Association between Financial Education, Affective and Cognitive Financial Knowledge, and Financial Behavior

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Using data from the 2018 National Financial Capability Study, this articled examined the relationship between financial education participation and affective and cognitive financial knowledge. Involvement in financial education yielded statistically significant associations between affective and cognitive domains. The results showed that participation in financial education was associated with both cognitive and affective financial knowledge as well as long-term financial behavior. The results supported the case for lifelong learning of financial education for young adults, minorities, and women. An important implication was the need to include both the affective and cognitive domains when teaching or researching financial education.

Keywords: *affective financial knowledge; cognitive financial knowledge; financial behavior; financial education*

Despite many efforts, current research on the association between financial education (FE) and behavior still shows inconclusive results (CFPB, 2015). Some of the diverse results found in these studies were due to differences in sample size, methodology, and loose definition of key concepts (CFPB, 2015; Delgadillo, 2014; Huston, 2010). The Consumer Financial Protection Bureau (CFPB, 2015) comprehensive meta-analysis report indicated that only a few studies in the field of household finance have used datasets with large samples, and even fewer have used longitudinal data or experimental studies with treatment and control variables. Furthermore, the CFPB revealed gaps in the literature regarding evidence-based measures to identify effective FE approaches. The panel of experts stated in the report that most studies have focused on correlational

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analyses. Thus, results have appeared inconsistent, with different studies reporting different conclusions.

It is arguable that studies of FE have also faced the problem of leaving relevant concepts loosely defined (Delgadillo, 2014; Huston, 2010). Delgadillo (2014) recognized that although there are no universally accepted definitions in the financial field, there are differences beyond semantics when it comes to financial literacy and FE. Huston (2010) stated that financial literacy, financial knowledge, and FE are often used interchangeably in the literature and popular media. In her review of more than 70 studies and datasets, Huston noted that about 72% did not include a definition of the constructs. Huston stated that only a few scholars have attempted to define or differentiate these terms.

To overcome the lack of consensus in defining FE, this study used the latest definition of FE given by United States Financial Literacy and Education Commission (USFLEC, 2020). This study has added an alternative measure of FE. Specifically, this study separated FE into affective and cognitive financial knowledge and explored how both domains were related to financial behavior. Researchers have demonstrated that when both measures are used, they have provided more robust and nuanced insights into how FE was related to financial behavior (Allgood & Walstad, 2013; Hadar, Soot, & Fox, 2013; Henager & Cude, 2016; Tang & Baker, 2016).

This study will contribute to the literature by exploring the affective and cognitive domains of FE using data from the most recent National Financial Capability Study (NFCS) sponsored by FINRA, a government-authorized not-for-profit organization that oversees US broker-dealers. The FINRA 2018 NFCS was chosen because it overcomes the shortcomings previously mentioned. In its latest wave, the NFCS surveyed over 25,000 American adults. Findings from the survey were weighted to be representative of Census distributions according to the American Community Survey. National figures were weighted to be representative of the national population in terms of age, gender, ethnicity, education, and Census Division (FINRA, 2019). This study attempted to answer these two research questions: (i) How did participants exposed to FE respond to affective and cognitive financial knowledge questions compared with those who did not have any exposure? and (ii) How was FE exposure associated with short- and long-term financial behavior?

LITERATURE AND CONCEPTUAL FRAMEWORK

Financial Education

This study used the definition of FE as presented in the National Strategy for Financial Literacy report released by the USFLEC for 2020. This document defined FE as the process by which "people gain information, skills, confidence, and motivation to act through various means including classroom education, one-on-one counseling and coaching, technology-based intervention, and self-study" (USFLEC, p. 2).

A partition of FE into two components offers useful guidance. The first part of the FE definition included the words information and skills, which corresponds to the cognitive domain (Delgadillo, 2014). The words confidence and motivation represented the affective domain. The last part of the USFLEC

definition presented the modalities that facilitate FE (e.g., formal, informal, and non-formal classroom education, counseling, coaching, cyber interventions, and self-learning).

In the last decade, behavioral finance (BF) has provided financial professionals with tenets to better understand financial behavior. Traditional theories of finances have assumed that people operate with perfect information, act rationally, and have self-control in financial decision-making (Thaler, 2015). If adult learners were rational agents, providing cognitive financial knowledge would be sufficient to achieve desirable financial results. Adult learners would be able to transfer this new knowledge into action. For example, they would be able to use credit cards wisely, buy homes based on affordability ratios, follow a spending plan, allocate at least 10% of their income for retirement, and so forth. The assumption was simple, provide financial information, and adult learners would be on their path to financial success.

Another principle of BF is that emotions (e.g., confidence and motivation) have played an important role in decision-making. BF has incorporated this fact into decision-making theory (Ariely, 2008, Thaler, 2015). Also, BF has acknowledged the human condition and respected framing, subjective appraisals of situations, biases, heuristics in financial decision-making, and feelings of being under or overconfident. Kahneman (2011) said that these emotional states mediate decisions. Recognizing the human component in financial decision-making has led researchers to consider both the affective and cognitive components of FE.

