Examining Financial Anxiety Focusing on Interactions between Financial Knowledge and Financial Self-efficacy

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This study examined whether the association between financial knowledge and financial anxiety depends on an individual's financial self-efficacy by incorporating an interaction term between financial self-efficacy and financial knowledge. The self-efficacy component of the social cognitive theory of self-regulation has been tested using the 2018 National Financial Capability Study dataset. Households with higher financial knowledge and financial self-efficacy had lower levels of financial anxiety. After adding interaction terms of financial knowledge and financial self-efficacy in the model, the relationship between financial knowledge and financial anxiety depended on the levels of financial self-efficacy. Among those with anything less than high financial self-efficacy, the association between financial knowledge and financial anxiety weakens. The study found that financial knowledge and financial self-efficacy were significant in explaining financial anxiety and suggested implications for researchers, educators, and practitioners.

Keywords: financial anxiety, financial self-efficacy, financial knowledge, National Financial Capability Study

Financial anxiety, a feeling of anxiousness or worry due to one's financial situation (Archuleta et al., 2013), deserves greater attention because it is a risk factor in financially-related areas (Hayhoe et al., 2012). Financial anxiety is also a risk factor in non-financially-related aspects of life, including marriage relationships, parenting, job performance, and physical health (Davis & Mantler, 2004; Joo & Garman, 1998). In addition, financial anxiety is associated with negative behavioral involvement, such as smoking and alcohol consumption (Serido et al., 2014; Siahpush et al., 2003) and overall reduced life satisfaction (Mahmoud et al., 2012).

Similar to other generic anxiety, the experience of financial anxiety can be idiosyncratic and sometimes pathologically not well-defined compared to other concepts

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with bodily reactions or symptoms, such as stress (Selye, 1976). What is experienced by some people is not necessarily experienced by others, even though they are all exposed to the same source of anxiety. Because of this characteristic, financial anxiety is considered an individually perceived and experienced symptom.

It is important to note that anyone can experience financial anxiety. Still, susceptibility and response to anxiety may vary and should be addressed through one's capabilities to manage their financial situation. The intensity of financial anxiety can be associated with an individual's financial self-efficacy and financial knowledge. For example, as consumer transactions become more complex with growing consumer debt burdens and responsibility, consumers may feel that their understanding of financial markets and decisions, and their perceived control over the situations, is limited (Batty et al., 2015; Cardaci, 2018; Lusardi & Tufano, 2015; Shapiro & Burchell, 2012). In this sense, a lack of financial self-efficacy and knowledge can be potentially attributable to greater financial anxiety.

It is well established that financial knowledge and financial self-efficacy are associated with effective financial decision-making and behavioral involvement (Jorgensen et al., 2017; Paulus et al., 2015; Shapiro & Burchell, 2012; Shim et al., 2010). Self-efficacy, people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances (Bandura, 1986), is expected to work as a key factor associated with quality of financial life. Financial self-efficacy, as perceived control over financial situations or confidence, is a positive factor associated with financial behaviors (Jorgensen et al., 2017; Shim et al., 2010). In addition, financial knowledge and understanding key financial terms and concepts needed to function daily as an independent financial decision-maker in American society (Bowen, 2002) form the way people make decisions and behave (Shapiro & Burchell, 2012). Paulus et al. (2015) also argued that financial knowledge is associated with financial anxiety. Self-efficacy may complement knowledge and help explain financial anxiety (Bandura, 1991; Bandura, 1997; Mark et al., 2011). Therefore, discussion about financial anxiety should incorporate how to manage it not only through financial planning and counseling intervention but also through the effective decision making and financial competence derived from financial self-efficacy and knowledge (Grable et al., 2015; Shapiro & Burchell, 2012).

Despite the increasing importance of financial self-efficacy and knowledge for desired behaviors and outcomes in various financial areas, how these two constructs relate to psycho-physiological states and what could factor in the relationship have yet to be well documented. Previously, researchers studied the association between financial knowledge and financial anxiety (Paulus et al., 2015; Shapiro & Burchell, 2012) and the association between financial self-efficacy and financial anxiety (Jorgensen et al., 2017; Shim et al., 2010). However, the literature examined these associations separately, not together. To our knowledge, the current literature on the trilateral link between financial self-efficacy, financial knowledge, and financial anxiety is incomplete. The literature needs clarity on a potential supplementary association between financial self-efficacy and financial knowledge. Therefore, this study aims to fill a research gap in the literature on financial anxiety by examining the potential role of financial self-efficacy in the association between financial

knowledge and financial anxiety. In this study, we hypothesize that the relationship between financial knowledge and financial anxiety will depend on the individual's level of financial self-efficacy, such that the relationship between financial knowledge and financial anxiety will strengthen at higher levels of financial self-efficacy. On the other hand, the relationship between financial knowledge and financial anxiety will weaken at lower levels of financial self-efficacy.

