pre-Boomer	Boomer	GenX	Millennial
Objective Knowledge → 401(k)	.33 ^a	.32 ^a	.23*	-.25 ^a
Objective Knowledge → Pension	.23*	.23*	.27 ^a	-.25 ^a
Objective Knowledge → Non-Retirement Investment	.41 ^a	.32 ^a	.51 ^a	.70 ^a
Subjective Financial Skills → 401(k)	.01	.02	.01	-.12 ^a
Subjective Financial Skills → Pension	.02	.15 ^a	.09	-.25 ^a
Subjective Financial Skills → Non-Retirement Investment	.41 ^a	.32 ^a	.51 ^a	.70 ^a
Knowledge → Financial Skills → 401(k)	.19 ^a	.09	.24 ^a	.70 ^a
Knowledge → Financial Skills → Pension	.09	.23 ^a	.27 ^a	-.25 ^a
Knowledge → Financial Skills → Non-Retirement Investment	.41 ^a	.32 ^a	.51 ^a	.70 ^a

*Note: All path coefficients are standardized (StdYX).

^a $p < .05$.

savings ($StdYX = .32$, 95% CI [.19, .46], $p < .01$), and positively associated with having pension ($StdYX = .23$; 95% CI [.08, .38], $p < .01$). There was a direct effect of financial skills on having pension ($StdYX = .15$; 95% CI [.02, .29], $p < .01$). While there was no other direct effects, individuals likely to be involved in non-retirement funding when believe to have financial skills and knowledge ($StdYX = .32$; 95% CI [.10, .54], $p < .01$). With in this generation, accessing formal retirement funding were significantly correlated with having pension ($r = .11$; 95% CI [.07, .15], $p < .01$), correlated with non-retirement investment ($r = .23$; 95% CI [.19, .27], $p < .01$); accessing pension and investment were significantly correlated ($r = .14$; 95% CI [.10, .18], $p < .01$).

For Gen X generation ($n = 1428$), individuals age between 36 and 51, having higher score on objective financial knowledge were positively associated with having retirement funding ($StdYX = .23$; 95% CI [.07, .39], $p < .01$). While there is no other direct effect, within this Gen X generation, individuals likely to accessing all three forms of investment, retirement funding, pension and non-retirement investment when they reported having higher subjective financial skills and knowledge ($StdYX = .24$ 95% CI [.008, .47], $p < .05$; $StdYX = .27$ 95% CI [.02, .51], $p < .01$; $StdYX = .51$; 95% CI [.28, .75], $p < .01$, respectively). Within this generation, retirement funding and pension ($r = .16$; 95% CI [.11, .21], $p < .01$); retirement and non-retirement investment ($r = .23$; 95% CI [.19, .28], $p < .01$); and pension and non-retirement ($r = .17$; 95% CI [.11, .23], $p < .01$) were significantly correlated.

For the Millennials ($n = 1593$), while both financial skills and knowledge were negatively associated with non-retirement investment ($StdYX = -.25$; 95% CI [-.37, -.12], $p < .01$; $StdYX = -.25$; 95% CI [-.40, -.09], $p < .01$, respectively), these negative association mediated and moderated when both score increased, $StdYX = .70$; 95% CI [.46, .93], $p < .01$. Like other generation, all three forms, retirement funding and pension ($r = .13$; 95% CI [.08, .17], $p < .01$), retirement and non-retirement ($r = .20$; 95% CI [.16, .25], $p < .01$); and pension and non-retirement investment are significantly correlated ($r = .20$; 95% CI [.16, .25], $p < .05$).

4. Discussion

This study reinforces and expands the existing literature, affirming that an individuals' financial knowledge is positively correlated with savings behavior, consistent with previous research (M. R. Despard, Friedline, & Economic, 2020; Kim & Yuh, 2018; Lusardi & Mitchell, 2011; Nicolini, 2021, pp. 110–123). Across all four generations, this association held prominent. However, there was a significant moderating factor played by financial skills on the relationship between financial knowledge and pension planning, particularly within the

Boomer generation. This indicates a reliance on personal financial competence over mere objective knowledge when faced with complex financial decision-making processes.

The important contribution of this research lies in its identification of a moderated and mediated effect of subjective financial skills on savings patterns across different generations. Aligning with prior studies, our findings highlight a positive relationship between subjective financial knowledge and savings behavior among younger cohorts (Loke et al., 2015; M. Sherraden et al., 2018; Xiao & O'Neill, 2016), supplemented by a mediation effect of self-efficacy on the relationship between objective knowledge and savings behavior (Rothwell et al., 2016; Rothwell & Wu, 2019). Exploring further into the intricacies of savings accounts and the impact of generational views, one of the study's significant revelations is the partial indirect effect of subjective financial skills in the association between financial knowledge and engagement in the stock market.