Operationalization of Affective and Cognitive Domains in Financial Education

Bloom and Krathwohl (1956) provided a theory to operationalize the concept of FE, which we used in this study. In general, Bloom and Krathwohl claimed that any area of teaching and learning can be arranged in three parts: cognitive domain (knowledge), affective domain (attitudes and emotions), and psychomotor domain (skills). Bloom and Krathwohl (1956) conceptualized a system with different categories of learning behavior to assist in the design and assessment of learning.

Affective financial knowledge. In FE, affective learning includes attitudes, motivation, and values. The measurement of these constructs has involved processes including self-reflection appraisals, statements of opinions, beliefs, or assessments of worth (Smith & Ragan, 1999). The affective domain of finance included how learners effectively appraise their dealings with money (Krathwohl, Bloom, & Masia, 1973). The identification of the affective measurements in the 2018 NFCS used in this study was guided by the definition of FE provided by USFLEC (2020), which included confidence and a subjective measurement of financial well-being.

In financial literature, financial confidence has been linked with financial capability (Sherraden, 2013). In studies using financial confidence as a scale, Assad (2015) found that participants' perceived confidence levels impacted their financial well-being and involvement in the learning process. In addition to confidence, researchers have measured the affective domain of finances by using a subjective assessment of financial well-being. For example, Sorgente and Lanz

(2017) used items that looked at individuals' perception and emotional evaluation as direct predictors of financial well-being.

The CFPB has done extensive research into how financial well-being is defined and measured. This research culminated in a report and a financial well-being scale released in 2015. The financial well-being scale was developed from in-depth interviews, research from a variety of academic disciplines, and consultations with financial experts. The 2018 NFCS contained an abbreviated version of the CFPB's financial well-being scale that included items such as perceived financial capability to achieve financial goals, and perceived financial satisfaction. Both items were used in this study to measure affective financial knowledge.

Cognitive financial knowledge. Many FE programs offered in the United States allocate most of their time and effort while teaching to the cognitive domain of finances (Assad, 2015; Fox, Bartholomae, & Lee, 2005; Tang & Baker, 2016). The cognitive domain involves knowledge and numerical skills that can be assessed in six different skills: remember, understand, apply, analyze, evaluate, and create (Krathwohl et al., 1973).

The cognitive domain has used numerical and conceptual financial knowledge. The Global Financial Literacy Excellence Center (GFLEC) developed a measure of cognitive financial knowledge, namely the financial literacy index. The GFLEC index, also known as the Standard & Poor's Ratings Services Global Financial Literacy Survey, is the world's largest, most comprehensive global measurement of financial literacy. It probed knowledge of four basic financial concepts: risk diversification, inflation, numeracy, and interest compounding (Global Financial Literacy Excellence Center, n.d.). Some items that relate to the cognitive domain in finances included: How much more in interest will one pay with a 30-year mortgage as opposed to 15 years? What is the relationship between interest rates and bond prices? What are the differences between simple and compound interest rates? Would buying a single company's stock provide a safer return than a stock mutual fund? Those same items were available in the 2018 NFCS and were used in this study.

Financial Education and Financial Behavior

The evidence of the impact of FE on specific short- and long-term financial behavior has had mixed results. One of the most frequently cited qualitative meta-analyses of FE and financial behaviors argued against FE by claiming that the correlation between cognitive knowledge and financial practices was too small (Fernandes, Lynch, & Netemeyer, 2014). Fernandes et al. (2014) found only small (but statistically significant) correlations between FE and subsequent adaptive short-term behavior (e.g., saving, and avoiding high debt levels) and long-term financial behavior (e.g., planning for retirement) across 13 studies from eight different countries. Fernandes et al. (2014) claimed that FE "explains only 0.10% of the variance in financial behaviors" (p. 1861), and they add that FE "may decay over time" (p. 1866).

In contrast to Fernandes et al. (2014) study, a quantitative meta-analysis study by Kaiser, Lusardi, Menkhoff, and Urban (2020) refuted the findings presented by Fernandes and colleagues. This meta-analysis included 76 randomized control trials and experiments (as opposed to 13 in 2014), and 33 countries (as

opposed to eight) with a total sample of over 166,000 individuals (Kaiser et al., 2020). Kaiser et al. (2020) found that FE had positive *causal effects* on financial knowledge and financial behaviors and that the estimated effect of FE was at least three times as large as the effect documented in Fernandes et al. (2014). Further, accounting for differences in programs, the effects of FE were more than five times as large as the effects reported by Fernandes et al. Treatment effects found by Kaiser et al. (2020) were meaningful in size, like those seen in educational interventions in other domains. Contrary to Fernandes et al. (2014), Kaiser et al. (2020) did not find evidence of a dramatic decay of the effects of FE overtime.

Even though not a lot of research has documented causal relationships between FE programs and positive financial behavior, many studies have documented strong correlations between the lack of FE and financial behavior (Gale & Levine, 2011; Lusardi & Mitchell, 2008; Lusardi & Mitchell, 2014). Americans who did not participate in FE were more likely to make expensive "mistakes" in their financial decisions (Gun, 2017; Lusardi & Mitchell, 2014).

