

Financial literacy and financial behavior: Assessing knowledge and confidence

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Abstract

This article explores how financial literacy, comprised of both actual financial knowledge and perceived financial confidence, affect financial decisions. Using national survey data from the United States, results indicate that financial confidence is a critical component of financial literacy and is important across all knowledge levels. However, overconfident individuals, or those with high confidence (or self-assessed) knowledge but low actual knowledge, have a higher propensity to engage in risky (costly) financial behaviors. Together, results suggest that financial literacy initiatives should focus not only on factual knowledge, but on helping individuals achieve a healthy dose of confidence. © 2015 Academy of Financial Services. All rights reserved.

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1. Introduction

Financial literacy is a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate short-term decision making and sound, long-range financial planning, while mindful of life events and changing economic conditions. (Remund, 2010, p. 284)

Financial decision making is an essential component of day-to-day life, from minor decisions such as deciding whether or not to purchase a latte to major decisions such as taking on a home mortgage. Several definitions of financial literacy highlight that to make sound financial decisions, individuals must not only possess the necessary knowledge, but

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must also have “the ability and confidence” to *apply* their knowledge. This article explores how financial literacy influences financial behaviors. By examining two components of financial literacy, financial knowledge, and financial confidence (or perceived knowledge), this article demonstrates that both components are critically important to sound decision-making.

Using survey data from FINRA’s 2012 National Financial Capability Study (NFCS), financial knowledge is measured by the number of correct answers to multiple-choice and true or false questions. Financial confidence reflects a self-assessed level of financial knowledge, which may or may not coincide with measured financial knowledge. This article demonstrates that both knowledge and confidence influence financial behaviors, and surprisingly, the effect of financial confidence on behaviors is just as important as the effect of financial knowledge. Furthermore, confidence is an important predictor of financial behavior across all actual financial knowledge level groups.

Additionally, by examining the interaction of financial knowledge and confidence, this study expands on the literature related to overconfidence, or the tendency to overestimate one’s accuracy and to underestimate risk. In instances where confidence exceeds actual knowledge (i.e., overconfidence), an individual has a greater likelihood of engaging in risky (costly) financial behaviors, such as taking out a title-loan. A key contribution, therefore, is a better understanding of how confidence influences financial behaviors: confidence is good, but not if it greatly exceeds actual knowledge. Prior research associating perceived knowledge with individual financial behaviors has failed to reconcile instances in which inaccurate self-assessments can be harmful. This article shows that, overall, positive illusions are good. However, this article also illuminates the particular risky situations in which overconfidence is self-injurious. These findings are relevant across a multitude of disciplines and are pertinent to individuals, practitioners, and institutions alike. There are clear implications for financial literacy initiatives, initiatives that are of utmost importance given the pervasiveness of financial decisions in every individual’s daily life.

The article is organized as follows. Section 2 provides an overview of the literature, touching on financial literacy, perceived knowledge, and overconfidence. Section 3 details the hypotheses, as well as an overview of the data, measures, and methods. Section 4 presents the results and Section 5 concludes.

2. Literature review

2.1. Financial literacy

Mandell (2008, p. 257) describes financial literacy as “the ability of consumers to make financial decisions in their own best short- and long-term interests.” At its most basic level, “financial literacy relates to a person’s competency for managing money” and “is typically measured at the individual level and then aggregated by groups” (Remund, 2010, p. 279). Because of the changing economic environment (e.g., see Organisation for Economic Co-operation and Development [OECD], 2005), financial literacy initiatives have received much attention.

Research suggests that financial education has a positive effect on financial behaviors: education programs and seminars affect savings and total financial wealth (Lusardi, 2004), and individuals who studied economics or business in high school are less likely to be unbanked (Bernheim, Garrett, and Maki, 2001; Grimes, Rogers, and Smith, 2010). However, other research questions the effectiveness of financial literacy initiatives: educating employees about the risks of employer stock does not significantly affect 401k holdings (Choi, Laibson, Madrian, and Metrick, 2005) and high school students who complete a semester of a financial literacy course are no more financially literate than high school students who have not completed the course (Mandell and Klein, 2009). U.S. households with higher levels of knowledge engage in more financial planning, although this positive relationship is weak (Alhenawi and Elkhal, 2013).