The purposes of this study are: (a) to examine the association among financial knowledge, financial self-efficacy, and financial anxiety, controlling for various household characteristics; (b) to analyze the role of financial self-efficacy as a moderator in the association between financial knowledge and financial anxiety; and (c) to provide implications to educators, researchers, and financial practitioners. In particular, we constructed an index of financial anxiety based on three items in the 2018 National Financial Capability Study (NFCS), which measures financial anxiety more comprehensively. In addition, we tested financial self-efficacy and financial knowledge as the determinants of financial anxiety and their interactions in hierarchical regression models. This study contributes to the literature on financial anxiety by providing evidence of a moderating role of financial self-efficacy in exploring the relationship between financial knowledge and financial anxiety.

LITERATURE REVIEW

Previous research did not extensively discuss the combined association among financial knowledge, financial self-efficacy, and financial anxiety. However, the findings can be useful for practitioners if the combined effects of interaction terms between financial knowledge and financial self-efficacy exist. Before presenting the analytic findings, the following review showed how previous literature investigated each concept and their independent associations (e.g., between financial knowledge and financial anxiety, and financial self-efficacy and financial anxiety). Based on the literature and theory, three hypotheses about their associations between financial knowledge, financial self-efficacy, and financial anxiety will be established.

Measurement of Financial Anxiety

In this study, financial anxiety is the main concept explained by financial self-efficacy and financial knowledge. Financial anxiety is often defined as a psychosocial syndrome manifested by someone having an unhealthy attitude toward thinking about, engaging with, or managing their personal finances effectively (Burchell, 2003). Shapiro and Burchell (2012) more broadly defined financial anxiety to include physiological arousal to behavior as "psychosocial syndrome whereby individuals have an uneasy and unhealthy attitude toward engaging with and administering their finances in an effective way" (Shapiro & Burchell, 2012, p. 93). Although these definitions consider financial anxiety an unhealthy attitude, it is unclear what an "unhealthy" attitude means. Archuleta et al. (2013) put forward a more workable definition of financial anxiety, which refers to feelings of anxiousness or worry due to one's financial situation.

<u>Financial Anxiety</u>

Based on the above concept of financial anxiety, measures of financial anxiety differ by studies (Archuleta et al., 2013; Shapiro & Burchell, 2012). Shapiro and Burchell (2012) suggested that financial anxiety can be constructed by subconscious measures as well as conscious and subjective measures. Researchers used overall anxiety measures using subjective metrics for financial anxiety (Archuleta et al., 2013). Some researchers have formalized the concept of financial anxiety by adapting it from criteria (i.e., anxiousness, irritability, difficulty controlling worry, difficulty sleeping, difficulty concentrating at work/school, muscle tension, and fatigue) set forth by Generalized Anxiety Disorder found in the Diagnostic and Statistical Manual of Mental Disorders-IV-TR (i.e., DSM-IV-TR; APA, 2000) and applying similar criteria to one's financial situation (Archuleta et al., 2013).

Measurement of Financial Knowledge

Huston (2010) has noted that the measurement of financial knowledge is dominated by measures of objective knowledge focused on the cognitive dimensions of the construct and relies on a test measure of what people know or understand about financial concepts. This type of knowledge is most often measured using a set of multiple-choice or true-false test questions (Hastings et al., 2013; Hilgert et al., 2003; Lusardi & Mitchell, 2014). There is no consistency in the number of questions asked, with the minimum amount being three and the maximum of 68 (Huston, 2010), to measure objective financial knowledge; however, most research uses one or more of the following content areas: money basics, investing, borrowing, and protecting resources (Huston, 2010).

Measurement of Financial Self-efficacy

Researchers have measured financial self-efficacy differently. Some researchers have created scales to construct a subjective measure of efficacy specific to financial matters (Hoge et al., 2017; Lown, 2011; Montford & Goldsmith, 2016). Most studies have employed a single-item measurement of financial self-efficacy (Asebedo, 2016; Sass et al., 2015; Smith et al., 2013; Xiao & Porto, 2017). Among the researchers who used a single item, some have operationalized financial self-efficacy as a measure of one's perceived control (Asebedo, 2016; Smith et al., 2013), while others have focused on perceived financial confidence (Danes & Haberman, 2007; Heckman & Grable, 2011). Hira (2010) also defined self-efficacy as confidence in one's ability to deal with a situation without being overwhelmed.