Empirical studies have shown that not participating in FE has had devastating effects on financial well-being (Bell et al., 2009; Mitchell & Lusardi, 2015). Lacking participation in FE was correlated with failing to save for emergencies, overspending, investing in overly risky or overly safe assets, failing to pay credit card bills, retaining costly mortgages and credit cards, failing to do estate planning, or remaining in the fringe economy (Hastings & Mitchell, 2018; Hastings & Tejeda-Ashton, 2008; Hastings, Madrian, & Skimmyhorn, 2013; Jacobson, 2020).

According to research by FINRA, the lack of participation in FE has been associated with a host of negative credit behaviors, including higher borrowing rates, delinquency, and home foreclosure (FINRA, 2019). These negative behaviors were particularly evident among young people. Individuals in the age range of 18 to 34 paid more than older adults in interest to credit card debt and penalty fees. Other financial concerns were student loan repayments and over-indebtedness, which were more common among Millennials than older working-age adults. Furthermore, Millennials were more frequently engaged in expensive money management behaviors than older working-age adults. They also demonstrated lower basic financial math skills while at the same time being more likely to overestimate their own financial knowledge (Board of Governors of the Federal Reserve System, 2019).

Studies on the lack of FE and financial behavior have yielded consistent findings. The lack of exposure to FE has been associated with financial problems such as low asset accumulation or net worth, households underinvesting for retirement, consumers taking on too much debt or using higher cost sources of debt such as using the alternative financial sector (Hastin et al., 2013; Hastings & Mitchell, 2018; Lusardi & Mitchell, 2014; Mandell & Klein, 2009).

Some research has pointed to the directional, significant, and economic importance of relationships between financial knowledge and positive financial behaviors (Hastings et al., 2013; Lusardi & Mitchell, 2014). According to these studies, higher financial literacy—measured with cognitive financial knowledge questions—was correlated with helping consumers make better informed financial decisions, lessening the likelihood of engaging in high-cost credit, helping in the management of risk, and providing consumers with greater control over their financial future.

Affective and Cognitive Knowledge and Short- and Long-term Behavior

Studies have found a positive association between financial education and financial outcomes (Kim & Yuh, 2018; Lusardi & Mitchell, 2007, 2008, 2014; Moore, 2003). Most of these studies have investigated the effect of cognitive knowledge with either short- or long-term behavior. Only a few studies have investigated both the affective and cognitive domains. However, when researchers included both, they found that their results were more robust in understanding the effect of FE on short- and long-term behavior. Moreover, some studies have revealed that affective financial knowledge was more influential than cognitive financial knowledge in determining financial behavior (Allgood & Walstad, 2013; Assad, 2015; Hadar et al., 2013; Henager & Cude, 2016; Tang & Baker, 2016).

Tang and Baker (2016) demonstrated that two individuals with the same level of affective financial knowledge had different responses on their cognitive knowledge levels, which led to different financial behaviors. Similarly, Assad (2015) showed that when participants reported under-confidence or lack of confidence, they were self-critical and doubtful of their financial ability, more anxious, nervous, tense, uncomfortable, and insecure. Interestingly, when confidence was high (overconfidence), but actual cognitive knowledge was low, individuals were more likely to take financial risks by engaging in costly behaviors.

Allgood and Walstad (2013) developed a measure that accounted for both an individual's actual financial knowledge, and self-rating of perceived financial knowledge, to investigate five short-term credit card behaviors. The authors argued that looking at actual financial knowledge and perceived financial knowledge provided "more robust and nuanced insights" about how FE affected short-term financial behavior. Not surprisingly, individuals with both high knowledge and high perceived knowledge were more likely to make "good" financial decisions than individuals with both low knowledge and low perceived knowledge. Somewhat surprising, however, was how influential perceived (as opposed to actual) financial knowledge was on positive short-term credit card behavior, such as paying credit cards bills in full, avoiding fees, decreasing the odds of paying interest, or exceeding the card limit.

Hadar et al. (2013) conducted four studies to understand the relationship between subjective knowledge and objective knowledge. Although Hadar et al. (2013) did not call their variables *affective* or *cognitive knowledge*, their definition of subjective knowledge looked like affective knowledge, and their definition of objective knowledge resembled cognitive knowledge. As indicated by Hadar et al. (2013), cognitive knowledge was more strongly related to an individual's financial expertise. In contrast, affective knowledge was more strongly associated with consumers' confidence in making effective financial decisions. Hadar et al. (2013) used different affective knowledge manipulations related to long-term behavior, such as investing, to show that affective knowledge, independent of cognitive knowledge, and influenced investment decisions. The authors concluded that effective FE for long-term behavior must include both cognitive knowledge and affective knowledge.