If financial knowledge is not enough, what other factors influence the financial-decision making process? This article explores how a specific cognitive element, perceived knowledge (or financial confidence), shapes financial behaviors.

2.2. *Perceived knowledge (confidence)*

Researchers often emphasize what people actually know at a given time, yet understanding perceptions is also important. Park, Gardner, and Thukral (1988) emphasize that perceived knowledge is related to cognitive functioning, including recognition (Schachter, 1983), identification (Nelson, Gerler, and Narens, 1984), and problem solving (Metcalf, 1986). Both an individual's actual financial knowledge and perceived financial knowledge influence investments (Kyrzhenko and Shumb, 2009), retirement planning (Parker, Bruin, Yoong, and Willis, 2011), and credit card behaviors (Allgood and Walstad, 2013). Furthermore, Carpena, Cole, Shapiro, and Zia (2011) emphasize that aside from numeracy based knowledge, financial literacy may also affect decisions through an individual's increased awareness and initiative. Thus, financial confidence is a critical component of financial decision making.

Often there is a discrepancy between an individual's actual knowledge and an individual's self-perception, or confidence. Correlations between actual and perceived financial knowledge vary considerably on an individual basis (Agnew and Szykman, 2005). It is interesting to look at the interactions and differences between these two measures of knowledge, specifically in situations where confidence exceeds actual knowledge.

2.2.1. *Overconfidence*

Overconfidence refers to an individual's propensity to overestimate the accuracy of his or her estimates, meaning that there is "a positive difference between assessed confidence and observed achievement" (Campbell, Goodie, and Foster, 2004, p. 299). Such overestimation, is more likely to occur "after unexpectedly difficult tasks" (Healy and Moore, 2007, p. 4). For example, less skilled financial planners are more confident than the more skilled (Cordell, Smith, and Terry, 2011). Individuals who are overconfident have narrow confidence intervals and, therefore, tend to overestimate precision and underestimate risk (Goel and Thakor, 2008). Often, those who take more risk are not necessarily risk-seeking, but are less aware

of the risk (Simon, Houghton, and Aquino, 2000). Even when given high incentives for accuracy, individuals still exhibit overconfidence (Williams and Gilovich, 2008).

In a theoretical model, Goel and Thakor (2008) posit that CEO overconfidence effects firm value nonmonotonically, meaning that overconfidence is good up to a point (to overcome initial risk aversion) but then is harmful (leading to excessive risk-taking). Likely, these findings will hold for the individual financial decisions considered in this analysis: that overconfidence is “good” for most financial decisions, but overconfidence is harmful for risky financial decisions. As Johnson and Fowler (2011, p. 320) warn, “it seems that we are likely to become overconfident in precisely the most dangerous of situations.”

3. Method

3.1. Hypotheses and research approach

Hypothesis 1 (H1): Financial confidence predicts financial behavior.

Because cognitive functioning is a critical component of the decision making process (see Section 2.2.), financial confidence likely influences all types of financial decisions. In fact, Carpena et al., (2011) find that financial education initiatives do not equip individuals with the numeracy knowledge needed to make complex financial decisions; however, the initiatives greatly affect awareness and familiarity with financial services and products. Thus, confidence is likely an important component of financial decision making. Logistic regressions explore whether financial confidence affects financial behaviors above and beyond the influence of actual (measured) financial knowledge.

Hypothesis 2 (H2): Overconfident individuals (high confidence, low knowledge) are most likely to engage in risky financial behaviors.