Association among Financial Knowledge, Financial Anxiety, and Financial Self-efficacy

The literature has relatively well established that effective financial decision-making is related to financial knowledge and financial anxiety (Shapiro & Burchell, 2012). Research suggests that those experiencing financial anxiety have difficulty making decisions (Ackert et al., 2003). Shapiro and Burchell (2012) noted that individuals who experience financial anxiety have a subliminal bias in processing financial information. They also noted that those with an anxious disposition toward a cognitive engagement with their finances are more likely to use avoidance mechanisms, a defense procedure. People with higher levels of financial knowledge commonly exhibit less anxiety about financial matters (Lind et al., 2020; Tinghög et al., 2021).

Hayhoe et al. (2012) found that those with lower anxiety levels tend to engage in more recommended financial management behaviors (e.g., spending and financial goal setting). Those who present lower anxiety levels are also more likely to save regularly. Furthermore, Sages et al. (2013) linked anxiety to three financial management behaviors: (a) spending more than earnings, (b) difficulty paying bills due to insufficient income, and (c) reaching the maximum limit on credit cards. In their study, anxiety was not significantly associated with making oneself aware of the total amount of money one owes, paying credit card bills in full to avoid finance charges, or obtaining cash advances to pay money toward other credit card balances.

Research supports the hypothesis that financial knowledge is associated with increased financial self-efficacy. In a national survey, Warmath and Zimmerman (2019) reported a positive association between financial self-efficacy and individuals' perception of their knowledge of financial matters compared to the average person. In a study of young adults, researchers found that those who had received financial education from their parents and greater financial self-efficacy were more likely to perform positive financial behaviors (Jorgensen et al., 2017). A study by Shim et al. (2010) concluded that an individual's self-assessment of their ability had a stronger relationship to behaviors than objective financial knowledge. Shim et al. (2010) concluded that when parents served as role models, the young adults in the study felt they had greater control over their financial behaviors.

Theoretical Background

Bandura (1986) introduced the social cognitive theory of self-regulation, known as self-efficacy (hereafter). Increased self-efficacy is associated with what Bandura calls "success orientation." This mindset allows people to take on challenging tasks, intensify their efforts if they fail instead of giving up, and approach taxing situations with little stress. As a result, self-efficacy plays an important role in influencing the course of one's life (Bandura, 1997) and life satisfaction (O'Sullivan, 2011; Posadzki et al., 2009). Those with higher self-efficacy think, act, and feel differently from those who are less efficacious.

Self-efficacy is theoretically associated with anxiety. A human being's brain perceives an anxious stimulus, and it causes physiological responses (Everly & Sobelman, 1987). Self-efficacy is expected to be associated with emotional and physiological states (Bandura, 1986, 1997). When discussing self-efficacy and anxiety-related responses, a focus should be made on what is "perceived" by individuals because different responses can occur when and how a stimulus is perceived (Carlson & Perrewé, 1999; Everly & Sobelman, 1987). Without the perception of an anxious situation, an anxious-related response cannot be captured.

Previous studies have reported that self-efficacy is associated with learning performance (Bandura, 1997; Linnenbrink & Pintrich, 2003; Pajares, 1996; Schunk, 1996) and the knowledge and skills required to perform desired behaviors and promote outcomes.. Paulus et al. (2015) discussed the association between knowledge and anxiety. As the self-efficacy theory suggests its significant role in various life achievements and aspects, studies also found the contribution of perceived self-efficacy to anxiety and depression (Bandura, 1997). Muris (2002) found that low levels of self-efficacy were related to high levels of

anxiety and depressive symptoms, and specific domains of self-efficacy are associated with particular types of anxiety. In summary, theory revealed self-efficacy, anxiety-related responses, and knowledge to be associated with each other. In this sense, it can be hypothesized that self-efficacy moderates the association between knowledge and anxious responses in addition to its main effect. In this study, this hypothesis is investigated in the financial realm.

Based on the social cognitive theory of self-regulation and previous studies, this research studied the association among knowledge, self-efficacy, and anxiety in the financial domain. In particular, this study investigated the role of financial self-efficacy as a moderator on the association between financial knowledge and financial anxiety (Figure 1). Specific research hypotheses are as follows:

H1. Financial knowledge will be negatively related to financial anxiety.

