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Measuring Financial Literacy

Financial literacy (or financial knowledge) is typically an input to model the need for financial education and explain variation in financial outcomes. Defining and appropriately measuring financial literacy is essential to understand educational impact as well as barriers to effective financial choice. This article summarizes the broad range of financial literacy measures used in research over the last decade. An overview of the meaning and measurement of financial literacy is presented to highlight current limitations and assist researchers in establishing standardized, commonly accepted financial literacy instruments.

Increasing consumer financial literacy is a public policy objective to improve welfare through better decision making (U.S. House of Representatives, Financial Services Committee 2009). The recent mortgage crisis, consumer overindebtedness and household bankruptcy rates provide evidence to support this goal. To assess current levels of financial literacy and explore means to improve it, a construct is needed to measure consumers' ability to make effective financial decisions. Despite its importance, the academic literature has given little attention to how financial literacy is measured.

The terms financial literacy, financial knowledge and financial education often are used interchangeably in the literature and popular media. Few scholars have attempted to define or differentiate these terms. Unlike health literacy, which is typically measured using one of the three standardized tests, there currently are no standardized instruments to measure financial literacy. Marcolin and Abraham (2006) identified the need for research focused specifically on measurement of financial literacy. Typically, financial literacy and/or financial knowledge indicators are used as inputs to model the need for financial education and explain variation

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in financial outcomes such as savings, investing and debt behavior. Far fewer studies specifically emphasize measurement of financial literacy as an objective.

The purpose of this article is to examine previous literature to identify obstacles, and propose an approach, to develop a more standardized measure of financial literacy. Previous literature that attempts to measure human capital specific to personal finance is reviewed to identify how financial literacy is currently conceptualized and measured. A commonly accepted, standard construct is particularly important in future studies to provide the consistency needed for comparison studies and/or meta-analyses.

BACKGROUND

Selection

Seventy-one individual studies drawn from fifty-two different data sets were identified for analysis. Selection was based primarily on whether a study used a measure to capture an individual's human capital specifically related to personal finance, including terms such as financial literacy, financial knowledge or a closely related measurement construct.¹ Although several studies assessed financial literacy education, they were not included because the purpose of this article was to establish elements of a financial literacy measure, and not a financial literacy education program (see Fox, Bartholomae, and Lee 2005 for an overview of financial literacy education programs).

Where appropriate, analysis was on the data sets ($N = 52$) rather than the individual studies ($n = 71$) to avoid overrepresenting data sets used in multiple studies. The seventy-one individual studies were from fifty unique (first-listed) authors/organizations. The majority of the fifty-two data sets used U.S. samples. The studies were published in a wide variety of outlets including academic journals and conference proceedings. Although the compilation may not be exhaustive, it should represent the majority of research published between 1996 and 2008 that included financial literacy/financial knowledge measures.

Method of Analysis

Prior studies were analyzed emphasizing information related to construct validation. According to Pedhazur and Schmelkin (1991, p. 59),

1. Some of the selected studies such as economic knowledge/literacy have a wider scope, whereas others are more narrow, focusing on credit, debt or investment knowledge and/or literacy.

the logical analysis approach to construct validation involves four main facets: definition of construct, item content, method of measure and scoring procedure. The first, and arguably most important, aspect defines the construct to allow for operationalization that is complete and mutually exclusive from other constructs. The second element determines the instrument content and often involves using items from each relevant domain as indicators of the given construct. Measurement procedures include structural concerns such as how the data were collected (interview, rating scales); the number, wording and order of items included in the instrument and the conditions of administration. Instrument scoring is an important means of rating, communicating and providing consistency in testing and interpreting results from an instrument.

Financial literacy constructs from previous literature were assessed by whether a definition was provided and whether multiple terms were used to represent the same construct. The specific codes used are explained in Appendix 1. However, generally a construct was coded based on whether it was defined, at least somewhat conceptually discussed beyond the operational measure, or a definition could be implied.

Each study also was coded based on the financial domain content of each construct. After examination for commonality, four main categories emerged: personal finance basics, borrowing, saving/investing and protection. More details about the coding are in Appendix 1.

