

**Financial Literacy as More than Knowledge: The Development of a Formative Scale  
through the Lens of Bloom's Taxonomy of Knowledge**

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ABSTRACT

For well over a decade, financial literacy has been a primary lens through which researchers approach financial education. Unfortunately, in most cases, this potentially rich construct is reduced to mere financial knowledge. This myopic conceptualization hampers the development of the concept and programs to build financial literacy. Despite research that reveals these limits, the field has either persisted with this narrow definition of financial literacy or abandoned the model altogether in favor of capability or similar constructs. Using Bloom's domains of knowledge, we redefine financial literacy as the combination of three different indicators reflecting three domains of knowledge: financial skill, self-efficacy, and explicit knowledge. Using data from a national survey, we apply the methods of formative scale development to construct and validate a more robust conceptualization and measurement of financial literacy. We explore how this financial literacy index might inform development of innovative financial education programs.

The burden of financial responsibility is increasingly shifting to the individual American who is more than likely ill-prepared to handle the challenge (Erturk et al. 2007; Mandell and Klein 2009). Numerous studies provide evidence of the challenges most Americans face. Roughly 59% of American households do not have a budget or spending plan (US Bank 2016). Emergency savings is lacking in 61% of households (Martin 2018). One-third of Americans have saved less than \$5,000 with 21% having zero saved for retirement (Northwestern Mutual 2018). Circumstances such as these may lead to higher rates of material hardship and psychological distress (Dakin and Wampler 2008).

Some researchers, practitioners, and policymakers suggest that people with higher levels of financial literacy are more likely to avoid these economic and psychological circumstances (Mandell and Klein 2009; Robb and Woodyard 2011). The result has been a proliferation of programs designed to impact knowledge of financial concepts. The model underlying these efforts is that financial literacy supports better financial decision making and increases the probability of achieving desirable financial outcomes (Collins and O'Rourke 2010). While there is some evidence that this relationship may be true for longer horizon financial behaviors (Wagner and Walstad 2018), the weight of the evidence mostly concludes that it has little to no effect (Allgood and Walstad 2016; Borden et al. 2008; Fernandes, Lynch, and Netemeyer 2014; Jones 2006; Robb and Woodyard 2011).

Despite more than a decade of research, practice, and policy related to financial literacy, however, the concept and its relationship to financial decision making remain underdeveloped. Financial literacy has become synonymous with explicit financial knowledge with these terms being used interchangeably (Fernandes, Lynch, and Netemeyer 2014; Lusardi and Mitchell 2007 2014). Yet literacy includes more than cognitive knowledge. If we extend the current logic of

financial literacy to the realm of reading and writing literacy, only those individuals who are able to identify direct objects and diagram sentences would be deemed literate. The majority of US adults, many of them persuasive and articulate readers and writers, would likely fail such a test.<sup>1</sup> Moreover, as literacy experts have demonstrated, the best way to learn to read (or write) is to read (or write). This method builds the skills, knowledge, and self-efficacy required to increase literacy levels. Learning to read or write also requires the creation of safe spaces in which learners can make mistakes safely and increase their capability as a result.

We argue that the current myopic conceptualization and operationalization of financial literacy hamper creativity and innovation in financial education. Despite attempts to broaden our understanding (Huston 2010; Remund 2010), the lion's share of research on financial literacy remains focused on the explicit financial knowledge component with numerous knowledge tests being developed as financial literacy measures (Bowen 2002; Collins and O'Rourke 2010; Courchane and Zorn 2005; Duguid 2005; Fernandes, Lynch, and Netemeyer 2014; Goldsmith, Goldsmith, and Heaney 1997; Hastings, Madrian, and Skimmyhorn 2013; Knoll and Houts 2012).

This study leverages Bloom's domains of knowledge to offer an innovative conceptualization of financial literacy (Bloom et al. 1956). Our conceptualization recognizes the existing cognitive component of financial literacy (i.e., financial knowledge [Fernandes, Lynch, and Netemeyer 2014; Knoll and Houts 2012]), introduces a psychomotor component (i.e., financial skill [CFPB 2015]), and incorporates an affective component (i.e., self-efficacy [Bandura 1982; Lown 2011; Schwarzer and Jerusalem 1995]). We argue that it is the

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1. See, for example, *Can You Pass Fifth Grade English?*  
[https://offbeat.topix.com/quiz/17197/qidx1?tr=misc/search-result/external\\_item\\_search///.1568578701.uppdk1j7](https://offbeat.topix.com/quiz/17197/qidx1?tr=misc/search-result/external_item_search///.1568578701.uppdk1j7).  
Accessed 3/31/2019.

combination of these three elements that determines one's level of financial literacy. Building from our work with the Consumer Financial Protection Bureau (CFPB) Financial Well-Being Study as well as data from a new national study of US adults, we develop and validate a formative financial literacy scale that better reflects the concept. The validation measure we use is financial well-being. With this work, we intend to inspire and inform innovative programs to a more capacious model of financial literacy that transcends the mere accumulation of explicit financial knowledge.

## LITERATURE REVIEW

### Financial Literacy as Financial Knowledge

In 2008, President George W. Bush signed an Executive Order establishing the President's Advisory Council on Financial Literacy with the mission of improving the literacy of American citizens. This degree of focus at our highest level of government was perceived to be warranted, "because financial literacy leads to better outcomes for individuals and for our economy generally" (Bernanke 2006). The notion was that America can become a nation of financially literate citizens who are capable of achieving their own financial well-being and of promoting the well-being of society (Collins and O'Rourke 2010; Willis 2008, 2011). Regarding the 2008 US Great Recession, Federal Reserve Board Governor Frederic Mishkin stated that "A better-informed citizenry would likely have resulted in more prudent decision making and . . . less harm to the economy" (Quoted in Willis 2008).

From its earliest appearance in the literature financial literacy has been treated as the mere acquisition of economic concepts (Chen and Volpe 1998; Lusardi and Mitchell 2007). The use of explicit knowledge as a proxy for financial literacy may be due to the lack of definition

and accepted operationalization of the concept. In 2010, Huston found that 72% of studies measuring financial literacy did not offer any definition or description of the concept. It may also be due to the availability of financial knowledge questions in large, established data sets (Knoll and Houts 2012). Given the definitional void and availability of such knowledge questions, financial knowledge represents an easy, but limited, approach.

Yet there is some recognition that financial literacy involves more than being able to pass an economics or finance quiz. Often this recognition is granted in a passing or implicit way, as when discussions reference concepts such as “working knowledge,” “tools,” and “skills” (see Braunstein and Welch 2002 for an example). At other points in the literature the definitions of financial literacy itself tend to include concepts that reach beyond mere financial knowledge. For example, Mason and Wilson define financial literacy as “an individual’s ability to obtain, understand and evaluate the relevant information necessary to make decisions with an awareness of the likely financial consequences” (2000, 17). Huston (2010) suggests that financial literacy has two dimensions, personal financial knowledge and personal finance application where application implies ability and self-efficacy. Others, such as Remund (2010), argue that financial literacy relates to an understanding of financial concepts and the ability and self-efficacy to make decisions from that understanding. Finally, Kozup and Hogarth (2008) see financial literacy as including a set of critical thinking skills to weigh the pros and cons of a particular decision relative to one's own personal needs, values and goals. Even still financial literacy largely remains a construct related to whether an individual understands that stocks are riskier than bonds, can calculate compound interest, and understands the difference between a 15-year and 30-year mortgage (Fernandes, Lynch, and Netemeyer 2014; Lusardi and Mitchell 2007).

The problem is that financial literacy as only explicit financial knowledge largely fails to produce improvements in financial behavior (Fernandes, Lynch, and Netemeyer 2014) “to the degree necessary for consumers to protect and even increase their welfare in the modern financial marketplace” (Willis 2009, 416). In a recent study of more than 6,300 US adults, the Consumer Financial Protection Bureau concluded that explicit financial knowledge, on its own, was insufficient to improve financial decision making or well-being (CFPB 2015, 2018). These findings suggest that financial knowledge as currently and narrowly conceived, that is, as nothing more than explicit financial knowledge, is entirely insufficient. It is time to acknowledge that we have pushed the “literacy as knowledge” paradigm as far as it will go. Progress in the use of financial literacy as a construct and associated life outcomes requires an expanded conceptualization and measure.

### Financial Literacy Rebooted

We argue that financial literacy is an important but underdeveloped construct that represents more than an individual’s store of explicit financial knowledge. It involves and includes ability and self-efficacy (Remund 2010). It requires knowledge and skill (Houston 2010) as well as a facility for critical thinking (Kozup and Hogarth 2008). Improvements in any one of these elements would lead to an increase in financial literacy although potentially at different rates.