H2. Financial self-efficacy will be negatively related to financial anxiety.

H3. Financial self-efficacy will be interactively related to the association between financial knowledge and financial anxiety.

Figure 1.

Interaction between Financial Self-efficacy and Financial Knowledge for Financial Anxiety.
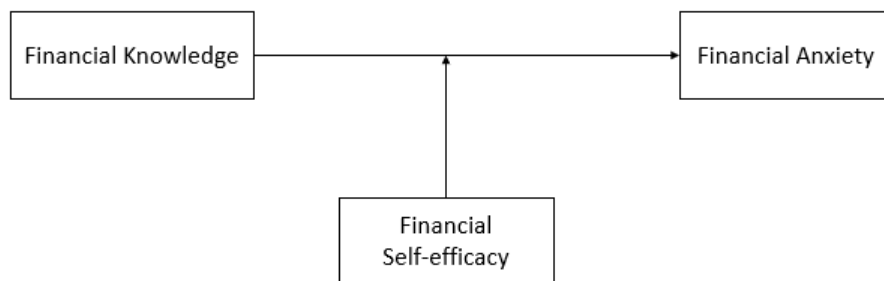
METHOD

Dataset and Sample Selection

This study used the 2018 National Financial Capability Study (NFCS) dataset released triennially by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation in the United States since 2009. The NFCS was designed to explore the financial capability of U.S. households and investigate differences associated with demographic, attitudinal, behavioral, and financial literacy characteristics. The 2018 NFCS collected data from 500 respondents from each state and the District of Columbia, oversampling Oregon and Washington. The total number in the sample of the 2018 NFCS was 27,091. Our final analytic sample included 24,056 respondents because we excluded those with missing

values for dependent and independent variables. Both descriptive and multivariate results are weighted to be representative of the U.S. national population.

Dependent Variable: Financial Anxiety

The 2018 NFCS includes three psycho-physiological symptom questions to measure financial anxiety: "Discussing my finances can make my heart race or make me feel stressed," "Thinking about my personal finances can make me feel anxious," and "I worry about running out of money in retirement." All three variables were measured on a scale of 1 *(strongly disagree)* to 7 *(strongly agree)*. Following previous studies (e.g., Shapiro & Burchell, 2012) that measure financial anxiety, three items were used to construct the financial anxiety variable. Cronbach's alpha coefficient for the three items was 0.8786, greater than the suggested value of 0.7 (Nunnally & Bernstein, 1994), and suggested the items have internal consistency. Specifically, we created a composite index of financial anxiety with polychoric correlations using a principal component analysis (PCA) to measure the concept more comprehensively. PCA is a data reduction technique designed initially for linear combinations of variables with a maximum variance; thus, the distribution assumption can be violated when the data are discrete, such as our categorical survey items (Kolenikov & Angeles, 2004; 2009). Thus, following previous studies (Kolenikov & Angeles, 2004; 2009, Lee & Kim, 2016), we used polychoric correlations of the items for PCA.[1] The score of the composite variable ranged from 1.7 to 12.1.

Focal Independent Variables

Financial Knowledge

This study measured financial knowledge based on the five questions presented by Lusardi and Mitchell (2011). The financial knowledge questions were about the time value of money, inflation, bonds, mortgages, and stocks. The number of correct answers to the five financial knowledge questions consisted of a fundamental concept and simple application questions about personal finance. The scores ranged from 0 to 5. Financial knowledge was mean-centered.

Financial Self-efficacy

A financial self-efficacy item was adapted from Danes and Haberman (2007) and Heckman and Grable (2011). It asked, "If you were to set a financial goal for yourself today, how confident are you in your ability to achieve it?" The response choices were 1 (not at all confident), 2 (not very confident), 3 (somewhat confident), and 4 (very confident). This unidimensional item (i.e., a single item) asked for the confidence level with the order but without zero, not as a nominal category. Therefore, this study used ordinal operationalization for this item (Price, 2017).

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[1] Full results will be provided upon request.

Socio-demographic Characteristics

In addition to financial knowledge and financial self-efficacy, the following set of socio-demographic variables was included as controls: age, age squared/100, race/ethnicity (**White**[2], Black, Hispanic, Asian/others), education (**high school or less**, some college, bachelor's degree, post-graduate degree), gender (male, **female**), marital status (**married**, single, separated/divorced/widowed), presence of dependent children (yes, **no**), employment status (**salaried worker**, self-employed, retired, not working including homemaker, student, disabled, unemployed), household income (**less than $25,000**, $25,000 - $50,000, $50,000 - $100,000, $100,000 or more), and risk tolerance (1: not at all willing -10: very willing).