Particularly for Millennials, subjective financial skills emerge as a safeguard enabling participation in non-retirement investments like the stock market, contingent upon a robust belief in their financial competence. This insight is particularly pertinent considering the propensity of younger individuals to engage in riskier financial behavior (Mottola, 2014), a tendency that may be exacerbated by a lack of objective knowledge yet compensated for by heightened subjective financial skills (Robb et al., 2015). Recent study however, suggested that financial self-efficacy increases older individuals to have better savings behavior (Asebedo et al., 2019). As the current study shows, younger adults may require objective knowledge before subjective knowledge in financial matters. This findings suggests a paradigm shift where today's younger generations are poised to make financial decisions anchored not just in objective financial knowledge but also in a well-grounded sense of subjective financial skills.

The analysis of multi-group path analysis further supports this paradigm shift. For instance, the path from objective financial knowledge to non-retirement investment showed a stronger effect in the Millennial group compared to the Boomer group. This indicates that Millennials are more likely to use their financial knowledge to engage in non-retirement investments, whereas Boomers may rely more on traditional retirement plans.

Similarly, subjective financial skills had a more pronounced effect on savings behavior among younger cohorts. This highlights the importance of confidence and perceived competence in financial decision-making for Millennials and Gen Xers, who might face different financial challenges and opportunities compared to older generations.

4.1. Practice implication

The findings from the current study stresses the complexity of its relationship between objective and subjective financial knowledge and skills, and their collective impact on savings behaviors across different generations. Noteworthy, the moderating effect of subjective financial skills on the relationship between financial knowledge and traditional retirement plan from their employers (e.g., 401(k)s and pension) engagement within the Boomer generation indicates the critical role of personal financial confidence in decision making processes. This insight aligns with Sherraden's (2013) theory, which posits that access to financial products and knowledge alone may not suffice, whereas individuals also need the confidence to act on this knowledge effectively. For Millennials, the observed partial mediation and moderation effect of subjective financial skills on stock market participation emphasizes the protective role these skills play in navigating investment decisions. This is particularly relevant in today's financial environment, where younger generations are confronted with an array of complex investment options. These findings suggest that financial education programs should not only aim to improve objective knowledge but also to enhance individuals' self-efficacy in their financial capabilities (Loke et al., 2015; Xiao et al., 2014; Xiao & O'Neill, 2016).