We believe that financial literacy should be understood as a single measure produced by the combination of factors in the same way that an individual’s socioeconomic status (SES) is the weighted combination of their education, income, occupation, and residence (Hauser 1973). As a combination of these indicators, SES represents an individual’s relative position in the

social hierarchy in a way that any one of the indicators could not. As Law and Wong note that “income level and occupational prestige are, however, not manifestations of SES. SES is a result or outcome of these two indicators” (1999, 146).

We argue that financial literacy operates in much the same way and, therefore, should be considered a formative scale (Fornell and Bookstein 1982). Such a scale would allow the field to move beyond a “literacy means knowledge” model in order to capture the lived financial experience of people and to help support improvements in that experience.

Most scale development efforts rely on reflective methods (Ellwart and Konradt 2011; Law and Wong 1999). These methods assume that an underlying latent construct “causes” or is reflected in an individual’s answers to highly correlated statements (DeVellis 2016; Netemeyer, Bearden, and Sharma 2003). In comparison, formative scale development methods assume that an individual’s level on a latent construct is “caused” by a combination of their values on distinct indicators. In the context of formative scale development, references to “causes” are not intended to imply causality in the traditional sense, but to convey that, as Diamantopoulos and Sigauw note, “it is changes in the indicators that determine changes in the value of the latent variable” (2006, 263). These two methods can lead to different scale content and conclusions (Law and Wong 1999).

Two critical steps of formative scale development are content and indicator specification. Content specification involves a strong theoretical definition of the content domain the scale is designed to capture (Bollen and Lennox 1991). A strong definition of the concept is extremely important in formative scale development (Nunnally and Bernstein 1994). Indicator specification involves the identification of the indicators required to form the scale. It is important to ensure that all important indicators are included while remaining true to the content specification

(Bollen and Lennox 1991). To accomplish these steps, we turn to Bloom's domains of knowledge.

### Financial Literacy from a Bloom's Domains of Knowledge Perspective

We believe that it is entirely appropriate to turn to the field of education to theorize our proposed formative financial literacy scale. After all, literacy is an outcome of comprehensive and effective education. It reflects an individual's understanding of and ability to use the knowledge gained as well as an ability to engage in independent learning. Bloom's domains of knowledge provide a foundation for educational efforts to build literacy across several domains including basic education, information literacy, and visual literacy.

Bloom's domains of knowledge provide educators with an understanding of the nature and order of teaching required to help students achieve success in higher-order thought or tasks (Harrow 1972). It includes three domains of knowledge<sup>2</sup>: cognitive, affective, and psychomotor, which allow an individual to operate in their world (Bloom et al. 1956).

The *cognitive domain* "includes those objectives that deal with the recall or recognition of knowledge, and the development of intellectual abilities and skills" (Bloom et al. 1956, 7).

The *affective domain* "includes objectives which describe changes in interest, attitudes, and values, and the development of appreciations and adequate adjustment" (Bloom et al. 1956, 7).

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2. The reader may be most familiar with the pyramid ranging from "Remember" at the base to "Create" at the apex most often used to reflect Bloom's taxonomy. In fact, this pyramid reflects the levels of knowing that exist within the cognitive domain of knowledge. In this paper, we refer to the domains of knowledge (rather than levels of knowing) from Bloom's work.

The *psychomotor domain* is the “manipulative or motor-skill area” with an “emphasis upon the specific development of desirable movement behaviors” (Harrow 1972, 7).

These domains work together to support literacy. For example, motivation (i.e., the affective domain) can influence a desire for greater mastery in the psychomotor domain (Harrow 1972). Higher levels of knowledge (i.e., the cognitive domain) can influence the ability to take effective action (i.e., the psychomotor domain).

When applied to financial literacy, financial knowledge as currently construed represents only one of the three domains – the cognitive domain. In our attempt to conceive a more capacious definition, we argue that self-efficacy represents the affective domain and financial skill the psychomotor domain. Together, these concepts represent a formative financial literacy scale.

#### Self-Efficacy as the Affective Domain of Financial Literacy

Self-efficacy (i.e., “confidence in one’s ability to deal with a situation without being overwhelmed” [Hira 2010, 15]) relates to one’s motivation, optimism, persistence, and resilience (Gist and Mitchell 1992, Park and Folkman 1997). Social cognitive theory places self-efficacy in a social-learning context involving the individual, the environment, and the interaction between the two (Bandura 1997). It describes the individual’s perception of their ability to act successfully given past performance and expectations for future outcomes. In the context of financial decision making, self-efficacy reflects the individual’s belief that they can accomplish the actions required to achieve their financial goal or objective (Snyder and Lopez 2009). This objective might be a future goal such as retirement or something more immediate like paying all the bills next month (Lown 2011). Bandura distinguishes between the theoretical construct of self-efficacy and the colloquial term “confidence” (1997). In his view, confidence refers to a

general strength of belief while self-efficacy “includes both an affirmation of a capability level and the strength of that belief” (Bandura 1997, 382). Thus, concepts such as over- or under-confidence, while interesting and important, are not included in a self-efficacy framework.

In reading and writing literacy, self-efficacy involves a willingness to try that supports gains in literacy (Schunk 2003). In the realm of household finance, self-efficacy is associated with positive financial behaviors and outcomes (Asebedo and Seay 2018; Chatterjee, Finke, and Harness 2011; Farrell, Fry, and Risse 2016). Higher levels of self-efficacy correlate with financial well-being (CFPB 2018), the setting of more challenging goals (Bandura 1997), and the facilitation of financial help-seeking (Lim et al. 2014).

#### Financial Skill as the Psychomotor Domain of Financial Literacy

We first theorized the concept of financial skill during our qualitative work on the CFPB National Financial Well-Being study. When we began that work, we expected to learn more about financial knowledge and the role it plays in financial decision making and well-being. The assumed underlying order to gain financial well-being was first to acquire knowledge and then to apply that knowledge. What we learned instead was that retained knowledge was most often gained from the positive and/or negative outcomes of a decision; thus, behavior preceded knowledge for most people and in most decisions. We began then to ponder a number of questions. What made the difference in whether or not they were able to make effective decisions? Was it all just trial and error? Learning from their mistakes?

Across the 59 one-on-one consumer interviews, 30 financial practitioner interviews, and 1,600 pages of transcripts, consumers described their positive experiences as: a) the ability to recognize when you do not know enough to make a decision, b) having trustworthy sources to

ask before you decide, and c) the ability to use what you've learned in the decisions you make. We called this behavior "financial skill," that is, the individual's capacity to assess their preparedness and then interacting with their environment to obtain what might be missing. Financial skill is a learned behavior. It is a set of psychomotor activities that can lead to better financial decision making. It is conceptually similar to the just-in-time education described by Willis (2008) and some practices used in financial coaching (Collins and Olive 2016). The concept of financial skill is distinct from the more general description of "skills" in financial capability that includes behaviors and other types of skills.

Relatively little work examines financial skill (Hung, Parker, and Yoong 2009; Knoll and Houts 2012), although there is some evidence suggesting that it may be a powerful catalyst (Atkinson et al. 2007; Knoll and Houts 2012; Fernandes, Lynch, and Netemeyer 2014; Willis 2008). Extant literature provides evidence that individuals may learn from their financial experiences and mistakes, thereby improving their decision making over time (Agarwal et al. 2009; Hastings, Madrian, and Skimmyhorn 2013). Interpersonal advice-seeking also has been shown to improve financial decisions. For example, Hilgert, Hogarth, and Beverly (2003) find that individuals who learn from family, friends, and personal experience when making financial decisions tend to engage in more positive financial behaviors.

#### Financial Literacy as a Formative Combination of Financial Knowledge, Skill, and Self-Efficacy

Using the framework of Bloom's work (Bloom et al. 1956), we argue that financial literacy is the combination of the skill to gather the necessary advice and information needed for a financial decision (psychomotor), the confidence required to make that decision (affective), and the ability to build useful stores of financial knowledge (cognitive) from the experience that can

be applied to future decisions (psychomotor). If any one of these factors improves, financial literacy will increase. With this understanding, financial literacy can be defined simply as *one's capacity to make effective financial decisions*, where “capacity” refers to knowledge, skill, and self-efficacy.