Empirical Model

We estimated three Ordinary Least Squares (OLS) regression models to analyze the association between financial knowledge, financial self-efficacy, and financial anxiety controlling for various household characteristics. First, we conducted a baseline regression to analyze the relationship between financial knowledge and financial anxiety (Model 1). Second, financial self-efficacy was added to the model (Model 2). To test the explanatory power of financial self-efficacy, this study constructed a hierarchical model and performed an F-test with the null hypothesis that the regression coefficient of the financial self-efficacy variable was zero. Third, this study hypothesized that financial self-efficacy would moderate the relationship between financial knowledge and financial anxiety. Thus, we estimated the moderating effect of financial self-efficacy by adding interaction terms between financial knowledge and financial self-efficacy variables (Model 3). The interaction terms were created by *financial knowledge * financial self-efficacy*. Based on our hypotheses and the use of interaction terms between the two variables, a hierarchical model can provide greater detail of how they work separately and together than a single model.

Model 1: Financial anxiety = f (financial knowledge, socio-demographic characteristics)

Model 2: Financial anxiety = f (financial knowledge, financial self-efficacy, socio-demographic characteristics)

Model 3: Financial anxiety = f (financial knowledge, financial self-efficacy, interaction terms, socio-demographic characteristics)

RESULTS

Descriptive Results

Table 1 shows descriptive statistics of sample characteristics. Most households had completed some college or more (71%), 52% were married, 64% were Whites, and 36% had at least one financially dependent child. Approximately 50% of respondents were salaried workers (i.e., full-time and part-time), 7% were self-employed, 21% were not currently

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[2] Reference groups in multivariate analyses were presented in bold.

working (homemaker, student, disabled, unemployed), and 22% were retired. Lastly, the average household income of half of the households fell between $35,000 and $100,000. Concerning households' general sociodemographic characteristics, respondents' mean age was 47, and the risk tolerance level was 5.0 out of 10.

Table 1.

Sample Socio-demographic Characteristics, 2018 NFCS (N=24,056).

Characteristics	Percentage (%)	Mean (Median), SD
Gender		
Male	49.3	
Female	50.7	
Race/ethnicity		
White	64.3	
Black	11.5	
Hispanic	15.9	
Asian/others	8.3	
Marital status		
Married	52.0	
Single	31.7	
Separated/divorced/widowed	16.4	
Presence of dependent child		
Yes	36.0	
No	64.0	
Education		
Less than high school	2.5	
High school	27.0	
Some college	39.9	
Bachelor degree	18.9	
Post-graduate degree	11.8	
Employment status		
Salaried	50.2	
Self-employed	7.3	
Retired	21.8	
Not working (homemaker, student, disabled, unemployed)	20.7	
Household income		
Less than $15,000	10.9	
At least $15,000 but less than $25,000	10.5	
At least $25,000 but less than $35,000	10.9	
At least $35,000 but less than $50,000	14.7	
At least $50,000 but less than $75,000	19.4	
At least $75,000 but less than $100,000	14.2	
At least $100,000 but less than $150,000	12.8	
$150,000 or more	6.6	
Age of respondent		47.1 (47.0), 16.8
Risk tolerance		5.0 (5.0), 2.7

Weighted results.

Table 2 presents the descriptive results of focal variables, such as financial anxiety, financial knowledge, and financial self-efficacy. The mean level of the composite index of financial anxiety was 7.6 (3.2) of 12.1, and that of each item in the financial anxiety score was 4.1 (2.1), 4.5 (2.0), and 4.5 (2.0) of 7.0, for stress, anxiousness, and worry, respectively. The mean level of financial knowledge was 2.8 (1.4) of 5.0. Approximately 34% of households reported being very confident about their ability to achieve a financial goal, and 44% answered "somewhat confident." In comparison, 16% were "not very confident," and 7% were "not at all confident."

Table 2.

Focal Variables, 2018 NFCS (N=24,056).