Instrument structure was addressed by examining the number of instrument items and the data collection method. The data collection method was coded as described in Appendix 1.

To address rating issues, the instrument was examined and coded to indicate if and how a criterion was applied to determine if an individual was financially literate (see Appendix 1 for details). Finally, the sample size and target audience for the instrument were noted.

Summary of Information

Table 1 provides information about each data set (A through AZ) and study (one through seventy-one) and shows results for each instrument evaluation category—construct, content, structure, rating—as well as for target audience and sample size.

RESULTS

Table 2 presents a summary of the instrument evaluation categories from each of the fifty-two data sets used by the seventy-one studies selected for this analysis.

TABLE 1
Compilation of Studies with Measures of Human Capital Related to Personal Finance^a

Data/Study Information			Construct		Structure		Other			
D#	S#	References	Def. Incl.	FK = FL?	Content	Items	Coll.	Rating	Aud.	N
A	1	ANZ (2008)	Yes	No	1, 2, 3, 4	26	1A	No	G	3,500
B	2	Beal and Delpachitra (2003)	Yes	No	1, 2, 3, 4	25	2D	No	S	789
C	3	Moore (2003)	SW	No	1, 2, 3, 4	26	1A	No	G	1,361
D	4	Hogarth and Hilgert (2002)	SW	Yes	1, 2, 3, 4	28	1A	Yes	G	1,004
E	5	Hilgert, Hogarth, and Beverly (2003)								
	6	Tennyson and Nguyen (2001)	SW	Yes	1, 2, 3, 4	31	2D	Yes*	S	1,643
7-14		Mandell ^b								
F	15	Chen and Volpe (1998)	No	Yes	1, 2, 3, 4	36	2D	Yes	S	924
G	16	Chen and Volpe (2002)								
H	17	Avard et al. (2005)	No	Yes	1, 2, 3, 4	20	2D	No	S	407
I	18	Bankrate (2003)	No	Yes	1, 2, 3, 4	12	1A	Yes*	G	1,000
J	19	NFI (2007)	No	Yes	1, 2, 3, 4	NR	2C	No	G	805
K	20	O'Neill and Xiao (2003)	No	NA	1, 2, 3, 4	20	2C	No	G	642
L	21	Danes and Haberman (2004)	No	NA	1, 2, 3, 4	14	2D	No	S	5,329
	22	Danes and Haberman (2007)								
M	23	Manton et al. (2006)	No	NA	1, 2, 3, 4	20	2D	No	S	407
N	24	FSA (2006a, 2006b)	No	NA	1, 2, 3, 4	NR	1B	No	G	5,328
O	25	Cutler and Devlin (1996)	No	Yes	1, 3, 4	14	1**	No	G	1,000
P	26	Chen and Volpe (2005)	No	Yes	1, 3, 4	68	2D	No	S	212
Q	27	Volpe, Chen, and Liu (2006)								
R	28	IPT (2007)	No	No	3, 4	10	1A	No	S	1,255
	29	Servon and Kaestner (2008)	Yes	Yes	1, 2, 3	13	1A	No	S	243
	30	Bowen (2002)	Yes	Yes	2, 4	19	2D	No	S	64

TABLE 1
(Continued)