Lusardi (2012) reported on the link between financial numeracy and financial decisions. She found that a large group of the adult population were overconfident in their math skills—having high levels of confidence—but the

same subjects performed poorly in the actual calculations. She concluded that the combination of high financial confidence with low numeracy levels was associated with riskier financial behavior. Lusardi noted that these were significant findings because calculations about compound interest serve as the basis of most short- and long-term financial decisions, including using credit cards, savings, engaging in mortgage contracts, or fully appreciating the benefits of investing early.

Henager and Cude (2016) examined the relationship between financial literacy and financial behavior among various age groups. Their financial literacy construct included objective financial knowledge, subjective financial knowledge or confidence, and subjective financial management ability. Both objective and subjective financial literacy variables were positively associated with long- and short-term financial behavior in the full sample. In the age subsamples, subjective financial knowledge, or confidence, was more strongly related to long- and short-term financial behavior than either objective financial knowledge or subjective financial management ability in the younger age groups. In the older age groups, objective financial knowledge was more strongly related to long-term financial behavior than either of the other two measures of financial literacy. Henager and Cude concluded that perceived financial knowledge (affective knowledge) had a stronger relationship than objective knowledge with short-term financial behavior related to spending and saving.

This study focused on the additional evidence from the 2018 NFCS on affective and cognitive measures of financial knowledge. We also examined how exposure to FE is related to short- and long-term financial behavior. Based on the literature review, the authors assumed that individuals with exposure to FE would score higher on the affective and cognitive financial knowledge assessment. The authors also investigated whether affective and cognitive financial knowledge would translate into positive short- and long-term financial behavior. Based on review of empirical studies, the following hypotheses were proposed:

H1: Individuals who participated in FE will report higher levels of affective and cognitive financial knowledge than those who did not participate in FE.
H2: Individuals who participated in FE will be more likely to engage in short- and long-term positive financial behavior as compared to those who did not participate in FE.

METHODOLOGY

Data and Sample

This study employed data from the 2018 National Financial Capability Study (NFCS). The NFCS includes questions related to an individual's perceptions, attitudes, experiences, and behavior on a wide variety of financial topics. A total of 27,091 adults were recruited for the 2018 survey. Out of the 27,091 respondents, a higher proportion of them (N = 27,091) were women (55.9%), baby boomers (34.7%), married (53.4%), White (74.2%), had some college

education (37.4%), employed/self-employed (56.1%), and those with income of $100,000 or greater (19.5%).

In this study, we focused on FE and its association with financial knowledge —separated into affective and cognitive domains—and financial behaviors. If respondents reported either "prefer not to say" or "don't know" on key financial variables (i.e., FE participation, financial knowledge, and financial behavior), they were excluded from the sample. Following this procedure, the final sample size was 7,920 individuals. Sub-samples consisted of 2,415 individuals who participated in FE and 5,505 who did not participate in FE. A higher proportion of the study sample (N = 7,920) were men (61.9%), baby boomers (40.5%), married (61.6%), White (76.8%), with some college education (34.1%), employed/self-employed (61.8%), and those with income of $100,000 or greater (29.6%).

Measurement of Variables

Dependent variables. In the empirical models, the dependent variables were financial knowledge and financial behavior. Financial knowledge was measured by affective and cognitive financial knowledge. The variable of affective financial knowledge was measured using the sum of the five affective knowledge questions—perceived financial knowledge, daily financial management skills, math skills, confidence in goal achievement, and financial satisfaction. The total for responses ranged from 5 = lowest level to 35 = highest level. The variable of cognitive financial knowledge was measured using the sum of six questions—numeracy, inflation, bonds, mortgage, investment, and compound interest. The total for responses to these questions ranged from 1 = zero correct to 7 = all correct.

The short-term financial behavior variable was measured by summing four positive financial behaviors: spending less than or equal to their budget, having liquid savings, paying credit card debt in full each month, and setting aside rainy-day funds. The responses included 1 = none of these behaviors, 2 = one occurrence, 3 = two occurrences, 4 = three occurrences, and 5 = all four behaviors with the total sum ranging from 1 to 5. The long-term financial behavior variable was measured in a similar way by summing four positive financial behaviors: having investment accounts, having 401ks, having IRAs, and having a will. The responses were scored as 1 = none of these behaviors, 2 = one occurrence, 3 = two occurrences, 4 = three occurrences, and 5 = all four behaviors, with the total sum ranging from 1 to 5.

Independent variables. To examine the effect of FE participation on financial knowledge and behavior, we created a dummy categorical variable for FE participation and coded it as 1 if they received FE, and 0 if otherwise. The question for FE participation was the following: "Was FE offered by a school or college you attended, or a workplace where you were employed?" Responses include: (i) being offered FE, but did not participate in FE; (ii) being offered and did participate in FE; and (iii) not offered and did not participate in FE.