While no study seems to have examined how these components might fit together in a formative view of financial literacy, several studies have examined relationships between them. Danes and Haberman (2007) found that financial knowledge and self-efficacy are positively associated. Heckman and Grable (2011) found a positive relationship between financial knowledge and financial self-efficacy. In the National Financial Well-Being Study, the CFPB (2018) found a positive relationship between financial knowledge and financial skill, as well as between financial self-efficacy and financial skill.

We believe that we must stop treating these constructs as though they are independent rather than interconnected components of financial literacy. Treating financial literacy as a formative scale allows us to escape from the “literacy-as-knowledge” corner into which we have painted research in this area. Studying knowledge, self-efficacy, and skill as components or indicators of financial literacy offers the promise of new insights that may drive innovations in financial education. Perhaps a formative scale would encourage researchers to consider the three constructs in studies more consistently. Such a scale could support research that identifies more promising approaches to financial education than existing programs focused primarily on increasing explicit financial knowledge.

In what follows, we apply the remaining steps in formative scale development to examine the relationships between these domains of financial literacy and whether they might be formed into a more robust financial literacy scale. The first step is an examination of the correlations

between our indicators. There is no requirement that indicators in a formative scale be correlated with each other. Given the use of multiple regression to define the scale, there is, however, an expectation that they will not be excessively correlated (Bollen and Lennox 1991). A second step is to examine the relationship between the formative scale and a closely-related construct (e.g., subjective knowledge). A final step is to examine criterion validity or the relationship between the financial literacy scale and previously examined outcomes associated with a higher or lower level of financial literacy (Diamantopoulos and Siguaaw 2006). A formative scale can only be validated by reference to consequences or effects of the latent construct (Bollen and Lennox 1991; Bagozzi 1994, 2007). The primary consequence we consider here is financial well-being (CFPB 2017; Netemeyer et al. 2017) which we take as the “ultimate outcome of financial education” (CFPB 2015). Once the scale is developed, we explore its application in relation to financial well-being and other hypothesized effects (i.e., FICO score, money management skills, and personal savings orientation).

*H1: Financial knowledge, skill, and self-efficacy will be distinct constructs with no evidence of excessive correlation.*

*H2: Financial knowledge, skill, and self-efficacy will be positively and significantly associated with the hypothesized correlate of subjective financial knowledge.*

*H3: Financial knowledge, skill, and self-efficacy will be positively and significantly associated with financial well-being.*

*H4: The financial literacy scale will provide a parsimonious measure that is associated with hypothesized outcomes of financial literacy as expected.*

## METHODS

### Data and Sample Characteristics

The data for this study were obtained through an online survey of adults ages 18 and older selected from the Survey Sampling International panel. A total of 601 surveys were completed. The average age of survey participants was 41 years and average income was \$70,027. Females represented 55.9% of the sample. In terms of race and ethnicity, 14.2% of the participants were Hispanic, 61.5% were White, Non-Hispanic, and 12.0% were Black, Non-Hispanic. Bachelor's degrees or higher levels of education were present for 25.4% of the sample.<sup>3</sup>

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3. The data can be made available to academic researchers with necessary IRB approval for use of the data.

## Measures

Three existing scales were used to measure financial skill, financial knowledge, and self-efficacy. Table 1 contains the item wording and descriptive statistics for each of these scales.

--- TABLE 1 ABOUT HERE ---

Financial skill was measured using the IRT-based scale developed in the CFPB Financial Well-Being Study (CFPB 2017). The CFPB provides detailed documentation of the large-scale study used to develop this scale including three waves of data collection with more than 14,000 US adults and a national study with more than 6,000 US adults to confirm the scale. They provide two methods of scoring a data set: a sum score method and Stata code to apply the IRT model for a more precise estimate. In this study, the IRT scoring method using Stata was implemented as described in the financial skill technical guide (CFPB 2018). Financial knowledge was assessed using the 10-item version of the IRT-based scale developed by Knoll and Houts (2012).

Financial self-efficacy was measured using the general self-efficacy scale (Schwarzer and Jerusalem 1995). This scale was selected over the Financial Self-Efficacy Scale (Lown 2011) for reasons related to polarity (Herche and Engelland 1996) and context (Schuman, Presser, and Ludwig 1981) effects. Polarity effects relate to findings that negatively-worded survey items are not necessarily a flipped version of a positively-worded item (Herche and Engelland 1996). That is, survey respondents do not answer negatively-worded questions in the same way they answer positively-worded questions. The Financial Self-Efficacy Scale was an attempt to address Bandura's (2006) call for domain-specific measures of self-efficacy. Unfortunately, the domain-

specific questions are all negatively worded whereas the general self-efficacy scale items are positively worded (Schwarzer and Jerusalem 1995). It is unclear how the reverse polarity of the items impacts responses and, therefore, the latent construct(s) being reflected. Despite Bandura's (2006) suggestion that self-efficacy is domain specific, we decided to use the general self-efficacy scale because it contains all positively-worded items, has been used extensively across a number of domains, and was more likely to reflect an accurate measure.

This is not to say that we reject in any way Bandura's argument, namely that "the efficacy belief system is not a global trait, but a differentiated set of self-beliefs linked to distinct realms of functioning" (2006, 307). Yet whereas this observation has been interpreted as requiring different an entirely different scale to capture an individual's self-efficacy within a particular domain, we believe that these concerns can be adequately addressed by the very domain-specific context (rather than the form) of the questions. Here we rely on the context effect (Schuman, Presser, and Ludwig 1981) for justification.

Research demonstrates that when a respondent completes a survey, the questions that precede the question being answered influence how the respondent interprets the meaning of the current question (Bailey and Marsden 1999). For example, in a survey where the preceding questions inquired about the respondent's financial decisions, it is very likely that any questions touching on self-efficacy will be interpreted from this perspective as well (Sudman, Bradburn, and Schwarz 1996). Thus, by selecting the general self-efficacy scale and embedding it in a financial-domain survey, we were able to avoid possible issues with the polarity effect and still measure self-efficacy from a financial perspective by relying on the context effect.

Financial well-being was measured overall using the full IRT-based version of the CFPB financial well-being scale (CFPB 2017). In addition, the present and future dimensions of

financial well-being were measured using current money management stress and expected future financial security (Netemeyer et al. 2017). In addition, three measures of objective financial situation were included: self-reported FICO score; money management (Dew and Xiao 2011); and personal savings orientation (Dholakia et al. 2016).

A set of demographic characteristics was used as controls for the regression analyses conducted and to profile individuals with higher (or lower) levels of financial literacy. These characteristics included age in years, income, sex, education, and race/ethnicity. Age was calculated by subtracting the current year from the self-reported year of birth. Income was estimated using the mid-point of the ranges representing the response options for this question. The highest category, \$150,000 or more, did not have an upper bound and was recoded to be \$199,999. Education was coded as a binary indicator of whether the individual had a bachelor's degree or higher (1) versus a lower level of education (0). Race/ethnicity was captured in a set of binary indicators for White Non-Hispanic, Hispanic, Black Non-Hispanic, and Other Race Non-Hispanic. White Non-Hispanic was the omitted category for the regression analysis.

### Analysis

We employed formative scale development methods to determine whether financial skill, knowledge, and self-efficacy were accurate indicators of the level of financial literacy for a given individual. The measure of financial literacy conforms to a functionalist point of view (Blackburn 1994) in which only a pure description (i.e., non-interpretive) of an abstract mental state is possible (Bagozzi 2007). Thus, we make no claim that financial skill, knowledge, and self-efficacy “cause” financial literacy; only that the level of each of these indicators contributes to an individual's capacity to make financial decisions. You cannot include only one indicator

(typically financial knowledge) in a model assessing financial outcomes, find that there is no relationship, and then determine that financial literacy does not have an effect. For some individuals, their capacity to make financial decisions may be based more on financial skill (i.e., having trustworthy sources and knowing when/how to use them). For others, it may be grounded in self-efficacy (i.e., the belief that they can be successful that leads to engagement). A reflective scale is not appropriate precisely because the very concept of financial literacy does not exist independently of these measurements (Bagozzi 2007).

While the methods for formative scale development are not as well established as the methods for reflective scales (Diamantopoulos and Winklhofer 2001), there are suggested practices which we have attempted to follow. With the content and indicator specifications being accomplished above, we turned to the steps used to evaluate these indicators. First, we examined the correlations between the proposed indicators. With a formative scale, correlations between indicators can be positive, negative, or non-significant, but should not be high (Bollen and Lennox 1991); given the role of regression in formative scale development, multicollinearity represents a barrier to identifying the role of each indicator in the scale.