D#		Data/Study Information		Construct		Structure		Other	
		References	Def. Incl.	FK = FL?	Content	Items	Coll.	Rating	Aud. N
S	31	Cude et al. (2006)	SW	NA	1, 2, 3	10	2C	No	S 1,891
T	32	Robb and James (2008)	No	Yes	1, 2, 3	6	2C	No	S 3,525
U	33	Schwab (2007)	No	NA	1, 2, 3	NR	2C	No	S 1,000
V	34	Kim (2001)	Yes	Yes	2, 3	12	2**	No	S 106
W	35	Hira and Loibl (2005)	SW	Yes	2, 3	4	2D	No	S 1,386
X	36	Perry and Morris (2005)	SW	NA	2, 3	5	2D	No	S 10,997
	37	Perry and Ards (2002)							
	38	Courchane and Zorn (2005)	Yes	Yes		NR		No	12,140
Y	39	AARP (2007)	No	No	2, 3	14	1A	No	S 1,031
Z	40	Edmiston and Gillett-Fisher (2006)	No	Yes	2, 3	9	2D	Yes*	S 66
AA	41	Bernheim (1998)	No	Yes	1, 3	13	2**	No	S 806
AB	42	Lusardi and Mitchell (2006)	No	Yes	1, 3	3	1A	No	S 1,269
	43	Lusardi and Mitchell (2008b)							785
AC	44	van Rooij, Lusardi, and Alessie (2007)	No	Yes	1, 3	16	2C	No	1,508
AD	45	Lusardi and Mitchell (2007b)	No	Yes	1, 3	13	2C	No	S 812
AE	46	Bernheim and Garrett (2003)	No	NA	1, 3	NR	1A	No	S 2,055
	47	Kotlikoff and Bernheim (2001)		Yes		11			806
AF	48	Alexander, Jones, and Nigro (1997)	SW	NA	3	9	1A	No	S 2,000
AG	49	Baron-Donovan et al. (2005)	No	No	1, 2	16	2D	No	S 42
AH	50	SIPC (2001)	No	No	3	6	1A	No	G 2,067
AI	51	JHFS (2002)	No	No	3	NR	**	No	S 801
AJ	52	Volpe, Chen, and Pavlicko (1996)	No	Yes	3	10	2D	Yes	S 454
AK	53	Volpe, Kotel, and Chen (2002)	No	Yes	3	10	2C	No	S 530

(continued)

TABLE 1
(Continued)

Data/Study Information			Construct		Structure			Other		
D#	S#	References	Def. Incl.	FK = FL?	Content	Items	Coll.	Rating	Aud.	N
AL	54	Agnew and Szykman (2004)	No	Yes	3	10	2D	No	G	398
AM	55	Müller and Weber (2008)	No	Yes	3	8	2C	No	S	3,086
AN	56	Borden et al. (2008)	No	NA	1, 2	7	2D	No	S	93
AO	57	NFCC (2007)	No	NA	1, 2	NR	1A	No	G	1,003
AP	58	Dwyer, Gilkeson, and List (2002)	No	NA	3	12	**	No	S	2,000
AQ	59	Wilcox (2003)	No	NA	3	10	2D	No	NR	NR
AR	60	Vanguard and Money (2002)	No	NA	3	20	2C	No	S	1,000
AS	61	NASD Investor Literacy Research (2003)	No	NA	3	14	2D	No	S	1,086
AT	62	Lusardi and Tufano (2009)	Yes	NA	2	3	1A	No	G	1,000
AU	63	Lyons, Rachlis, and Scherpf (2007)	SW	Yes	1	45	1A	No	G	1,578
AV	64, 65	Lusardi and Mitchell (2007a, 2007c)	No	Yes	1	3	1A	No	S	1,984
	66, 67	Lusardi and Mitchell (2008a, 2008c)								
AW	68	FRB Minn (1998)	No	NA	1	13	1A	No	G	404
AX	69	Henry, Weber, and Yarbrough (2001)	No	NA	1	3	2D	No	S	126
AY	70	NCEE (2005a, 2005b)	No	NA	1	24	2C	No	G/S	5,754
AZ	71	EBRI (2001)	No	NA	1	NR	1A	No	S	1,000

^aPlease refer to Appendix 1 for a detailed explanation of terms and coding used within Table 1.

^bMandell (1997, 2001, 2002, 2004, 2006, 2008) conducted the JumpStart Coalition for Personal Finance Literacy nationwide surveys for high school students in. In 2008 the study also was administered to 1,030 college students. Sample sizes range from 1,643 in 1997 to 6,856 in 2008.

FSA, Financial Services Authority; IPT, Investor Protection Trust; SIPC, Securities Investor Protection Corporation; JHFS, John Hancock Financial Services, and Matt Greenwald and Associates; NFCC, National Foundation for Credit Counseling; FRB Minn, Federal Reserve Bank of Minneapolis; NCEE, National Council on Economic Education; EBRI, Employee Benefit Research Institute, and Mathew Greenwald and Associates.