Age, gender, marital status, race/ethnicity, education, employment status, and income level were included as independent variables in the multivariate analysis. Age was divided by generation consistent with studies from this data set (Mottola, 2014): Millennials aged 18–37, Generation X aged 38–53, silent

generation aged 73+, and Baby Boomers aged 54–72 (reference group). The measurements of the other socio-demographic variables were as follows: gender (female, [male, reference group]), marital status (never-married single, unmarried single, [married, reference group]), race/ethnicity (Black, Hispanic, Asian/others, [White, reference group]), education level [less than high school/high school graduate, some college education, college graduate, [post-college, reference group]), employment status (self-employed, full/part-time work, retired, [not-work, reference group]), and household income level (<$25,000, $25,000–$49,999, $50,000–$74,999, $75,000–$99,999, [>$100,000, reference group]).

Statistical Analyses

First, means, medians, and percentages of all variables included in the multivariate analyses were calculated. Second, to compare the differences in socio-demographic variables between those who participated in FE and those who did not, chi-square tests were conducted. Third, to examine the effects of FE participation on affective and cognitive financial knowledge, and on short- and long-term financial behaviors, ordinary least squares (OLS) regression analyses were conducted (Hypotheses 1 and 2). To adjust the current statistics to be more representative of the entire population, the weight variable (wgt_n2) from the 2018 NFCS data was used in the OLS regression analyses.

RESULTS

Descriptive Statistics

Table 1 shows the socio-demographic characteristics of the study sample by FE participation status. The descriptive results show that among age groups, 35.8% of those who participated in FE were Millennials, while 24.7% of Generation X, 35.2%, of Baby Boomers, and 4.3% of the silent generation participated in FE. More men (65.5%) had participated in FE than women (34.5%). Among single, never-married individuals, 28.1% participated in FE than those who did not participate in FE (22.0%), while among married individuals, a slightly higher proportion (62.3%) did not participate in FE than those who did participate (59.9%).

White individuals had a greater proportion (79.0%) that did not participate in FE, while minority groups had a greater proportion of participation in FE with 12.9% Black, 7.0% Hispanic, and 8.4% Asian/Other as participants. A smaller portion of those who had a high school or less education participated in FE (9.9%) than those who did not (22.0%); whereas a greater proportion with some college, college degree, and post-degree education (35.8%, 31.8%, 22.5%, respectively) participated in FE than those who did not (33.3%, 25.5%, 19.2%, respectively). A larger proportion of those working (self-employed 9.8% and full/part-time work 57.9%) participated in FE, whereas a greater proportion of those not working (retired 28.5% and unemployed/others 12.1%) did not participate in FE. More than half of those who did not participate in FE had an income of less than $75,000 (53.6%). However, a greater proportion of those who participated in FE had an income of $75,000+ (52.9%).

TABLE 1: Socio-Demographic Characteristics by Financial Education Participation (N = 7,920)

	Participated in Financial Education(n = 2,415)	*Did not Participate in FE (n = 5,505)*	*Test statistics Chi-square (χ^2)*
Age:			
Millennials	35.8%	23.9%	χ^2 = 144.12***
Generation X	24.7%	25.3%	
Baby boomers	35.2%	42.8%	
Silent generation	4.3%	8.0%	
Gender:			
Male	65.5%	60.3%	χ^2 = 19.81***
Female	34.5%	39.7%	
Marital status:			
Married	59.9%	62.3%	χ^2 = 43.79***
Never-married single	28.1%	22.0%	
Unmarried single	12.0%	15.7%	
Race/Ethnicity:			
White	72.7%	79.0%	χ^2 = 76.89***
Black	12.9%	7.2%	
Hispanic	7.0%	6.1%	
Asian/Other	8.4%	7.7%	
Education:			
High school	9.9%	22.0%	χ^2 = 171.35***
Some college education	35.8%	33.3%	
College graduate	31.8%	25.5%	
Post-college	22.5%	19.2%	
Employment status:			
Self-employed	9.8%	8.6%	χ^2 = 53.92***
Full/Part-time work	57.9%	50.8%	
Retired	21.3%	28.5%	
Unemployed/ other	11.0%	12.1%	
Income level:			
Less than $25,000	12.5%	10.9%	χ^2 = 27.97***
$25,000-$49,999	20.5%	17.7%	
$50,000-$74,999	20.6%	18.5%	
$75,000-$99,999	18.1%	20.4%	
Income of $100,000+	28.3%	32.5%	

*p < .05; **p < .01; ***p < .001.

Table 2 compares the difference in affective and cognitive financial knowledge, and short- and long-term financial behaviors between those who participated in FE and those who did not participate in FE. As for the affective financial knowledge, the descriptive results show that those who participated in FE reported significantly higher levels of perceived financial knowledge (5.9),

perceived financial capability (6.3), confidence in math skills (6.2), confidence in financial goals (3.4), and perceived financial satisfaction (6.9) as compared to the averages of those who did not participate in FE.