Policymakers and social scientists need to consider these dynamics in

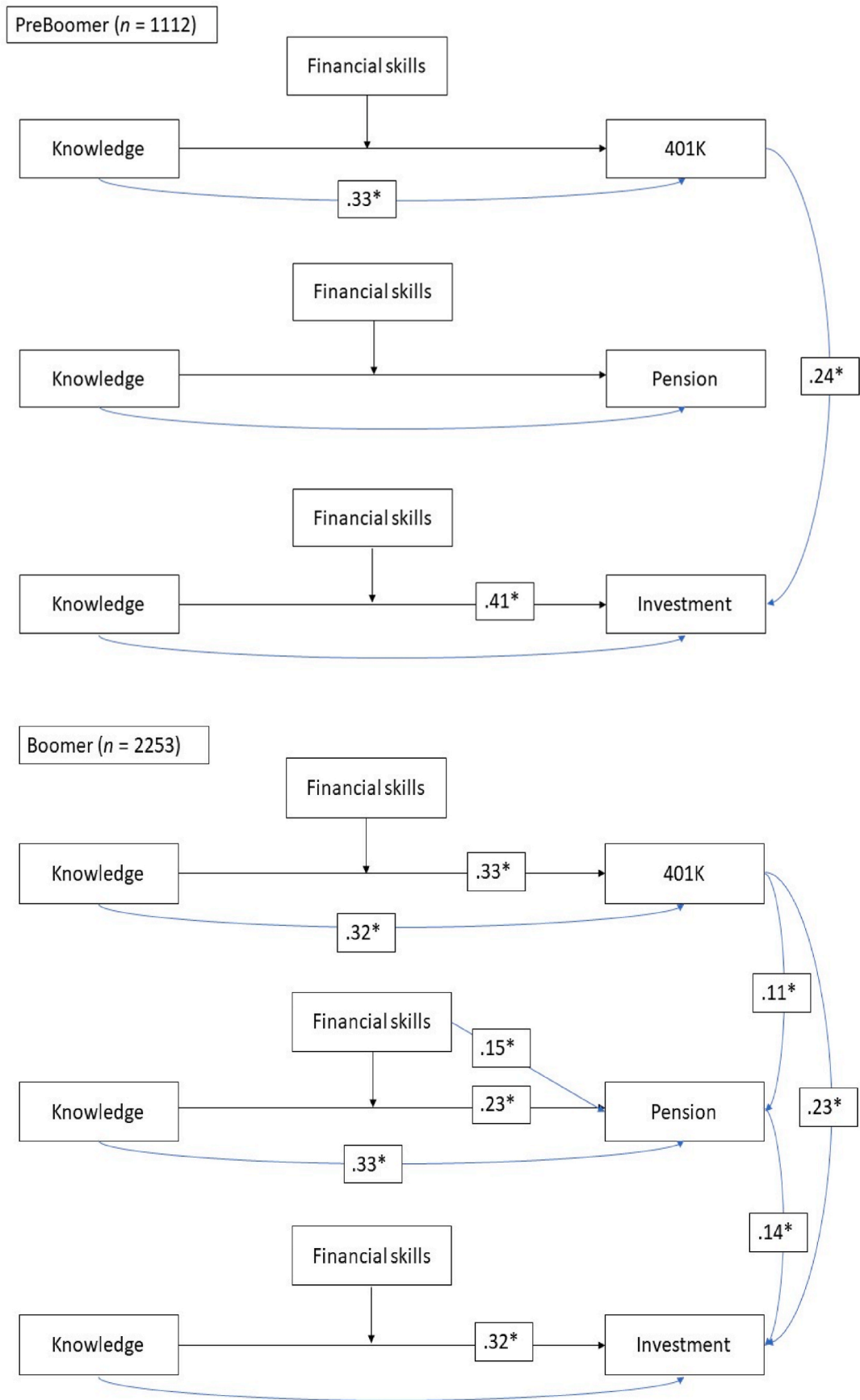


Fig. 2. Mediated Moderation effect by Generation
 Note: STDYX are reported.