TABLE 2
Summary of Measures Used in the Compilation of Studies

Category	Frequency
Construct	
Definition included	
Yes	13%
No	72%
Discussed somewhat	15%
Knowledge = literacy? (mixed constructs)	
Yes	47% (76%) ^a
No	15% (24%)
Only one (or neither) included in study	38%
Content	
Basic concepts	63%
Borrowing concepts	52%
Saving/investment concepts	69%
Protection concepts	33%
Single focus (one content area)	35%
Comprehensive (all four content areas)	25%
Structure	
Number of items ($N = 46$, 8 not reported)	
Mean	16
Median	13
Mode	10
Minimum	3
Maximum	68
Data collection	
Interview	38%
Telephone	36% (95%) ^b
In person	2% (5%)
Self-report	58%
Internet	22% (38%) ^c
Paper (either mail/in person)	36% (62%)
Not reported	4%
Rating	
Provided	6%
Not provided	88%
Ordinal rank imposed	6%
Other	
Audience	
General adult population	30%
Specific target group	68%
Not reported	2%
Sample size	
Mean	1,575
Median	1,000
Mode	1,000
Minimum	42
Maximum	12,140

^aValues in parentheses refer to the frequency within the group of papers that report using both of the terms financial knowledge and financial literacy.

^bValues in parentheses refer to the frequency within the group of studies that used the interview method for data collection.

^cValues in parentheses refer to the frequency within the group of studies that used a self-report data collection technique.

Construct

The majority of studies (72%) did not include a definition of financial literacy. Although 15% included some discussion beyond identifying the specific elements in their measure, only 13% provided a formal definition of the construct operationalized (see Appendix 2 for the eight definitions). Of the eight definitions identified, two focused primarily on ability (definitions 1 and 2) and three on knowledge only (definitions 3, 7 and 8). The definitions used by the U.S. Financial Literacy and Education Commission (2007) and the Jump\$tart Coalition (2007) were essentially the same (definitions 5 and 6), in that they included both knowledge and ability and stated an intended outcome (i.e., lifetime financial security/well-being) within the definition. The definition Servon and Kaestner (2008; definition 4) used also included both dimensions of knowledge and ability with no additional stipulation.

Forty-seven percent of the studies analyzed used the terms financial literacy and financial knowledge synonymously (Table 2). When censoring the sample to only those studies that included both terms (62%), over three-quarters used these terms interchangeably. If these two constructs are conceptually different, then using the terms interchangeably indicates a potential problem.

Content

Review of the literature over the last decade indicated that at least four distinct content areas were used to varying degrees:

- Money basics (including time value of money, purchasing power, personal financial accounting concepts).

Intertemporal transfers of resources between time periods, including both

- borrowing (i.e., bringing future resources into the present through the use of credit cards, consumer loans or mortgages) and
- investing (i.e., saving present resources for future use through the use of saving accounts, stocks, bonds or mutual funds).

The fourth content area is

- Protecting resources (either through insurance products or other risk management techniques).

As shown in Table 2, over half of the measures in prior studies included basic, borrowing or saving/investment concepts, whereas

one-third included resource protection concepts. Forty percent of the measures were comprised of two or three content areas. Just over one-third (35%) were focused solely on one content area, with over one-half devoted to saving/investment items only. Only one-quarter of the measures incorporated all four of the content areas. Measures that incorporate all content areas are likely to be more accurate.

Structure

Table 2 shows the substantial variation among the studies in the number of items used to measure the financial literacy construct (minimum = 3, maximum = 68). However, the mean, median and mode were all between 10 and 16.

In terms of data collection, 38% of the studies used interview techniques; the remainder relied on self-administered surveys. The overwhelming majority of interview data (95%) was obtained via telephonic surveys. Much of the self-reported data were collected through the Internet (38%), but the majority was obtained either in person or by mail.