TABLE 2: Financial Knowledge and Behavior Characteristics by Financial Education Participation (N = 7,920)

		Participated in FE (n = 2,415)	*Did not Participate in FE* (n = 5,505)	*Test statistics*
Affective Knowledge	5–35	28.8	27.6	$t = -9.49$***
Perceived financial knowledge	1–7	5.9	5.6	$t = -13.19$***
Perceived financial capability	1–7	6.3	6.1	$t = -4.18$***
Confidence in math skills	1–7	6.2	6.0	$t = -6.57$***
Confidence in goal achievement	1–4	3.4	3.2	$t = -8.06$***
Perceived financial satisfaction	1–10	6.9	6.6	$t = -5.12$***
Cognitive Knowledge	1–7	5.3	5.3	$t = -0.53$
Interest question correct	1	86.3%	87.6%	$\chi^2 = 2.54$
	0	13.7%	12.4%	
Inflation question correct	1	73.4%	76.7%	$\chi^2 = 10.03$***
	0	26.6%	23.3%	
Bond question correct	1	50.5%	49.1%	$\chi^2 = 1.35$
	0	49.5%	50.9%	
Mortgage question correct	1	91.8%	91.2%	$\chi^2 = 0.81$
	0	8.2%	8.8%	
Portfolio question correct	1	79.9%	83.2%	$\chi^2 = 63.72$***
	0	20.1%	16.8%	
Compounded *i* question correct	1	52.5%	44.8%	$\chi^2 = 39.47$***
	0	47.5%	55.2%	
Short-term Positive Behaviors	1–5	4.0	3.9	$t = -3.80$***
Spending less/equal	1	79.0%	83.0%	$\chi^2 = 18.13$***
	0	21.0%	17.0%	
Having liquid savings	1	87.5%	83.7%	$\chi^2 = 18.88$***
	0	12.5%	16.3%	
Paying credit card debt in full	1	62.2%	58.7%	$\chi^2 = 8.39$***
	0	37.8%	41.3%	
Setting aside emergency funds	1	73.0%	66.1%	$\chi^2 = 37.02$***
	0	27.0%	33.9%	
Long-term Positive Behaviors	1–5	3.5	3.2	$t = -9.13$***
Holding investment accounts	1	61.1%	51.4%	$\chi^2 = 63.72$***
	0	38.9%	48.6%	
Having 401k plans	1	77.3%	29.7%	$\chi^2 = 42.41$***
	0	22.7%	70.3%	
Having IRA plans	1	61.1%	53.4%	$\chi^2 = 40.22$***
	0	38.9%	46.6%	
Having a will	1	54.9%	49.3%	$\chi^2 = 20.80$**
	0	45.1%	50.7%	

*$p < .05$; **$p < .01$; ***$p < .001$.

For cognitive financial knowledge items, the inflation, portfolio, and compounded interest rate questions showed a significant difference between those with and without FE. In regard to inflation and portfolio questions, a greater percentage of individuals who answered the question correctly did not participate in FE, 76.7% and 83.2% respectively. As individuals participated in FE, a higher proportion (52.5%) answered the compounded interest question correctly.

In this study, we measured financial behavior through short- and long-term financial behavior. Short-term financial behaviors were budgeting, paying credit cards in full, and setting aside an emergency fund. When individuals participated in FE, a higher proportion was found to have liquid savings (87.5%), always paying credit cards in full (62.2%), and setting aside an emergency fund (73.0%). Although they did not participate in FE, a high proportion of respondents budgeted (83.0%). Further, as for the long-term financial behaviors, higher proportions were found in the participated in FE group for all four categories (having investment in stock accounts, 61.1%; having a 401k, 77.3%; having an IRA account(s), 79.6%; and having a will, 54.9%) than the non-participation group.

Multivariate Results

We proposed that individuals who participated in FE would have higher affective and cognitive financial knowledge than those who did not (Hypothesis 1). Also, we proposed that individuals who participated in FE would be more likely to engage in positive short- and long-term financial behavior than those who did not (Hypothesis 2). Table 3 shows that all else being equal, the coefficients associated with FE participation were statistically significant and positive for affective financial knowledge and cognitive financial knowledge. Thus, Hypothesis 1 was supported. The OLS results also showed that as individuals had FE, they engaged in long-term financial planning such as having investment accounts, retirement accounts, and a will. However, the effect of FE on short-term financial behavior was not significant; thus, Hypothesis 2 was only partially supported.

Table 3 also shows how affective and cognitive knowledge are associated with short and long-term financial behaviors. The OLS results indicated that as levels of affective financial knowledge increased, short- and long-term financial behavior increased. However, as cognitive financial knowledge increased, while short-term behavior also increased, long-term behavior decreased.