Variables	Mean (Median), S.D.	Percentage (%)
Dependent variables		
Composite index	7.6 (8.0), 3.2	
Stress	4.1 (4.0), 2.1	
Anxiousness	4.5 (5.0), 2.0	
Worry	4.5 (5.0), 2.0	
Independent variables		
Financial knowledge	2.8 (3.0), 1.4	
Financial self-efficacy		
Very confident		33.7
Somewhat confident		43.8
Not very confident		15.6
Not at all confident		6.9

Multivariate Results: OLS Regression

Table 3 shows the regression results in a hierarchy. In the baseline model (Model 1), the results revealed that the level of financial knowledge was negatively associated with levels of financial anxiety, supporting H_1. The change in the composite index of centered financial anxiety decreased by 0.2534 as the financial knowledge level increased. Model 2 incorporates financial self-efficacy. The results were similar after adding financial self-efficacy. Financial knowledge level was still negatively related to financial anxiety, supporting H_1; financial anxiety decreased by 0.2199 when centered financial knowledge increased by 1 unit. Lower levels of financial efficacy were positively related to financial anxiety levels, supporting H_2. Compared to those who feel very confident about their ability to achieve a financial goal, the other groups who feel less confident (somewhat confident, not very confident, or not at all confident) had higher levels of financial anxiety. Specifically, compared to the "Very confident" group, the "Somewhat confident," "Not very confident," and "Not at all confident" groups showed 1.8020, 3.3205, and 3.9239 higher levels of financial anxiety, respectively. Our F-test across all specifications implies that the regression model's explanatory power increased when financial self-efficacy was added.

To test the moderating effect of financial self-efficacy on the association between financial knowledge and financial anxiety, we conducted additional analyses that include the

interaction terms between financial self-efficacy and financial knowledge, as shown in Model 3. The results of financial self-efficacy and financial knowledge remained similar to those of the previous models, even after including the interaction terms between financial knowledge and financial self-efficacy, which indicates that higher financial knowledge was related negatively to levels of financial anxiety, supporting H_1. In contrast, lower levels of financial self-efficacy were related positively to those of financial anxiety, supporting H_2.

Regarding the moderating role of financial self-efficacy, levels of financial self-efficacy were related to the association between financial knowledge and financial anxiety, supporting H_3. Even though financial knowledge was negatively associated with financial anxiety, its role became offset when it interacted with a lack of financial self-efficacy. The main effect of the centered financial knowledge on financial anxiety was -0.5955. An increase in the centered financial knowledge for those who reported "Somewhat confident" would have a decrease of 0.1263 in financial anxiety levels.

In contrast, "Not at all confident" and "Not very confident" were related to a 0.1438 and 0.1423 increase in financial anxiety levels, respectively (see Appendix). Lower levels of financial self-efficacy had a higher level of financial anxiety than the highest level of financial self-efficacy; however, among those with the average level of financial knowledge, lower levels of financial self-efficacy can be related to higher levels of financial anxiety. Results of an F-test suggest that when the interaction terms were added, the regression model's explanatory power increased.

Most control variables remained significant across all three models despite some variations in their categories. These findings show that (a) financial self-efficacy had a moderating effect mainly on the association between financial knowledge and financial anxiety, but (b) financial self-efficacy did not influence the socio-demographic factors' effects on financial anxiety as they were used as controls for the focal variables. Specifically, the combined effect of age and age-squared showed a curvilinear relationship with financial anxiety; for example, in Model 1, financial anxiety was positively related to age until 38.2 years old and then decreased. Race, gender, employment status, and income were related negatively to levels of financial anxiety, while education and the presence of a dependent child were related positively to financial anxiety levels. Risk tolerance was negatively related to financial anxiety in Model 1 while positively related to Models 2 and 3.

Table 3.

Regression Results: With Financial Self-efficacy and Financial Knowledge Interaction Terms, 2018 NFCS (N=24,056).

Variable	Model 1		Model 2		Model 3	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Financial knowledge (FK)	-0.2534***	0.0152	-0.2199***	0.0139	-0.5955***	0.0217
Financial self-efficacy (ref: Very confident)						
Somewhat confident (A)	-	-	1.8020***	0.0408	1.7075***	0.0406
Not very confident (B)	-	-	3.3205***	0.0561	3.3018***	0.0559
Not at all confident (C)	-	-	3.9239***	0.0780	4.0096***	0.0809
Interaction terms						
A * F.K.	-	-	-	-	0.4692***	0.0271
B * F.K.	-	-	-	-	0.7378***	0.0372
C * F.K.	-	-	-	-	0.7393***	0.0499
Socio-demographic characteristics					-	
Age of respondent	0.0824***	0.0074	0.0338***	0.0069	0.0365***	0.0068
Age 2/100	-0.1079***	0.8057	-0.0626***	0.7409	-0.0646***	0.7327
Race (ref: White)						
Black	-0.4294***	0.0629	-0.1262*	0.0577	-0.2035***	0.0572
Hispanic	-0.0680	0.0546	0.0010	0.0500	-0.0044	0.0494
Asian/others	-0.0491	0.0700	-0.0915	0.0641	-0.1150	0.0634
Education (ref: High school or less)						
Some college	0.3721***	0.0468	0.3525***	0.0428	0.32558***	0.0423
Bachelor degree	0.1010	0.0594	0.1319*	0.0543	0.1335*	0.0537
Post-graduate degree	0.0646	0.0711	0.1593*	0.0651	0.19854**	0.0644
Male (ref: Female)	-0.5184***	0.04031	-0.4947***	0.0369	-0.51071***	0.0365
Marital status (ref: Married)						
Single	0.0946	0.05307	-0.0080	0.0486	-0.0020	0.0480
Separated/divorced/ widowed	0.1321*	0.05790	-0.0155	0.0530	-0.0074	0.0524
Presence of dependent child (ref: No)	0.5776***	0.0452	0.4441***	0.0414	0.4107***	0.0410