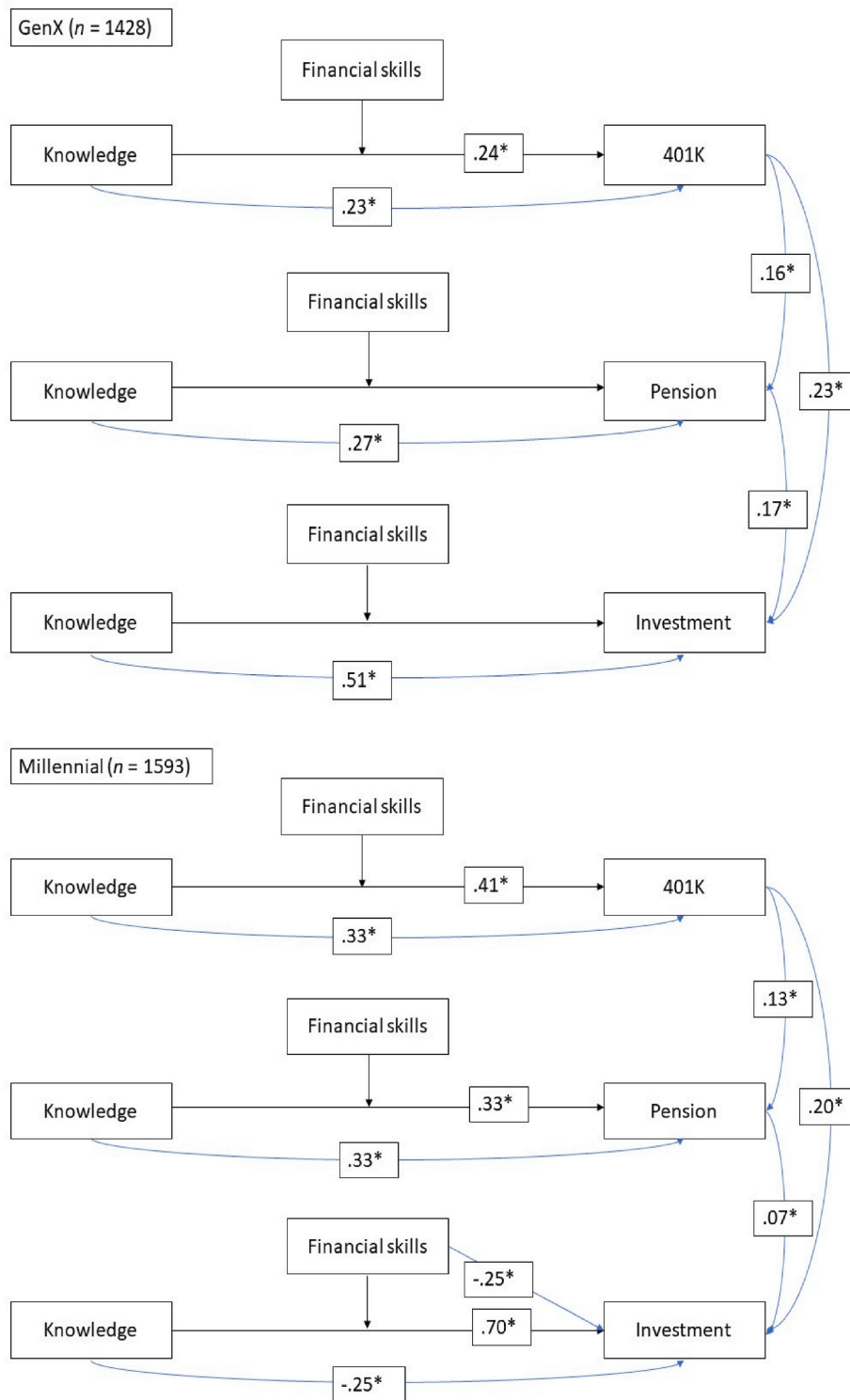


Fig. 3. Mediated moderation effects by generation continue
 Note: STDYX are reported here.

their efforts to understand and influence savings behaviors. As suggested, individuals' characteristics and levels of objective knowledge highly influences their savings behaviors (Asebedo et al., 2019). The increase in publicly and privately available savings options (Bond et al., 2021) and the diversification of company-offered retirement plans (Wu et al., 2016) highlight the importance of equipping individuals with the necessary tools to make informed decisions. The current study's findings advocate for a more dedicated approach to financial education, one that

addresses both the cognitive and psychological components of financial decision-making.

In practice, this could involve the development of educational curricula and advisement services that not only convey factual financial information but also engage individuals in activities that build financial self-efficacy. Such initiatives could include interactive workshops, simulation-based learning experiences, and personalized financial counseling, all designed to reinforce the application of objective

knowledge through the lens of subjective financial confidence and competence. Building on the foundational understanding that financial education programs can more effectively empower individuals by integrating both objective knowledge and subjective skills, it's critical to consider how these elements can be operationalized within existing educational frameworks. With the proliferation of financial education initiatives targeting individuals from an early age, there is a unique opportunity to embed practices that not only inform but also build the confidence and competence necessary for navigating the complexities of modern financial planning (Jump\$tart Coalition, 2017; Lusardi et al., 2010, pp. 358–380):

- **Early Financial Education:** The widespread availability of financial education programs in early childhood education settings underscores the importance of instilling sound financial principles from a young age. Enhancing these programs to include activities that encourage engagement with various investment types can serve as a critical step in cultivating an early understanding of and confidence in financial decision-making.
- **Peer-to-Peer learning:** Recognizing that traditional financial education has predominantly focused on the transmission of objective knowledge, there is a compelling case for incorporating more experiential and interactive learning models. Peer-to-peer activities and interactive games, for example, can significantly enrich the learning experience, sparking interest in financial topics and building supportive community where learners feel more confident in exploring financial matters (Adams & West, 2015; Kim & Yuh, 2018; Lone & Bhat, 2024; Walstad & Wagner, 2023; Xiao & O'Neill, 2016).
- **Curriculum Development for financial well-being:** The development of a curriculum aimed at fostering financial well-being should extend beyond mere knowledge acquisition to include the cultivation of positive attitudes, optimism, and resilience in financial decision-making. Such a curriculum can lay the foundation for lifelong financial well-being, equipping individuals with both the knowledge and the confidence to navigate their financial futures (Bruhn et al., 2013, 2016; Danes & Brewton, 2014).

As financial products and retirement planning options have become more complex and varied than in the past, the responsibility for informed financial decision-making increasingly rests on the individual. This shift emphasizes the critical role of subjective financial skills in accessing and effectively utilizing these financial products. Therefore, creating environments that not only provide knowledge but also actively engage individuals in mastery experiences can significantly enhance their financial self-efficacy (Birkenmaier et al., 2019; Parker et al., 2012). In essence, this holistic approach to financial education, which balances the gaining objective financial knowledge with the development of subjective financial skills, ensures that individuals are not only informed about financial strategies and products but also possess the confidence and competence to apply this knowledge in alignment with their personal financial goals and circumstances. By adopting such an approach, financial education programs can more effectively prepare individuals to thrive in today's dynamic financial landscape.