Second, we explored the relationship between the formative scale and a hypothesized correlate (Diamantopoulos and Winklhofer 2001) using an ordered probit model. This step in the process offers an examination of the concurrent validity of the proposed financial literacy indicators by determining whether the indicators of financial literacy are associated with a hypothesized correlate of financial literacy in expected ways. The correlate we selected was the individual's summary judgment or self-assessment of their knowledge of financial matters (Xiao, Chen, and Chen 2014). Previous studies have shown a correlation between subjective knowledge and indicators of financial literacy (Hadar, Sood, and Fox 2013). This summary assessment used

as the hypothesized correlate here was measured by the person's answer to this single question: *Compared to the average person, would you say that you know more, about the same, or less about financial matters?* Studies have shown that such single-item measures provide a valid assessment of straightforward constructs often outperforming multi-item scales for such constructs (Bergkvist and Rossiter 2007; Sackett and Larson 1990; Wanous, Reichers, and Hudy 1997). Shim et al. (2010) use a similar single-item measure to assess an individual's belief about their knowledge of financial matters. We use this correlate to assess whether the three proposed indicators of financial literacy have the expected association with such a summary judgment of ability. This step provides confidence in our indicator specification insofar as it reveals whether the selected indicators have unique and significant relationships with a variable related to financial literacy.

Finally, we assessed the concurrent validity of the indicators with hypothesized outcomes of financial literacy (Diamantopoulos and Sigauw 2006). This step differs from the one above with its focus on the hypothesized *outcome* rather than *correlate*. With a formative scale, concurrent validity (i.e., judging the scale in relation to a hypothesized outcome) is the "best we can do" (Bagozzi 1994, 333). As Bagozzi writes, "Formative measurement is only meaningful when the formative latent variable also predicts manifest variables or latent variables that have reflective indicators" (Bagozzi 2007, 235). Furthermore, as Bollen and Lennox explain, "taken in isolation, the formative indicator measurement model . . . is statistically underidentified" and "can be estimated only if it is placed within a larger model that incorporates consequences (i.e., effects) of the latent variable" (1991, 308). Thus, we assessed the validity of the indicators using OLS regression with financial well-being as the hypothesized effect. Financial well-being was selected for the regression given that it is a more global measure of financial wellness and highly

correlated with one's objective financial situation (CFPB 2018). As a final assessment of the indicators, we examined the unique contribution of each indicator to the model by "evaluating the consequences of removing indicators" (Bollen and Lennox 1991, 308).

We examined our proposed financial literacy scale by re-estimating the financial well-being regression, and studying the correlation between the three indicators and a set of hypothesized outcomes (i.e., self-reported FICO score, money management skill, and perceived savings orientation). Finally, we examined the level of financial literacy overall and by indicator for identified demographic groups.

## RESULTS

### Correlations between Indicators

Table 2 contains the descriptive statistics for, and correlations between, the indicators. The three indicators were positively and significantly correlated. While none of the correlations indicated multicollinearity, the correlation between financial skill and financial self-efficacy was high, relative to the correlations between either of these characteristics and financial knowledge. A confirmatory factor analysis was used to examine the discriminant validity between financial skill and financial self-efficacy. We then estimated two models, one that treated these two scales as separate latent constructs, and a second that treated them as if they were the same construct. The model assuming separate scales showed reasonable fit ( $X^2_{(169)} = 956.283$ , RMSEA = .079, CFI = .930, TLI = .921), while the model assuming a single scale revealed a lack of fit ( $X^2_{(170)} = 3340.752$ , RMSEA = .157, CFI = .718, TLI = .685). These results suggest that financial skill and self-efficacy are distinct constructs.

--- TABLE 2 ABOUT HERE ---

### Financial Literacy Indicators and a Hypothesized Correlate

Next, we examined the relationship between the proposed indicators of financial literacy and the individual's perception of their knowledge of financial matters compared to the average person (our hypothesized correlate). If financial skill, knowledge, and self-efficacy are all three indicators of financial literacy, we would expect them each to have a significant relationship with our hypothesized correlate.

An ordered probit model revealed that all three indicators of financial literacy had statistically significant and positive associations with the hypothesized correlate. Table 3 contains the results of this model. For a white male, age 41, with a household income of \$70,000, the midpoint level of financial knowledge, and the average financial self-efficacy score, an increase in financial skill of one point is associated with an average increase in rating being above average in financial skill by 1.2%. For a white male, age 41, with a household income of \$70,000, the midpoint level of financial skill, and the average financial self-efficacy score, an increase in financial knowledge of one point is associated with an average increase in rating being above average in financial skill by 8.8%. For a white male, age 41, with a household income of \$70,000, the midpoint level of financial skill, and the midpoint level of financial knowledge, an increase in financial self-efficacy of one point is associated with an average increase in rating being above average in financial skill by 1.0%. Given the extant scholarship on subjective knowledge and financial literacy (Hadar, Sood, and Fox 2013), these findings suggest that financial skill, knowledge, and self-efficacy are all reasonable indicators of financial literacy with each indicator contributing uniquely to the overall concept.

--- TABLE 3 ABOUT HERE ---

### Financial Literacy Indicators and Hypothesized Outcomes

Financial well-being represents a summary assessment of how people feel they are doing (Brüggen et al. 2017; CFPB 2015; Netemeyer et al. 2017). We used financial well-being as the dependent variable in an OLS regression analysis. Table 4 contains the results of this model. The three proposed indicators were used as independent variables and the demographics described above as the control variables. The adjusted  $R^2$  for this model was .185. Additional models available upon request were estimated using one or two of the three indicators. A comparison of Akaike Information Criterion for each model confirmed that the three-indicator model performed better than any of the others with one or more indicators removed. The coefficients for all three indicators were significantly related to an individual's level of financial well-being. The Variable Inflation Factors were all below 2 suggesting that there were no issues with multicollinearity in the model. The standardized coefficients for financial skill, self-efficacy, and financial knowledge were .143, .165, and .140 respectively ( $p < .01$  for all).

--- TABLE 4 ABOUT HERE ---

These findings support the criterion validity of the combination of financial skill, self-efficacy, and knowledge as a formative financial literacy scale. All three indicators have an independent relationship with the hypothesized outcome. The combination of the three indicators produces a model that is as good or better than the model containing only one or two of the indicators.

### The Financial Literacy Index

The question, then, is why use a formative scale rather than three separate indicators? There are at least two possible answers to this question: one related to the theoretical construct and the other related to parsimony in analysis. From the theoretical construct perspective, the formative scale is preferred if it provides a more accurate and robust understanding of the construct. From the analytical perspective, if the formative measure performs as expected in the model, it offers a more parsimonious assessment of financial literacy than the three separate indicators (Diamantopoulos and Sigauw 2006).

To assess the second rationale, we calculated the financial literacy scale using standardized values for financial skill, financial knowledge, and financial self-efficacy weighted by the standardized coefficients from the financial well-being model. We believe this method was appropriate because changes in financial skill, knowledge, and self-efficacy “cause” changes in financial literacy rather than being manifestations of a change in financial literacy (Jarvis, MacKenzie, and Podsakoff 2003). This method produced a raw financial literacy score with a mean of .0008 and a standard deviation of .3334. To support our interpretation of the score, we followed the lead of the CFPB (2017) and multiplied the raw financial literacy score by 45 and added 50 to produce an adjusted financial literacy score with a mean of 50 and a standard deviation of 15.

Financial well-being was regressed on the financial literacy scale score controlling for the demographics used in previous models. Table 5 contains the results of the model. The  $R^2$  for this model was .199, which was identical to the model with the three separate indicators. The F-statistic increased from 13.909 to 17.448. Financial literacy was significantly and positively

related to financial well-being ( $r = .333, p < .001$ ). These findings suggest that the formative scale of financial literacy performs as expected based on our analysis with the individual indicators.

--- TABLE 5 ABOUT HERE ---

We estimated two additional models replacing overall financial well-being with the subdimensions identified by Netemeyer et al. (2017), namely current money management stress and expected future financial security. The purpose of these models was to understand whether the formative financial literacy scale would behave as expected when moving beyond the overall financial well-being measure used to define the formative combination of indicators. As expected, financial literacy was significantly and negatively associated with current money management stress ( $r = -.273, p < .001$ ). The  $R^2$  for this model was .148. Likewise, financial literacy was significantly and positively associated with expected future financial security in the expected direction ( $r = .550, p < .001$ ). The  $R^2$  for this model was .433. These findings suggest that, while significant in both cases, financial literacy may play a greater role in the individual's perception of their likely financial future than in their sense of current money management stress.