Rating

Almost nine of every ten studies reviewed did not provide an indicator of whether a respondent was financially literate. The remaining studies were evenly split between a financial literacy threshold and a grading system to interpret results from the measure. For example, according to Volpe, Chen, and Pavlicko (1996), a respondent with an investment IQ score of 70 or better was investment literate (i.e., mastered the investment basics). Another study used an A to F grading system, but did not indicate which grade level represented financial literacy (Bankrate 2003). In the Jump\$tart survey, a student fails with a score below 60% (Mandell 1997). However, according to Mandell (2009), students are financially literate if they score 75% or more. The status of scores from 60% to 74% is unclear.

Other

Most studies targeted specific audiences (68%). The most common target groups were students (high school and/or college students) and investors. Other types of target audiences were workers, teachers and subjects segmented by age (e.g., respondents aged 20–40, over 40, 30–48, 21–69, 25–65). Sample sizes among the studies ranged from 42 to

12,140. The mean sample size was 1,575, with a median and mode of 1,000.²

OBSTACLES TO A STANDARD FINANCIAL LITERACY MEASURE

Examination of the studies revealed three main barriers to developing a standardized approach to measure financial literacy: the lack of conceptualization and definition of the construct financial literacy, content of the instrument and instrument interpretation. The first is the most important.

Nearly three-quarters of the studies did not elaborate on the construct used; the remainder used definitions with varying elements (e.g., knowledge, ability, outcome). Also, the majority that included the constructs of both financial literacy and financial knowledge used these terms interchangeably, providing more evidence of a need for construct clarification. Not having a precise and consistent construct conception limits the ability to conduct comparative analyses or assess financial literacy rates and their subsequent impact on financial well-being. This is a critical barrier because all other stages of instrument development depend on having a complete and well-defined construct.

A second barrier to developing a standardized approach to financial literacy is the use of measures that are not comprehensive. Only one-quarter of the studies included all of the personal finance components in their measure.

Finally, an overwhelming majority of the studies (88%) reviewed did not include a guide for measurement interpretation. This lack of clarity is a barrier to a common or general understanding of the financial literacy construct.

PROPOSED APPROACH TO MEASURE FINANCIAL LITERACY

Using concepts, methods and empirical evidence from personal finance literature and other literacy studies, one approach to address the barriers to financial literacy measurement is outlined below. First, the concept and definition are presented along with a discussion of differentiating among the constructs of financial literacy, knowledge, education, behavior and well-being. Other assessment issues also are addressed.

2. Regardless of how many studies used a particular set of data, the sample size for each data set was included only once in calculations for mean, median and mode. When different sample sizes were reported, the average was used.

The Concept and Definition of Financial Literacy

General literacy refers to a person's ability to read and write (Zarcadoolas, Pleasant, and Greer 2006). The standard definition of literacy developed by the Literacy Definition Committee and used by the National Adult Literacy Survey is "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (Kirsch et al. 2001, p. 3). When operationalized, this definition covers three broad areas—prose (written information), document (tabular/graphical information) and quantitative (arithmetic and numerical information)—each with its own standardized testing instrument (Kirsch et al. 2001). Literacy in the broadest sense consists of understanding (i.e., knowledge of words, symbols and arithmetic operations) and use (ability to read, write and calculate) of materials related to prose, document and quantitative information.