4.2. Limitation

This study pioneers the investigation of subjective financial skills and their moderating effects on savings behaviors across generations, offering valuable insights into the dynamics of financial decision-making. However, it is important to acknowledge certain limitations that suggest directions for future research.

First, this study pertains to the measurement of savings products within the CFPB dataset. The dataset categorizes savings behaviors primarily in terms of traditional products such as 401(k)s, pensions, and non-retirement investments, potentially oversimplifying the complexity of modern investment categories. Questions related to stock market

participation, for instance, do not fully capture the motivations behind investment account ownership or the specificity of investment choices, such as individual company stocks. Despite this, the study's use of these broad categories still provide valuable insights into general savings patterns and preferences, emphasizing the foundational role of subjective financial skills in navigating the retirement planning process.

Another consideration is the variability in retirement savings options offered by employers, which the dataset does not explicitly detail. This lack of detail might obscure the influence of specific employer-provided retirement savings options on individuals' savings behaviors. While this aspect was not the focal point of the current study, the findings illustrate the broader influences of both objective knowledge and subjective skills on savings behaviors, regardless of the specific retirement savings avenues available to individuals.

This study also limited by its inability to account for the role of early-life income in shaping long-term wealth accumulation and financial decision-making. The dataset captures only current income and lacks longitudinal data on financial trajectories. Consequently, the influence of early-life income on generational savings behaviors cannot be explored. Further research using longitudinal data could provide deeper insights into these dynamics.

Furthermore, the complexity of the direct and indirect analysis, while offering a comprehensive understanding of the interactions between variables, adds layers to the analysis that require careful interpretation. The high CFI and TLI values of 1.00, while theoretically possible, are rare and may suggest overfitting or a just-identified model. This highlights the necessity for cautious interpretation of these fit indices and consideration of alternative explanations.

Lastly, the cross-sectional design of this study limits the ability to draw causal inferences. While the findings suggest significant relationships between financial knowledge, skills, and savings behavior, the directionality of these relationships cannot be firmly established. Similarly, the changing economic environment, including fluctuations in market conditions and changes in retirement policies, could influence the applicability of our findings. The data collected in 2016 may not fully reflect the current financial landscape, affecting the generalizability of the results. Although continuous updates to the dataset and replication of the study in different economic contexts are necessary, the economic and social disruptions caused by the COVID-19 pandemic have had unprecedented effects on individuals' financial behaviors and livelihoods. Therefore, the use of pre-COVID data in this study provides a baseline understanding of financial behaviors that may differ from post-pandemic patterns. Future research should consider these changes and aim to understand how such significant events reshape financial decision-making savings behaviors.

Even with these limitations, the study's findings significantly advance our understanding of financial planning and decision-making processes. By highlighting the critical role of subjective financial skills, especially in conjunction with objective financial knowledge, this research emphasizes the need for a more dimensional approach to financial education, which cultivates both financial literacy and confidence.

This study provides the complexity of financial decision-making in today's economic environment and reinforces the importance of empowering individuals with both the knowledge and the confidence to make informed financial decisions. It lays the groundwork for future initiatives in financial education and policymaking aimed at enhancing financial well-being across generations.

5. Conclusion

This study reflects the evolving options of savings and retirement planning, emphasizing the enriched array of options available to younger generations compared to their pre-Boomer and Baby-Boomer counterparts. The current investigation, leveraging a nationally representative sample from the United States across all generational cohorts,

underscores a pivotal shift, including the role of objective financial knowledge in influencing savings behavior is significantly complemented, and at times moderated, by subjective financial skills, particularly in the realm of stock investments. The findings revealed, merely possessing objective financial knowledge is no longer sufficient for navigating the complex financial decision-making required today. Instead, there is a pronounced need for individuals, especially among younger generations, to cultivate robust financial skills, that not only encompass understanding but also engaging with confidence in financial decision-making processes.

Evaluating this findings, this study advocates for targeted intervention that focus on enhancing subjective financial skills, fostering an environment where individuals not only informed but also confident in their financial choices. The implications of this study allure a reevaluation of current financial education frameworks, suggesting a more holistic prepare individuals for the financial challenges and opportunities of the 21st century. Moving forward, it is imperative that both research and practice align to explore and implement the most effective strategies for empowering individuals with the tools necessary to achieve financial well-being, thereby enriching community practices and enhancing the collective financial literacy landscape.

CRedit authorship contribution statement

Soohyoung Rain Lee: Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Eujiin Jung:** Writing – review & editing, Conceptualization. **Sil Jin:** Writing – original draft, Investigation. **Zhong Anastasia Wang:** Writing – review & editing. **Petra Brown:** Writing – review & editing. **Esther Polotsky:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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