As an additional assessment of the external validity of our proposed indicators, we correlated the formative financial literacy scale as well as each indicator with three hypothesized outcomes of financial literacy: self-reported FICO score, money management skills (Dew and Xiao 2011), and personal savings orientation (Dholakia et al. 2016). Table 6 contains the correlations for the single measure of financial literacy as well as its three indicators. All

correlations were significant at the .01 level and in the expected direction. Based on these findings, it is reasonable to conclude that the formative financial literacy scale offers a single variable that can adequately represent the indicators that determine it.

--- TABLE 6 ABOUT HERE ---

Another consideration was how the formative indicator might support our understanding of financial literacy. This theoretical conceptualization of financial literacy would suggest that measuring an individual's store of financial knowledge would be insufficient in understanding their literacy, i.e., *capacity to make effective financial decisions*. As a final step, we correlated financial literacy with demographic variables studied most often in relation to financial knowledge. Table 7 presents these correlations. Consistent with previous research, older individuals, those with higher levels of income, males, and individuals with a bachelor's degree or higher tended to have higher levels of financial literacy. Higher levels of financial literacy for older individuals tended to be based on financial knowledge and self-efficacy, but not skill. Higher levels of financial literacy for males tended to be based on higher levels of financial skill suggesting greater experience, exposure, and advice seeking. Those with higher incomes or educations saw significant and positive correlations for all indicators of financial literacy.

--- TABLE 7 ABOUT HERE ---

Interestingly, there were no significant correlations between race/ethnicity and financial literacy using the overall scale. The differences observed in the literature previously were largely

isolated to differences in financial knowledge. There were no significant differences between races/ethnicities in financial self-efficacy. Black Non-Hispanics tended to have significantly higher levels of financial skill, while the correlations between financial skill and being White Non-Hispanic or Hispanic were not significant. These findings support the notion that an expanded view of financial literacy based on Bloom's domains of knowledge will be economically and socially useful in the development of more effective forms of financial education.

## DISCUSSION AND CONCLUSION

These analyses support the view of financial literacy as a formative combination of knowledge, skill, and self-efficacy. The correlations between these indicators are not excessively high (Bollen and Lennox 1991; Tabachnick and Fidell 2018). The indicators are significantly and independently associated with the hypothesized correlate of perceived relative knowledge (Bollen and Lennox 1991) and the hypothesized outcome of financial well-being (Bagozzi 1994, 2007). The formative scale performs as expected when entered into the model or correlated with additional outcomes. Perhaps most importantly, this conceptualization and operationalization of financial literacy reveals how strength in different indicators (cognitive, psychomotor, and affective) can support the decision-making capacity of different populations.

This study enters a financial literacy conversation that has largely stalled in the "literacy-as-knowledge" corner. As we have suggested, efforts to improve financial well-being through knowledge produce mixed results that depend somewhat on the rigor of the assessment (Collins and O'Rourke 2010). We argue that this situation has been produced by a focus on one leg of a three-legged stool. Financial literacy needs to be theorized in a multifaceted way. In other words,

it needs the type of thick description that characterizes theories of socioeconomic status and/or reading/writing literacy. We define financial literacy as *one's capacity to make effective financial decisions*, where “capacity” refers specifically to knowledge, skill, and self-efficacy. Using formative scale development methods, we measured financial literacy in precisely this way, as a weighted combination of financial knowledge, skill, and self-efficacy. This model was based on the cognitive, affective, and psychomotor domains of Bloom’s work.

A composite financial literacy score provides a more parsimonious measure for analysis of the role of financial literacy in a variety of financial behaviors and/or outcomes. This measure can be applied at a societal and/or community-level for efforts such as policy evaluation or neighborhood comparisons, as well as a program- and/or individual-level for impact assessment or person-level preparedness.

We believe that the individual components of the composite score provide inspiration for expanded approaches to building financial literacy. For example, financial education efforts can be expanded beyond the delivery of financial knowledge to include efforts to build skill and self-efficacy. From a formative perspective, financial literacy increases as any one of these factors increases (Bollen and Lennox 1991). In fact, some people may benefit from a greater emphasis on components other than knowledge. For example, it appears that women may benefit from greater psychomotor development to build financial skill. Programs aimed at women could recognize such opportunities and emphasize the skill component for this population.

The stakes are at least as high with financial literacy than with other forms of literacy. Numerous studies suggest that an inability to make effective financial decisions leads to poor financial outcomes (Agarwal et al. 2009; Choi, Laibson, and Madrian 2011). Poor financial outcomes produce conditions that may worsen financial decision making, which may, in turn,

lead toward a downward spiral into material hardship (Carvalho, Meier, and Wang 2016). From this perspective, it is difficult to understand why financial literacy has been largely relegated to explicit knowledge of financial concepts. We believe that the formative scale offers meaningful opportunities to leverage more robust understandings of the concept as a means of improving financial well-being for individuals and society.

### LIMITATIONS

There are several limitations to this study that could be addressed through future research. This cross-sectional study provides evidence of association, not causation. A longitudinal study with interventions designed to increase one or more components of financial literacy would be required to examine potential causal relationship between improvement in one aspect of financial literacy and improved outcomes. In addition, our focus here was the application of formative scale methods to develop a new measure of financial literacy. In our view, financial literacy is the combination of financial skill, knowledge, and self-efficacy. We do not address the factors that affect financial literacy. Future research could take up this question to examine the antecedents of financial literacy. For example, an examination of the effect of financial socialization on this new conceptualization of financial literacy has the potential to expand our knowledge of financial socialization and how it impacts financial literacy (Shim et al. 2009, 2010; Hanson and Olson, 2018). Furthermore, this study was conducted with a national sample of US adults. Previous studies have demonstrated how “literacy as knowledge” varies by income, race/ethnicity, gender, and other population subgroups (Allgood and Walstad 2016; Heneger and Cude 2016; Lusardi and Mitchell 2007; Perry and Morris 2005). An exploration of the financial

literacy index and its indicators for these subgroups may reveal important opportunities for intervention and innovation in financial education.

## CONCLUSION

The practical impact of financial literacy programs has not lived up to its theoretical impact (Fernandes, Lynch, and Netemeyer 2014). We believe this gap stems from an incomplete conceptualization and operationalization of the financial literacy construct itself. In this article, we present a formative view of financial literacy built from a consideration of the three domains of knowledge (Bloom et al. 1956) rather than a reliance on the cognitive domain alone. The introduction of this formative scale of financial literacy represents the possibility of innovation in research, policy, and programs designed to create the literacy required for greater individual financial well-being. Using this scale, future research can move beyond the rut of financial literacy as cognitive knowledge. Financial knowledge is one path to financial literacy but not the only one. Financial skill in acquiring and using information and self-efficacy in making financial decisions are as (or perhaps more) important. Programs designed to enhance financial literacy should consider how their content and methods address each of the indicators while recognizing that financial knowledge may not be the most efficacious path to literacy for everyone.

## REFERENCES

- Agarwal, Sumit, John C. Driscoll, Xavier Gabaix, and David Laibson. 2009. The Age of Reason: Financial Decisions Over the Life Cycle and Implications for Regulation. *Brookings Papers on Economic Activity* (2): 51-117.
- Allgood, Sam, and William B. Walstad. 2016. The Effects of Perceived and Actual Financial Literacy on Financial Behaviors. *Economic Inquiry*, 54 (1): 675-697.
- Asebedo, Sarah D., and Martin C. Seay. 2018. Financial Self-Efficacy and the Saving Behavior of Retirees. *Journal of Financial Counseling and Planning*, 29 (2): 357-368.
- Atkinson, Adele, Stephen McKay, Sharon Collard, and Elaine Kempson. 2007. Levels of Financial Capability in the UK. *Public Money and Management*, 27 (1): 29-36.
- Bagozzi, Richard P. 1994. Structural Equation Models in Marketing Research: Basic Principles. In *Principles of Marketing Research*, edited by Richard P. Bagozzi (317-385). Oxford: Blackwell.
- Bagozzi, Richard P. 2007. On the Meaning of Formative Measurement and How It Differs from Reflective Measurement: Comment on Howell, Breivik, and Wilcox. *Psychological Methods*, 12 (2): 229-237.
- Bailey, Stefanie, and Peter V. Marsden. 1999. Interpretation and Interview Context: Examining the General Social Survey Name Generator Using Cognitive Methods. *Social Networks*, 21 (3): 287-309.
- Bandura, Albert. 1982. The Assessment and Predictive Generality of Self-Percepts of Efficacy. *Journal of Behavior Therapy and Experimental Psychiatry*, 13 (3): 195-199.
- Bandura, Albert. 1997. *Self-Efficacy: The Exercise of Control*. New York: Freeman.