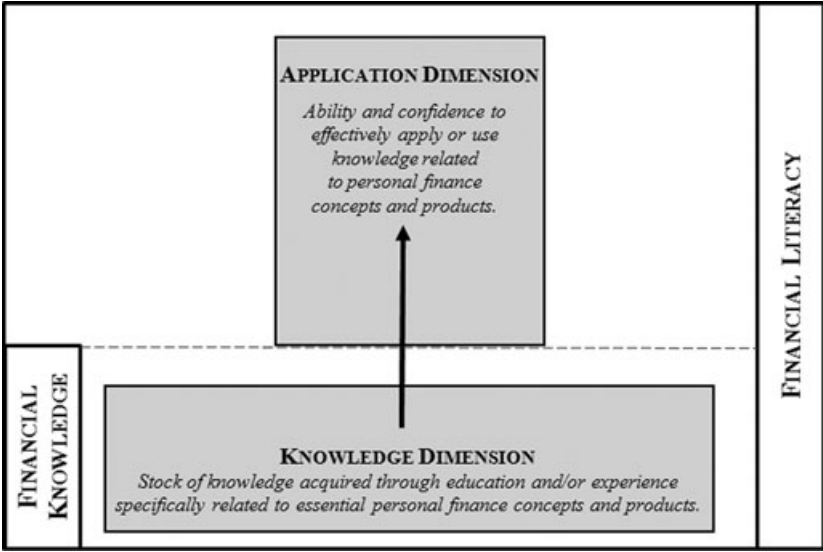
This idea of literacy has been expanded to the study of particular skill sets, for example computer literacy (Wecker, Kohnle, and Fischer 2007), statistical literacy (Callingham and Watson 2005) and health literacy (Baker 2006). The Educational Testing Service (ETS) identifies four types of literacy: prose, document, quantitative and health skills. ETS offers two sets of adult literacy tests (available at www.ets.org). Each type of literacy measures how well an individual can understand and use information. For example, health literacy measures how well an individual can understand and use health-related information related to five activities (health promotion, health protection, disease prevention, health care maintenance and systems navigation).

Like general or health literacy, financial literacy could be conceptualized as having two dimensions—understanding (personal finance knowledge) and use (personal finance application) (Figure 1) (Huston 2009). Although several financial literacy definitions have been proposed, there is no universally accepted meaning. Following the proposed financial literacy conceptual framework depicted in Figure 1, financial literacy could be defined as measuring how well an individual can understand and use personal finance-related information. This definition is direct, does not contradict existing definitions within the literature and is consistent with other standardized literacy constructs.

Differentiating Financial Literacy

Stemming from the proposed conceptualization and definition, financial literacy and financial knowledge are both human capital but different

FIGURE 1
Concept of Financial Literacy



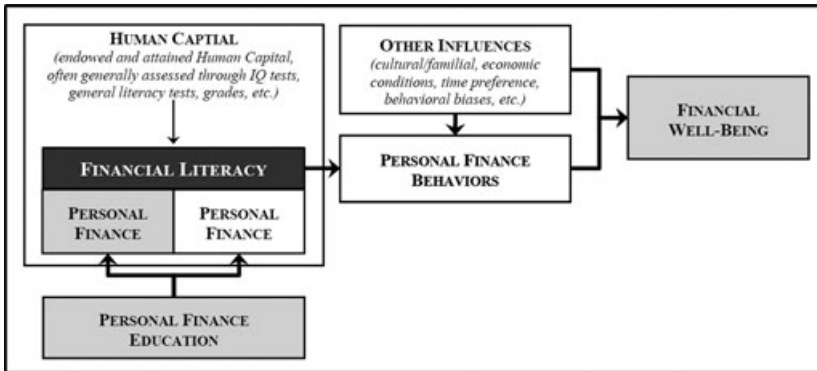
constructs. Financial knowledge is an integral dimension of, but not equivalent to, financial literacy. Financial literacy has an additional application dimension which implies that an individual must have the ability and confidence to use his/her financial knowledge to make financial decisions. When developing an instrument to measure financial literacy, it would be important to determine not only if a person knows the information but also if he/she can apply it appropriately.

Figure 2 shows the relationship among financial knowledge, education, literacy, behavior and well-being. Financial literacy consists of both knowledge and application of human capital specific to personal finance. The level of overall endowed and attained human capital influences a person's financial literacy. For example, if an individual struggles with arithmetic skills, this will certainly impact his/her financial literacy. However, available tools (e.g., calculators, computer software) can compensate for these deficiencies; thus, information directly related to successfully navigating personal finances is a more appropriate focus than numeracy skills for a financial literacy measure.