Also, Table 3 showed socio-demographic factors influencing individuals' affective and cognitive financial knowledge as well as short- and long-term financial behaviors. Generation was a significant predictor of financial knowledge and financial behavior. The OLS results showed that younger individuals (Millennials, Generation X) reported lower levels of cognitive financial knowledge than Baby Boomers. Generation Xers also reported lower levels of affective financial knowledge than Baby Boomers. Gender was significant across three of the four regression models (i.e., affective knowledge, cognitive knowledge, and long-term behavior), indicating that women reported lower levels of affective and cognitive financial knowledge, and lower levels of long-term financial behaviors compared with men. Compared to married individuals, unmarried single individuals had significantly lower levels of

TABLE 3: OLS Results: The Effects of Financial Education Participation on Financial Knowledge and Behaviors (N = 7,920)

	Affective Knowledge Est. Coefficient (SE)	*Cognitive Knowledge Est. Coefficient (SE)*	*Short-term Behaviors Est. Coefficient (SE)*	*Long-term Behaviors Est. Coefficient (SE)*
Financial Education Participation				
Participation	1.05 (0.12)***	0.07 (0.03)**	−0.02 (0.02)	0.21 (0.03)***
(Not Participation)				
Financial Knowledge				
Affective knowledge	n/a	n/a	0.10 (0.002)***	0.08 (0.003)***
Cognitive knowledge	n/a	n/a	0.05 (0.001)***	−0.03 (0.01)**
Control Variables:				
Age: (Baby boomer)				
Millennials	−0.05 (0.16)	−0.96 (0.04)***	−0.03 (0.03)	−0.19 (0.04)***
Generation X`	−1.23 (0.15)***	−0.37 (0.04)***	−0.18 (0.03)***	−0.27 (0.04)***
Silent generation	0.80 (0.24)***	0.07 (0.06)	0.04 (0.05)	0.23 (0.06)***
Gender: (Male)				
Female	−0.86 (0.11)***	−0.11 (0.03)***	0.05 (0.02)	−0.08 (0.03)**
Marital Status: (Married)				
Never-married single	−0.06 (0.14)	−0.01 (0.03)	0.04 (0.03)	−0.14 (0.03)***
Unmarried single	−0.38 (0.17)*	0.04 (0.04)	−0.08 (0.03)**	−0.13 (0.04)***
Race/Ethnicity: (White)				
Black	0.83 (0.18)***	−0.80 (0.04)***	−0.18 (0.04)***	0.09 (0.04)*
Hispanic	−0.67 (0.17)***	−0.25 (0.04)***	−0.003 (0.03)	−0.19 (0.04)***
Asian/other	−0.68 (0.19)***	0.01 (0.05)	0.18 (0.04)***	−0.01 (0.04)
Education: (Post-college)				
High school	−0.25 (0.18)	−0.76 (0.05)***	−0.09 (0.04)**	−0.32 (0.04)***
Some college	−0.43 (0.16)**	−0.43 (0.04)***	−0.15 (0.03)***	−0.30 (0.04)***
College graduate	−0.34 (0.17)*	−0.02 (0.04)	−0.03 (0.03)	−0.09 (0.04)**
Employment: (Not-work)				
Self-employed	2.01 (0.24)***	−0.18 (0.06)***	0.20 (0.05)***	0.30 (0.06)***
Full/part-time work	1.29 (0.18)***	−0.15 (0.05)***	0.13 (0.04)***	0.25 (0.04)***
Retired	3.00 (0.22)***	0.02 (0.05)	0.31 (0.04)***	0.43 (0.05)***
Income: ($100,000+)				
Less than $25,000	−4.76 (0.21)***	−0.52 (0.05)***	−0.63 (0.04)***	−1.14 (0.05)***
$25,000–$49,999	−3.28 (0.17)***	−0.40 (0.04)***	−0.40 (0.03)***	−0.70 (0.04)***
$50,000–$74,999	−1.73 (0.16)***	−0.17 (0.04)***	−0.14 (0.03)***	−0.34 (0.04)***
$75,000–$99,999	−0.02 (0.16)	−0.41 (0.04)***	−0.08 (0.03)**	0.06 (0.04)
Constant	28.56 (0.24)***	6.39 (0.06)***	1.09 (0.10)***	1.64 (0.12)***
F-value	111.55***	163.61***	224.17***	224.93***
Adj. R-Square	.22	.29	.38	.38

*p < .05; **p < .01; ***p < .001.

affective financial knowledge and lower short- and long-term financial behavior. However, never-married single individuals had significantly lower levels of long-term financial behavior than married individuals.

Black individuals reported higher levels of affective financial knowledge, but lower levels of cognitive financial knowledge than White individuals. There were significant differences in short- and long-term financial behaviors between

Black and White individuals, suggesting that Black individuals engaged in lower levels of short-term behavior whereas they practiced higher levels of long-term behavior than White individuals. As compared to White individuals, Hispanic individuals reported lower levels of both affective and cognitive financial knowledge, as well as long-term financial behavior. Asian and Other respondents reported lower levels of affective financial knowledge than White individuals, but there were no significant differences in cognitive financial knowledge between Asian and Other individuals and White individuals. However, Asian and Other individuals reported higher levels of short-term financial behavior as compared to White individuals.

Compared to individuals with a post-college degree, those with less than high school or some college education reported lower levels of cognitive financial knowledge as well as lower levels of short- and long-term financial behavior. Individuals with a college degree had lower levels of affective financial knowledge and long-term financial behavior than those with post-college degrees. Income levels were statistically significant in predicting financial knowledge and financial behaviors. When individuals made less than $75,000, they consistently reported lower levels of affective and cognitive financial knowledge and short- and long-term financial behavior than those who made more than $100,000. Table 3 showed that those in the $75,000-$99,999 category reported significantly lower levels of cognitive financial knowledge and short-term financial behavior than those who made $100,000 or more.