- Bandura, Albert. 2006. Guide for Constructing Self-Efficacy Scales. In *Self-Efficacy Beliefs of Adolescents*, edited by Tim Urdan and Frank Pajares (307-337). Charlotte, NC: Information Age Publishing.
- Bergkvist, Lars, and John R. Rossiter. 2007. The Predictive Validity of Multiple-Item versus Single-Item Measures of the Same Constructs. *Journal of Marketing Research*, 44 (2): 175-184.
- Bernanke, Ben S. 2006. Financial Literacy. Washington, D.C.: Board of Governors of the Federal Reserve System.
- Blackburn, Simon. 1994. *The Oxford Dictionary of Philosophy*. Oxford, England: Oxford University Press.
- Bloom, Benjamin. S., Max D. Engelhart, Edward J. Furst, Walker H. Hill, and David R. Krathwohl. 1956. *Taxonomy of Educational Objectives. Vol. 1: Cognitive Domain*. New York: McKay, 20-24.
- Bollen, Kenneth, and Richard Lennox. 1991. Conventional Wisdom on Measurement: A Structural Equation Perspective. *Psychological Bulletin*, 110 (2): 305-314.
- Borden, Lynne M., Sen-A Lee, Joyce Serido, and Dawn Collins. (2008). Changing College Students' Financial Knowledge, Attitudes, and Behavior Through Seminar Participation. *Journal of Family and Economic Issues*, 29 (1): 23-40.
- Bowen, Cathy F. 2002. Financial Knowledge of Teens and Their Parents. *Financial Counseling and Planning*, 13 (2): 93-102.
- Braunstein, Sandra, and Carolyn Welch. 2002. Financial Literacy: An Overview of Practice, Research, and Policy. *Federal Reserve Bulletin*, 445-457.

- Brüggen, Elisabeth C., Jens Hogleve, Maria Holmlund, Sertan Kabadayi, and Martin Löfgren. 2017. Financial Well-being: A Conceptualization and Research Agenda. *Journal of Business Research*, 79: 228-237.
- Carvalho, Leandro S., Stephen Meier, and Stefanie W. Wang. 2016. Poverty and Economic Decision-Making: Evidence From Changes in Financial Resources at Payday. *American Economic Review*, 106 (2): 260-84.
- Consumer Financial Protection Bureau (CFPB). 2015. Financial Well-being: The Goal of Financial Education. <https://www.consumerfinance.gov/data-research/research-reports/financial-well-being/>.
- Consumer Financial Protection Bureau (CFPB). 2017. CFPB Financial Well-Being Scale Development Technical Report. <https://www.consumerfinance.gov/data-research/research-reports/financial-well-being-technical-report/>.
- Consumer Financial Protection Bureau (CFPB). 2018. Measuring Financial Skill. <https://www.consumerfinance.gov/data-research/research-reports/measuring-financial-skill/>.
- Chatterjee, Swarn, Michael Finke, and Nathan Harness. 2011. The Impact of Self-Efficacy on Wealth Accumulation and Portfolio Choice. *Applied Economics Letters*, 18 (7): 627-631.
- Chen, Haiyang, and Ronald P. Volpe. 1998. An Analysis of Personal Financial Literacy Among College Students. *Financial Services Review*, 7(2): 107-128.
- Choi, James J., David Laibson, and Brigitte C. Madrian. 2011. \$100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans. *Review of Economics and Statistics*, 93 (3): 748-763.

- Collins, J. Michael, and Collin M. O'Rourke. 2010. Financial Education and Counseling—Still Holding Promise. *Journal of Consumer Affairs*, 44 (3): 483-498.
- Collins, J. Michael, and Peggy Olive. 2016. Financial Coaching: Defining an Emerging Field. In *Handbook of Consumer Finance Research*, edited by Jing Jian Xiao (93-102). New York: Springer Publishing.
- Courchane, Marsha, and Peter Zorn. 2005. "Consumer Literacy and Credit Worthiness." *Proceedings, Federal Reserve System Conference, Promises and Pitfalls: As Consumer Options Multiply, Who Is Being Served and at What Cost?, April 7, 2005 in Washington, DC.*
- Dakin, John, and Richard Wampler. 2008. Money Doesn't Buy Happiness, But It Helps: Marital Satisfaction, Psychological Distress, and Demographic Differences Between Low- and Middle-Income Clinic Couples. *The American Journal of Family Therapy*, 36 (4): 300-311.
- Danes, Sharon M., and Heather Haberman. 2007. Teen Financial Knowledge, Self-Efficacy, and Behavior: A Gendered View. *Journal of Financial Counseling and Planning*, 18 (2): 48-60.
- DeVellis, Robert F. 2016. *Scale Development: Theory and Applications*. Vol. 26. Thousand Oaks, California: Sage Publications.
- Dew, Jeffrey, and Jing Jian Xiao. 2011. The Financial Management Behavior Scale: Development and Validation. *Journal of Financial Counseling and Planning*, 22 (1): 43-59.

- Dholakia, Utpal, Leona Tam, Sunyee Yoon, and Nancy Wong. 2016. The Ant and the Grasshopper: Understanding Personal Saving Orientation of Consumers. *Journal of Consumer Research*, 43 (1): 134-155.
- Diamantopoulos, Adamantios, and Judy A. Siguaw. 2006. Formative Versus Reflective Indicators in Organizational Measure Development: A Comparison and Empirical Illustration. *British Journal of Management*, 17 (4): 263-282.
- Diamantopoulos, Adamantios, and Heidi M. Winklhofer. 2001. Index Construction with Formative Indicators: An Alternative to Scale Development. *Journal of Marketing Research*, 38 (2): 269-277.
- Duguid, Paul. 2005. The Art of Knowing: Social and Tacit Dimensions of Knowledge and the Limits of the Community of Practice. *The Information Society*, 21 (2): 109-118.
- Thomas Ellwart, and Udo Konradt. 2011. Formative Versus Reflective Measurement: An Illustration Using Work–Family Balance. *The Journal of Psychology*, 145 (5): 391-417.
- Erturk, Ismail, Julie Froud, Sukhdev Johal, Adam Leaver, and Karel Williams. 2007. The Democratization of Finance? Promises, Outcomes and Conditions. *Review of International Political Economy*, 14 (4): 553-575.
- Farrell, Lisa, Tim R. Fry, and Leonora Risse. 2016. The Significance of Financial Self-Efficacy in Explaining Women’s Personal Finance Behaviour. *Journal of Economic Psychology*, 54: 85-99.
- Fernandes, Daniel, John G. Lynch Jr, and Richard G. Netemeyer. 2014. Financial Literacy, Financial Education, and Downstream Financial Behaviors. *Management Science*, 60 (8): 1861-1883.

- Fornell, Claes, and Fred L. Bookstein. 1982. Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory. *Journal of Marketing Research*, 19 (4): 440-452.
- Gist, Marilyn E., and Terence R. Mitchell. 1992. Self-Efficacy: A Theoretical Analysis of Its Determinants and Malleability. *Academy of Management Review*, 17 (2): 183-211.
- Goldsmith, Ronald E., Elizabeth B. Goldsmith, and Joo-Gim Heaney. 1997. Sex Differences in Financial Knowledge: A Replication and Extension. *Psychological Reports*, 81 (3\_suppl): 1169-1170.
- Hadar, Liat, Sanjay Sood, and Craig R. Fox. 2013. Subjective Knowledge in Consumer Financial Decisions. *Journal of Marketing Research*, 50 (3): 303-316.
- Hanson, Thomas A., and Peter M. Olson. 2018. Financial Literacy and Family Communication Patterns. *Journal of Behavioral and Experimental Finance*, 19: 64-71.
- Harrow, Anita J. 1972. *A Taxonomy of the Psychomotor Domain: A Guide for Developing Behavioral Objectives*. Massachusetts: Addison-Wesley Longman Ltd.
- Hastings, Justine S., Brigitte C. Madrian, and William L. Skimmyhorn. 2013. Financial Literacy, Financial Education, and Economic Outcomes. *Annual Review of Economics*, 5 (1): 347-373.
- Hauser, Robert M. 1973. Disaggregating a Social-Psychological Model of Educational Attainment. In *Structural Equation Models in the Social Sciences*, edited by Arthur S. Goldberger and Otis D. Duncan (255-289). San Diego, CA: Academic Press.
- Heckman, Stuart J., and John E. Grable. 2011. Testing the Role of Parental Debt Attitudes, Student Income, Dependency Status, and Financial Knowledge Have in Shaping Financial Self-Efficacy Among College Students. *College Student Journal*, 45 (1): 51-65.