Variable	Model 1		Model 2		Model 3	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Employment status (ref: Salaried)						
Self-employed	-0.1570*	0.0746	-0.0855	0.0683	-0.1038	0.0675
Retired	-1.0600***	0.0686	-0.7279***	0.0630	-0.7063***	0.0623
Not working	-0.1938**	0.0533	-0.3740***	0.0490	-0.3517***	0.0485
Household income (ref: Less than $25,000)						
$25,000 - $50,000	-0.3606***	0.0578	-0.0934	0.0532	-0.1434**	0.0526
$50,000 - $100,000	-0.8913***	0.0602	-0.2664***	0.0560	-0.3104***	0.0554
$100,000 or more	-1.6948***	0.0732	-0.8078***	0.0683	-0.7669***	0.0675
Risk tolerance	-0.0199**	0.0077	0.0956***	0.0072	0.0876***	0.0071
Intercept	7.4139***	0.1841	5.9583***	0.1705	6.0661***	0.1687
Adjusted R^2	0.1697		0.3047		0.3205	
F-test for interaction terms			1556.4***		187.25***	

Weighted results. Significance levels are indicated by *** $p < .001$, ** $p < .01$, * $p < .0.05$.

Financial Anxiety

DISCUSSION

This study used a large-scale, national data set from the U.S. 2018 National Financial Capability Study to examine associations between financial knowledge and financial anxiety. Financial knowledge was measured using the Big Five questions. Financial anxiety was constructed with three items that proxy psycho and physiological states (stress, anxiousness, worry) using a principal component analysis with polychoric correlations to encompass such states comprehensively with methodological justification. The study also explored the role of financial self-efficacy as a moderator to test the supplementary association between financial knowledge and self-efficacy on financial anxiety variables based on self-efficacy theory. Our OLS results show that financial knowledge and financial self-efficacy were negatively related to financial anxiety, supporting H_1 and H_2. Results also show that the interaction terms between financial knowledge and financial self-efficacy were significant, supporting H_3 after controlling for socio-demographic characteristics.

The findings of this study indicate that having higher financial knowledge and financial self-efficacy is negatively associated with financial anxiety, which is consistent with previous research (Paulus et al., 2015). This evidence shows multiple benefits of having higher levels of financial knowledge and self-efficacy, which can boost its positive main effect when working together: Financial self-efficacy can relieve consumers' financial anxiety and reinforce the role of their financial knowledge if it is at higher levels. However, when financial self-efficacy levels are low, the positive role of financial knowledge could disappear. Financial anxiety-related emotional and physiological states were not mitigated when financial self-efficacy was low, even though financial knowledge was high. This implies that higher levels of one's perceived control or confidence in one's ability to deal with situations without being overwhelmed (Asebedo, 2016; Hira, 2010; Smith et al., 2013) can help people respond to financial anxiety better and make financial knowledge work to reduce financial anxiety.

This study gives implications to researchers and financial therapy and counseling practitioners in household finances that financial knowledge should be considered when financial self-efficacy is estimated. For instance, practitioners in front of clients with higher financial knowledge should be cautious of the sensitive response about financial anxiety when their financial self-efficacy level is low and help them improve their financial self-efficacy to reduce their financial anxiety. Practitioners should ask whether the client's feelings align with their current financial situation and assess financial self-efficacy before implementing therapeutic practices.