Financial literacy is a component of human capital that can be used in financial activities to increase expected lifetime utility from consumption (i.e., behaviors that enhance financial well-being). Other influences

FIGURE 2

Relations among Financial Literacy, Knowledge, Education, Behavior and Well-Being



(such as behavioral/cognitive biases, self-control problems, family, peer, economic, community and institutional) can affect financial behaviors and financial well-being. A person who is financially literate (i.e., has the knowledge and the ability to apply the knowledge) may not exhibit predicted behaviors or increases in financial well-being because of these other influences.

Financial education is an input intended to increase a person's human capital, specifically financial knowledge and/or application (i.e., financial literacy). A well-designed financial literacy instrument that adequately captures personal finance knowledge and application can provide insight into how well financial education improves the human capital needed to behave appropriately to enhance financial well-being.

Assessing Financial Literacy

Clarification of the financial literacy construct is the first step in operationalization. According to the proposed definition, a specific instrument developed to measure the construct would include both knowledge and application items. In terms of content, it would seem reasonable to use the four personal finance content areas that currently exist in the literature, with a focus on designing items strongly linked to the most common and/or most detrimental financial mistakes.

The specific number of instrument items primarily depends on adequate representation of each domain. Kim and Mueller (1978, p. 29) proposed one rule of thumb that the minimum number of items having meaningful loadings on a domain factor varies between three and

five. Assuming four personal finance content areas would suggest the minimum items required would be between twelve and twenty.

As for instrument structure, an accepted approach is to include at least three to five items per content factor resulting in initial instruments with twelve to twenty items (Kim and Mueller 1978) if the four content areas are used. Thus, initial instruments consisting of as few as three items (Henry, Weber, and Yarbrough 2001; Lusardi 2008a; Lusardi and Mitchell 2007a, 2007c, 2008c) would appear to be deficient to capture the breadth of human capital specifically related to personal finance. After initial testing, techniques such as item response theory approaches could be used to reduce the number of items (Edelen et al. 2006). Attention to item wording and ordering is important regardless of the data collection technique used. In terms of a target audience, it seems reasonable to begin with an adult audience because they control the greatest share of financial resources and other standardized literacy tests are aimed at an adult population. Finally, inclusion of a rating method, either a threshold or ranking system, is imperative to ensure common interpretation of the results.

CONCLUSIONS

Creation of financial education programs designed specifically to enhance financial literacy has been viewed as a solution to mitigating financial problems that individuals and families face. However, the literature offers mixed evidence that education provides measurable benefits (Fox, Bartholomae, and Lee 2005; Lusardi 2003; Mandell 2005; Willis 2008). Some research suggests that financial education does not have a significant effect on improving financial knowledge scores of high school students in the United States (Mandell 2005). Willis (2008) contends that the costs of financial education programs outweigh potential benefits. In contrast, other studies support a relationship between financial education, financial literacy and positive financial outcomes (Fox, Bartholomae, and Lee 2005; Lusardi 2003). These mixed results may indicate that not all financial education programs are equally effective, that factors other than financial literacy contribute to financial distress or both.

Literature on the cause and effect relationship between financial education and financial literacy is particularly limited. If the goal of financial education is to increase financial literacy, how do financial educators know if they have succeeded without a standard financial literacy measure? To be financially literate, individuals must demonstrate knowledge

and skills needed to make choices within a financial marketplace that all consumers face regardless of their particular characteristics. This may appear to be a one-size-fits-all approach to financial literacy measurement, but reflects the reality that all individuals make choices between standard financial products and services. Financial literacy education, which is aimed at improving a person's level of knowledge and/or ability, can and should be tailored to suit different demographics, life stages and learning styles—certainly not as a one-size-fits-all approach. Thus, it is important to clearly differentiate financial literacy from financial literacy education.

A successful measure of financial literacy will improve a researcher's ability to distinguish when a deficiency in financial literacy may be responsible for welfare-reducing financial choices and will allow educators to identify education to achieve a desired outcome. Another important consequence of an instrument that effectively measures financial literacy is that researchers are better able to identify what outcomes are most impacted by a lack of financial knowledge and skill. If, for example, financial literacy is strongly associated with the use of alternative borrowing products such as payday loans, then education efforts that improve literacy among this population may lead to changes in behavior. On the other hand, if financial literacy within a population of resource-constrained households with uncertain income and expenses does not independently predict use of these products, then education may be less effective than other forms of intervention.