- Henager, Robin, and Brenda Cude. 2016. Financial Literacy and Long- and Short-Term Financial Behavior in Different Age Groups. *Journal of Financial Counseling and Planning*, 27 (1):3-19.
- Herche, Joel, and Brian Engelland. 1996. Reversed-Polarity Items and Scale Unidimensionality. *Journal of the Academy of Marketing Science*, 24 (4): 366-374.
- Hilgert, Marianne A., Jeanne M. Hogarth, and Sondra G. Beverly. 2003. Household Financial Management: The Connection Between Knowledge and Behavior. *Federal Reserve Bulletin*, 89: 309.
- Hira, Tahira. 2010. "The NEFE Quarter Century Project: Implications for Researchers, Educators, and Policy Makers from a Quarter Century of Financial Education." NEFE Working Paper, National Endowment for Financial Education, Denver, CO. Available at: [http://www.nefe.org/Portals/0/WhatWeProvide/PrimaryResearch/PDF/TheQtrCenturyProject\\_FinalSeminal.pdf](http://www.nefe.org/Portals/0/WhatWeProvide/PrimaryResearch/PDF/TheQtrCenturyProject_FinalSeminal.pdf).
- Hung, Angela, Andrew M. Parker, and Joanne Yoong. 2009. "Defining and Measuring Financial Literacy." RAND Working Paper Series WR-708. RAND Corporation, **City, State**. Available at: <https://ssrn.com/abstract=1498674>.
- Huston, Sandra J. 2010. Measuring Financial Literacy. *Journal of Consumer Affairs*, 44 (2): 296-316.
- Jarvis, Cheryl Burke, Scott B. MacKenzie, and Philip M. Podsakoff. 2003. A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research. *Journal of Consumer Research*, 30 (2): 199-218.
- Jones, Joyce. 2006. College Students' Knowledge and Use of Credit. *Journal of Financial Counseling and Planning*, 16 (2): 9-16.

- Knoll, Melissa A., and Carrie R. Houts. 2012. The Financial Knowledge Scale: An Application of Item Response Theory to the Assessment of Financial Literacy. *Journal of Consumer Affairs*, 46 (3): 381-410.
- Kozup, John, and Jeanne M. Hogarth. 2008. Financial Literacy, Public Policy, and Consumers' Self-Protection—More Questions, Fewer Answers. *Journal of Consumer Affairs*, 42 (2): 127-136.
- Law, Kenneth S., and Chi-Sum Wong. 1999. Multidimensional Constructs M Structural Equation Analysis: An Illustration Using the Job Perception and Job Satisfaction Constructs. *Journal of Management*, 25 (2), 143-160.
- Lim, HanNA, Stuart Heckman, Catherin Phillips Montalto, and Jodi Letkiewicz. 2014. Financial Stress, Self-Efficacy, and Financial Help-Seeking Behavior of College Students. *Journal of Financial Counseling and Planning*, 25 (2): 148-160.
- Lown, Jean M. 2011. Development and Validation of a Financial Self-efficacy Scale. *Journal of Financial Counseling and Planning*, 22 (2): 54-63.
- Lusardi, Annamaria, and Olivia S. Mitchell. 2007. "Financial Literacy and Retirement Planning: New Evidence from the Rand American Life Panel." Michigan Retirement Research Center Research Paper No. WP 2007-157.
- Lusardi, Annamaria, and Olivia S. Mitchell. 2014. The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52 (1): 5-44.
- Mandell, Lewis, and Linda Schmid Klein. 2009. The Impact of Financial Literacy Education on Subsequent Financial Behavior. *Journal of Financial Counseling and Planning*, 20 (1): 15-24.

- Martin, Emmie. 2018. "Only 39% of Americans Have Enough Savings to Cover a \$1,000 Emergency." *CNBC*, January 18. Accessed 3/31/2019.  
<https://www.cnn.com/2018/01/18/few-americans-have-enough-savings-to-cover-a-1000-emergency.html>.
- Mason, Carolynne L. J., and Richard M. S. Wilson. 2000. "Conceptualising Financial Literacy." Occasional Paper 2000:7, Loughborough University Business School, Loughborough, England.
- Netemeyer, Richard G., William O. Bearden, and Subhash Sharma. 2003. *Scaling Procedures: Issues and Applications*. Thousand Oaks, California: Sage Publications.
- Netemeyer, Richard G., Dee Warmath, Daniel Fernandes, and John G. Lynch Jr. 2017. How Am I Doing? Perceived Financial Well-being, Its Potential Antecedents, and Its Relation to Overall Well-being. *Journal of Consumer Research*, 45 (1): 68-89.
- Northwest Mutual. 2018. "1 in 3 Americans Have Less Than \$5,000 in Retirement Savings." May 8. Accessed 3/31/2019. <https://news.northwesternmutual.com/2018-05-08-1-In-3-Americans-Have-Less-Than-5-000-In-Retirement-Savings>
- Nunnally, Jum C., and Ira H. Bernstein. 1994. *Psychological Theory*. New York: MacGraw-Hill.
- Park, Crystal L., and Susan Folkman. (1997). Meaning in the context of stress and coping. *Review of General Psychology*, 1 (2), 115-144.
- Perry, Vanessa G., and Marlene D. Morris. 2005. Who Is in Control? The Role of Self-Perception, Knowledge, and Income in Explaining Consumer Financial Behavior. *Journal of Consumer Affairs*, 39 (2): 299-313
- Remund, David L. 2010. Financial Literacy Explicated: The Case for a Clearer Definition in an Increasingly Complex Economy. *Journal of Consumer Affairs*, 44 (2): 276-295.

- Robb, Cliff A., and Ann Woodyard. 2011. Financial Knowledge and Best Practice Behavior. *Journal of Financial Counseling and Planning*, 22 (1): 60-70.
- Sackett, Paul R., and James R. Larson Jr. 1990. Research Strategies and Tactics in Industrial and Organizational Psychology. In *Handbook of Industrial and Organizational Psychology*, edited by Marvin D. Dunnette and Leaetta M. Hough (419-489). Palo Alto, CA: Consulting Psychologists Press.
- Schuman, Howard, Stanley Presser, and Jacob Ludwig. 1981. Context Effects on Survey Responses to Questions About Abortion. *Public Opinion Quarterly*, 45 (2): 216-223.
- Schunk, Dale H. 2003. Self-Efficacy for Reading and Writing: Influence of Modeling, Goal Setting, and Self-Evaluation. *Reading and Writing Quarterly*, 19 (2): 159-172.
- Schwarzer, Ralf, and Matthias Jerusalem. 1995. Generalized Self-Efficacy Scale. *Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs*, 1 (1): 35-37.
- Shim, Soyeon, Bonnie L. Barber, Noel A. Card, Jing Jian Xiao, and Joyce Serido. 2010. Financial Socialization of First-Year College Students: The Roles of Parents, Work, and Education. *Journal of Youth and Adolescence*, 39 (12): 1457-1470.
- Shim, Soyeon, Jing J. Xiao, Bonnie L. Barber, and Angela C. Lyons. 2009. Pathways to Life Success: A Conceptual Model of Financial Well-Being for Young Adults. *Journal of Applied Developmental Psychology*, 30 (6): 708-723.
- Snyder, Charles Richard, and Shane J. Lopez, ed. 2009. *Oxford Handbook of Positive Psychology*. Oxford: Oxford Library of Psychology.
- Sudman, Seymour, Norman Bradburn, and Norbert Schwarz. 1996. *Thinking About Answers: The Application of Cognitive Processes to Survey Methodology (Vol. 39)*. San Francisco: Jossey-Bass.

Tabachnick, Barbara G., and Linda S. Fidell. 2018. *Using Multivariate Statistics, 7<sup>th</sup> Edition*.  
New York: Pearson.

US Bank. 2016. 2016 US Bank Possibility Index.

<https://www.usbank.com/newsroom/news/americans-are-more-positive-on-social-media-than-in-real-life.html>.

Wagner, Jamie, and William B. Walstad. 2019. The Effects of Financial Education on Short-Term and Long-Term Financial Behaviors. *Journal of Consumer Affairs*, 53 (1): 234-259.

Wanous, John P., Arnon E. Reichers, and Michael J. Hudy. 1997. Overall Job Satisfaction: How Good are Single-Item Measures? *Journal of Applied Psychology*, 82 (2): 247-252.

Willis, Lauren E. 2008. Against Financial-Literacy Education. *Iowa Law Review*, 94: 197.