Emotional and physiological responses could be associated with how people perceive and engage in a stressful situation and assessment of their life, which is subject to psychological mechanisms and circumstances (Diener et al., 2002; Park et al., 2020). Studies based on self-efficacy theory suggest that self-efficacy can complement the knowledge and actual capability and ease the emotional and physiological state through goal orientation (Bandura, 1991). Our findings add empirical insights into the interactions and highlight the importance of financial self-efficacy at high levels. Studies also suggest that self-efficacy increases the capacity to manage behavior and face challenges (Bandura, 1991; Mark et al.,

2011), pushing people to perform more persistently (Bandura, 1997). These attitudes, beliefs, and behavioral tendencies can form psychological hardiness that buffers against stress (Lambert & Lambert, 1999) and one's satisfaction with life (Posadzki et al., 2009).

Effective financial decision-making and behavioral involvement improving commitment and control with financial knowledge and financial self-efficacy can deal with financial anxiety. This implies that psycho-social intervention, such as Cognitive Behavioral Therapy, is useful on the practical side. Based on Cognitive Behavioral Therapy, positive emotion leads to positive thoughts, behavioral changes, and a balanced life (Beck, 2011). Educators and practitioners in financial therapy and counseling can note our findings to empower students through improved financial self-efficacy. Students can utilize their financial knowledge more proactively in their financial life and handle financial stress better, resulting in life satisfaction.

Our findings describe how demographic characteristics can relate to financial anxiety. For example, a curvilinear association of age with financial anxiety, which means that financial anxiety was positively related to age but only up to a certain point, after which financial anxiety was negatively related to age, can be related to how people perceive their financial well-being. The subjective financial well-being of the retired group, with a mean age of 70, was higher than that of the non-retired group, with a mean age of 44 (Lim & Lee, 2021). Life conditions that can create financial responsibility, such as having a dependent child and having a higher education attainment than a high school diploma, were related to higher financial anxiety. In contrast, other conditions that can present greater resource capacity can be associated with lower levels of financial anxiety. For example, retired individuals have lower levels of financial anxiety. This may be due to people's steady income from their retirement funds. People with higher levels of income have lower levels of financial anxiety. This may be due to having more disposable income and assets. Males have less financial anxiety. Women are typically more anxious about their future financial security and are more intimidated than men about financial issues (Anthes & Most, 2000). These results call for future studies and counseling and therapy programs targeting group-specific interventions to deal with financial anxiety.

Limitations and Conclusion

Due to the data availability, our financial knowledge, self-efficacy, and anxiety measures were limited to the questions asked in the survey, although these were based on previous literature. Depending on the research context, purpose, and literature selected, other methods may be used to measure financial knowledge, financial self-efficacy, and anxiety in a more direct and diverse way, such as an experiment or other survey questions. Another limitation is that the data are cross-sectional. Thus, the results only show associations between dependent and independent variables that only imply potential effects of financial knowledge and self-efficacy on financial anxiety. This study did not address a causal relationship between the variables. Future studies using longitudinal data or other research designs, such as well-controlled field studies or lab studies, could further explore the potential causality of the variables. For example, researchers can assess whether financial self-efficacy and financial knowledge can be manipulated experimentally in future

studies. Further, although this study used interaction terms and hierarchical orders to differentiate the roles of financial knowledge and financial self-efficacy based on the theory, the moderation effect can be analyzed by future studies and expanded through diversified research methods, such as experiment design.

Even though this study has the limitations noted above, it highlights significant associations between financial knowledge self-efficacy and financial anxiety based on a large-scale data set and methodological diversification and justification of measures and analyses, in which further exploration, application, and discussion are expected by financial therapists, consumer educators, policymakers, and researchers. Additional research can explore associations between financial anxiety and financial knowledge using this nationally representative sample with comprehensive financial knowledge and behavior measures. For example, similar research can be replicated among different demographic groups to generate useful information for financial educators working with diverse populations.

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APPENDIX

Total Effect Calculations

Dependent variables	FK	FSE 1	FSE 2	FSE 3	FK * FSE 1	FK * FSE 2	FK * FSE 3	FK Total effect
Panel A: Model 1. Financial knowledge								
Financial Anxiety	- 0.25							- 0.25
Panel B: Model 2. Financial knowledge and financial self-efficacy								
Financial Anxiety	- 0.22	1.80	3.32	3.92				- 0.22
Panel C: Model 3. Financial knowledge, financial self-efficacy, and interactions								
Financial Anxiety	- 0.60	1.71	3.30	4.01	0.47	0.74	0.74	If FSE1, -0.13 If FSE2, 0.14 If FSE3, 0.14