Although a financial literacy measure may be used to predict financial behaviors or outcomes, it does not necessarily imply that individuals will behave in a way that many scholars, policymakers or educators would deem optimal. Other characteristics such as impulsiveness, behavioral biases, unusual preferences or external circumstances also contribute to what may appear to be poor financial decision making. A financial literacy measure only identifies the human capital required to engage in appropriate financial behavior; it does not ensure this will occur. Thus, educators cannot assume that people with less than optimal financial situations are necessarily financially illiterate.

It is increasingly apparent that financial mistakes can impact individual welfare as well as create negative externalities that affect all economic participants. Tracking variation and change in financial literacy rates is of interest to educators, policymakers, employers and researchers. A more standard approach to measure financial literacy is needed to identify barriers to financial well-being and assist in solutions that enable effective financial choice.

APPENDIX 1
Glossary of Terms Used in Table 1

Element		Description
Data/study	S#	Number of studies reviewed = 71, labeled 1–71.
	D#	Number of data sets used = 52, labeled A through AZ.
References		Authors and year of publication (complete citation available in reference section).
Construct	Def. Incl.	Whether included a specific definition of the concept measured (Yes or No; SW if construct at least somewhat conceptually discussed beyond operational measure, but not specifically defined OR definition can be implied because the study used an already established instrument defined in the original article).
	FK = FL?	Financial literacy used interchangeably with knowledge (Yes or No; NA if a related concept [e.g., economic literacy] was measured).
Content		General vs. specific nature of the measure. Measured by extent of coverage of each broad area of personal finance:
		1. Basic concepts (TVM, planning, economy) 2. Borrowing concepts (credit cards, loans, mortgages) 3. Saving/investing concepts (stock, bond, mutual fund, retirement savings) 4. Protection concepts (insurance, estate and tax planning, identity safety) NA = scope could not be determined.
Structure	Items	Number of items specifically included to measure financial knowledge and/or financial literacy (not necessarily the number of questions); NR if not reported.
	Coll.	Data collection method: <div>● 1 = interview ● 2 = survey ● ** = format not specified A: telephone C: web-based B: in person C: paper</div>
Rating		Whether a criterion was applied to interpret an instrument score as financially literate (Yes or No; Yes* if an ordinal ranking system was applied [levels, e.g., high to low, grade]).
Other	Aud.	Type of sample targeted for the study. G = general population, S = specific, e.g., college students, investors, workers. NR = not reported.
	N	Sample size, NR = not reported.

APPENDIX 2
Definitions of Financial Literacy^a

- 1 Financial literacy is the ability to make informed judgments and to take effective decisions regarding the use and management of money (Noctor, Stoney, and Stradling 1992, definition used by Beal and Delpachitra 2003 and ANZ 2008).
- 2 Personal financial literacy is the ability to read, analyze, manage and communicate about the personal financial conditions that affect material well-being. It includes the ability to discern financial choices, discuss money and financial issues without (or despite) discomfort, plan for the future and respond competently to life events that affect everyday financial decisions, including events in the general economy (Vitt et al. 2000; also cited by Cude et al. 2006).
- 3 Financial literacy is a basic knowledge that people need in order to survive in a modern society (Kim 2001).
- 4 Financial literacy refers to a person's ability to understand and make use of financial concepts (Servon and Kaestner 2008).
- 5 Financial literacy is the ability to use knowledge and skills to manage financial resources effectively for lifetime financial security (JumpStart Coalition 2007).
- 6 Financial literacy is the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being (U.S. Financial Literacy and Education Commission 2007).
- 7 Financial knowledge is defined as understanding key financial terms and concepts needed to function daily in American society (Bowen 2002).
- 8 Consumer literacy, defined as self-assessed financial knowledge or objective knowledge (Courchane and Zorn 2005).

^aOther definitions (e.g., financial knowledge and consumer literacy) were included only if the study used their measure and the term financial literacy interchangeably.

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