Willis, Lauren E. 2009. Evidence and Ideology in Assessing the Effectiveness of Financial Literacy Education. *San Diego Law Review*, 46: 415-441.

Willis, Lauren. E. 2011. The Financial Education Fallacy. *American Economic Review*, 101 (3): 429-34.

Xiao, Jing Jian, Cheng Chen, and Fuzhong Chen. 2014. Consumer Financial Capability and Financial Satisfaction. *Social Indicators Research*, 118 (1): 415-432.

TABLE 1

*Descriptive Statistics for Scale Items*

<b>Knoll and Houts (2012) Financial Literacy Scale (10-Item)</b>	<b>Percent Correct</b>
Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account? Answer Options: 1. More than today; 2. Exactly the same as today; 3. Less than today	48.1%
If the interest rates rise, what should happen to bond prices? Answer Options: 1. They should rise; 2. They should fall; 3. They should stay the same	21.1%
Considering a long time period (for example 10 or 20 years), which asset described below normally gives the highest return? Answer Options: 1. Savings accounts; 2. Bonds; 3. Stocks	30.8%
Normally, which asset described below displays the highest fluctuations over time? Answer Options: 1. Savings accounts; 2. Bonds; 3. Stocks	56.7%
When an investor spreads his or her money among different assets, does the risk of losing a lot of money increase, decrease or stay the same? Answer Options: 1. Increase; 2. Decrease; 3. Stay the same	46.9%
Do you think the following statement is true or false? “If you were to invest \$1000 in a stock mutual fund, it would be possible to have less than \$1000 when you withdraw your money.” Answer options: 1. True; 2. False	62.6%
Do you think the following statement is true or false? “‘Whole’ life insurance has a savings feature while ‘term’ insurance does not.” Answer Options: 1. True; 2. False	44.6%
Do you think the following statement is true or false? “A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.” Answer Options: 1. True; 2. False	68.9%
Do you think the following statement is true or false? “Housing prices in the US can never go down.” Answer Options: 1. True; 2. False	73.4%
Suppose you owe \$3,000 on your credit card. You pay a minimum payment of \$30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges? Answer Options: 1. Less than 5 years; 2. Between 5 and 10 years; 3. Between 10 and 15 years; 4. Never, you will continue to be in debt.	24.1%

<b>CFPB Financial Skill Scale (CFPB 2017)</b>	<b>Mean</b>	<b>Std. Dev.</b>
I know how to get myself to follow through on my financial intentions.	3.47	1.07
I know where to find the advice I need to make decisions involving money.	3.45	1.11
I know how to make complex financial decisions.	3.15	1.14
I am able to make good financial decisions that are new to me.	3.29	1.10
I am able to recognize a good financial investment.	3.09	1.17
I know how to keep myself from spending too much.	3.59	1.08
I know how to make myself save.	3.57	1.10
I know when I do not have enough information to make a good decision involving money.	3.69	0.95
I know when I need advice about my money.	3.55	1.04
I struggle to understand financial information.	3.00	1.11

<b>General Self-Efficacy Scale (Schwarzer and Jerusalem 1995)</b>	<b>Mean</b>	<b>Std. Dev.</b>
I can always manage to solve difficult problems if I try hard enough.	3.19	0.70
If someone opposes me, I can find the means and ways to get what I want.	2.76	0.75
It is easy for me to stick to my aims and accomplish my goals.	2.93	0.81
I am confident that I could deal efficiently with unexpected events.	2.83	0.86
Thanks to my resourcefulness, I know how to handle unforeseen situations.	2.92	0.87
I can solve most problems if I invest the necessary effort.	3.16	0.76
I can remain calm when facing difficulties because I can rely on my coping abilities.	2.99	0.82
When I am confronted with a problem, I can usually find several solutions.	3.00	0.78
If I am in trouble, I can usually think of a solution.	3.07	0.74
I can usually handle whatever comes my way.	3.05	0.79

TABLE 2

*Descriptive Statistics and Correlations for the Construct Indicators*

	Variable	Mean	Std. Dev.	Correlations	
				1	2
1	Financial Skill	48.91	13.59		
2	Financial Knowledge	-0.88	0.80	.165**	
3	Financial Self-Efficacy	29.91	5.89	.627**	.249**

\*\*  $p < 0.01$  (Two-tailed)

TABLE 3

*Ordered Probit Model of Relationship between Financial Literacy Indicators and Hypothesized Correlate*

<i>DV: Knowledge of Financial Matters Compared to Average Person</i>			
<b>Indicator</b>	<b>B</b>	<b>Std. Error</b>	<b>Z value</b>
Financial Skill	0.044***	0.005	8.612
Financial Knowledge	0.292***	0.078	3.923
Financial Self-Efficacy	0.036 **	0.012	3.082
<b>Control Variables</b>			
Age (in years)	-0.004	0.004	-1.242
Income (\$10,000s)	0.014	0.001	0.469
Male	0.247*	0.110	2.392
Bachelor's Degree or Higher	0.245	0.132	1.810
Hispanic	0.119	0.154	0.464
Black, Non-Hispanic	-0.220	0.171	-1.450
Other Race	0.007	0.232	0.001
Below to Average (Cutoff)	1.716***	0.3706	4.55
Average to Above (Cutoff)	4.006***	.4009	10.07
Observations	601		
Log Likelihood	-433.34		

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

TABLE 4

*Relationship between the Financial Literacy Indicators and Financial Well-Being*

<b>DV: Financial Well-Being</b>				
<b>Indicators</b>	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>	<b>VIF</b>
Financial Skill	0.148**	0.051	0.143	1.696
Financial Knowledge	2.919***	0.776	0.165	1.350
Financial Self-Efficacy	0.336**	0.118	0.140	1.712
<b>Control Variables</b>				
Age (in years)	0.109**	0.042	0.110	1.257
Income	0.000***	0.000	0.190	1.276
Male	-0.666	1.116	-0.024	1.110
Bachelor's Degree or Higher	-1.334	1.341	-0.041	1.200
Hispanic	0.193	1.562	0.005	1.141
Black, Non-Hispanic	2.071	1.740	0.048	1.151
Other Race	1.066	2.337	0.018	1.047
(Constant)	27.113***	3.718		
Adjusted R <sup>2</sup>	.185			
F	13.909			
<i>p</i>	< .001			

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

TABLE 5

*Relationship between Financial Literacy and Financial Well-Being*

<b>Indicators</b>	<b>Financial Well-Being Beta</b>	<b>Current Money Management Stress Beta</b>	<b>Expected Future Financial Security Beta</b>
Financial Literacy	0.333***	-0.273***	0.550***
<b>Control Variables</b>			
Age (in years)	0.110**	-0.165***	-0.273***
Income	0.190***	-0.135**	0.132***
Male	-0.024	0.020	0.111***
Bachelor's Degree or Higher	-0.041	0.075	0.052
Hispanic	0.005	-0.043	0.039
Black, Non-Hispanic	0.048	-0.055	0.089**
Other Race	0.018	-0.039	0.063
R <sup>2</sup>	.199	.148	.433
F	17.448	12.188	53.555
<i>p</i>	< .001	< .001	< .001

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

TABLE 6

*Correlations between Financial Literacy, Indicators of Financial Literacy, and Hypothesized Outcomes*

<b>Indicator</b>	<b>Self- Reported FICO Score</b>	<b>Money Management Skills</b>	<b>Personal Savings Orientation</b>
Financial Literacy	.391**	.447**	.599**
Financial Skill	.332**	.548**	.646**
Financial Knowledge	.294**	.158**	.229**
Financial Self- Efficacy	.246**	.396**	.503**

\*\*  $p < 0.01$  (Two-tailed)

TABLE 7

*Demographic Comparisons of Financial Literacy Overall and by Indicator*

<b>Demographic</b>	<b>Indicators of Financial Literacy</b>			
	<b>Financial Literacy</b>	<b>Financial Skill</b>	<b>Financial Knowledge</b>	<b>Financial Self-Efficacy</b>
Age (in years)	0.231**	-0.006	0.388**	0.097*
Income	0.292**	0.180**	0.254**	0.211**
Male	0.092*	0.137**	0.034	0.041
Bachelor's Degree or Higher	0.202**	0.148**	0.164**	0.136**
Hispanic	-0.072	-0.028	-0.107**	-0.013
White, Non-Hispanic	0.061	-0.054	0.194**	-0.015
Black, Non-Hispanic	-0.019	0.100**	-0.155**	0.035
Other Race	0.016	0.040	-0.003	0.000

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$  (Two-tailed)