DISCUSSION

The purpose of this study was to understand how FE participation influenced financial knowledge and financial behavior. Financial knowledge was separated into affective and cognitive domains. As individuals participated in FE, they showed both higher levels of affective financial knowledge (i.e., perceived financial knowledge, perceived financial capability, math skill confidence, confidence in goal achievement, and perceived financial satisfaction) and cognitive financial knowledge (i.e.., six items of financial literacy quiz). According to the multivariate results, Hypothesis 1 (Individuals who participated in FE will report higher affective and cognitive financial knowledge than those who did not) was supported. While FE in the United States mainly focuses on *cognitive* financial knowledge (Fox et al., 2005), it is essential to recognize *affective* financial knowledge as an important domain in FE. Research has shown that affective knowledge can be more influential in financial behavior than cognitive financial knowledge (Allgood & Walstad, 2013; Henager & Cude, 2016; Tang & Baker, 2016). Thus, it is critical that FE includes both affective and cognitive financial knowledge.

Hypothesis 2 (Individuals who participated in FE are more likely to engage in positive short- and long-term financial behavior than those who did not) was partially supported, as only long-term financial behavior was significantly influenced by FE participation. Short-term financial behavior scale was not significantly different between those who participated in FE and those who did not participate in FE. This result could be because of experiential learning of daily financial management activities, such as budgeting, spending, and paying credit card and other bills in full. Thus, when an adult participates in FE, most

of the gains in learning in the short-term can be reflected in sound long-term financial behavior.

Long-term financial behavior was significantly different between those who participated in FE and those who did not. The results suggested that when individuals participated in FE, they might be more motivated to own an investment account, retirement plan, or have a will. Even though short-term financial behavior was not statistically significant, the results of long-term financial behavior supported previous research about how financial knowledge, FE, and financial behaviors are related (Allgood & Walstad, 2013; Hastings et al., 2013; Lusardi & Mitchell, 2014).

IMPLICATIONS

The results provide practical implications for financial educators and counselors. The first implication for educators, practitioners, and researchers is to consider affective and cognitive knowledge as two important constructs of FE. The definition of FE proposed by the 2020 United States Financial Literacy and Education Commission (USFLEC) includes both domains. Therefore, we recommend using that definition to guide the development, design, and implementation of FE programs and research.

This study provides evidence that those who participated in FE had higher affective and cognitive financial knowledge levels. Moreover, based on the OLS results, as both levels of affective and cognitive financial knowledge increased, so did short-term financial behavior. This finding is consistent with previous research. However, while affective financial knowledge was associated with increased levels of long-term financial behaviors, cognitive knowledge was associated with decreased long-term behavior. When other studies, informed by behavioral finance, included both domains, they found that this balance yields more robust results in understanding the effect of FE in short- and long-term behavior (Allgood & Walstad, 2013; Hadar et al., 2013; Henager & Cude, 2016).

The affective domain of finances—the construct that captures our feelings, perceptions, and self-appraisals of our cognitive knowledge—might be even more critical in determining financial behavior (Allgood & Walstad, 2016; Tang & Baker, 2016). Sorgente and Lanz (2017) found that participants' perceived confidence impacts their financial well-being and involvement in the learning process. Lack of confidence may make individuals self-critical and doubtful of their financial abilities; feeling anxious, nervous, tense, and insecure might lead them to make unsound financial decisions.

We recommend that financial counselors and educators can use this information and include teaching strategies that tap into the affective knowledge domain. When teaching finances, professionals should assume they are teaching humans who will make mistakes, make irrational financial choices, have cognitive limitations, deal with self-control problems, and feel over or under-confidence in pursuing their financial goals. Biases ingrained in adult learners can be overridden, but not overwritten, by affective teaching processes that invite self-reflection, self-assessment, and increased awareness.

We suggest that financial counselors can use the findings of this study to provide more programs, or customize their current programs, to specific populations (e.g., young adults without a high school diploma, women in

general, the unemployed, Hispanic and Black, and individuals who made less than $25,000 per year). These demographic groups showed lower levels in both domains of financial knowledge and lower levels of positive financial behaviors.

We believe that researchers, practitioners, and teachers should consider promoting FE as a lifelong learning activity. As such, FE programs should capture individuals at all stages of development, from high school students, young adults, and college students to older adults, pre-retirees, and retirees. The latest 2018 NFCS provides additional evidence that there are statistically significant associations between FE, operationalized as affective and cognitive knowledge, and positive short- and long-term financial practices.

AUTHORS' CONTRIBUTIONS

Both authors planned the study. Dr. Delgadillo wrote the introduction, literature review, and research questions and hypotheses. Dr. Lee conducted the data analyses and wrote the methods and results sections. Dr. Delgadillo and Dr. Lee contributed to the implications and conclusions. Both authors contributed to revising the article for publication.

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