Overconfidence, or “that upward gap between what we know and what we think we know” (Cordell, Smith, and Terry, 2011, p. 255), results in an overestimation of accuracy and underestimation of risk (see Section 2.2.1.). Based on Goel and Thakor’s (2008) theoretical model, overconfidence may be beneficial to overcome initial risk aversion, but also leads to excessive risk-taking. Those individuals who self-assess their financial knowledge as higher than their actual knowledge may improperly assess risk levels, resulting in risky financial behaviors. It is hypothesized, then, that in most circumstances higher levels of confidence leads to “better” financial behaviors. However, too much confidence may be harmful in riskier circumstances because the risk level is not properly assessed. Logistic regressions explore whether overconfidence leads to an increased propensity to engage in risky (or costly) financial behaviors.

3.2. Data

Data are obtained from the 2012 National Financial Capability Study (NFCS) commissioned by the Financial Regulatory Authority’s (FINRA) Investor Education Foundation. The study, with support from the U.S. Department of the Treasury and the President’s

Table 1 Characteristics of the sample

	<i>N</i>	%
Total sample	25,509	100.0
Gender/sex		
Male	12,392	48.6
Female	13,117	51.4
Age		
18–24	3,139	12.3
25–34	4,669	18.3
35–44	4,171	16.3
45–54	5,005	19.6
55–64	4,569	17.9
65+	3,956	15.5
Ethnicity/race		
White	16,956	66.5
Non-White	8,553	33.5
Marital status		
Married	13,782	53.4
Single	7,469	28.2
Separated or divorced	10,899	14.0
Widowed	985	4.4
Education		
Not complete high school	2,210	8.7
High school graduate	5,695	22.3
GED	1,818	7.1
Some college	9,160	35.9
College graduate	4,105	16.1
Post-graduate education	2,519	9.9

Data was obtained from 2012 FINRAs National Financial Capability Study and is weighted based on national distributions within age/gender, ethnicity, education, and Census division.

Advisory Council on Financial Literacy, aims to measure American's money skills. The state-by-state survey collected data from 25,509 respondents via an online survey. All analyses are weighted based on national distributions within age/gender, ethnicity, education, and Census division. Table 1 provides descriptive statistics for the survey sample. The sample is ~51% female, 67% White, 53% married, and over 62% has an education beyond high school.

3.3. Measuring financial literacy

3.3.1. Financial knowledge

Five survey questions are used to measure basic financial knowledge. Table 2 documents the five questions and the survey results. The dummy variables *Interest*, *Inflation*, *Bond*, *Mortgage*, and *Risk* are created whereby a 1 represents a correct response and a 0 represents an incorrect response, a “Don't Know,” or a refusal to answer.¹

Approximately 14% of the respondents answered all five financial literacy questions correctly. Consistent with previous findings the results point to differences in knowledge across gender and race (Fisher, 2010; Lusardi, 2008; Mandell, 2006).² These gender differ-

Table 2 Financial knowledge

Question	Responses (N)	Percentage
Interest: Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?		
<i>More than \$102</i>	19,112	74.9
Exactly \$102	1,906	7.5
Less than \$102	1,407	5.5
Don't know	2,818	11.0
Prefer not to say	266	1.0
Inflation: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?		
More than today	2,201	8.6
Exactly the same	2,176	8.5
<i>Less than today</i>	15,630	61.3
Don't know	5,164	20.2
Prefer not to say	334	1.3
Bond: If interest rates rise, what will typically happen to bond prices?		
They will rise	5,014	19.7
<i>They will fall</i>	7,168	28.1
They will stay the same	1,290	5.1
There is no relationship...	2,186	8.6
Don't know	9,545	37.4
Prefer not to say	306	38.6
Mortgage: 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.		
<i>True</i>	19,142	75.0
False	2,303	9.0
Don't know	3,882	15.2
Prefer not to say	182	0.7
Risk: Buying a single company's stock usually provides a safer return than a stock mutual fund.		
True	2,209	8.7
<i>False</i>	12,366	48.5
Don't know	10,715	42.0
Prefer not to say	219	0.9

The five financial literacy questions as they appear in FINRA's 2012 National Financial Capability Study. *Correct answers are italicized.* Binary variables were created for each of the five literacy topics (*Interest*, *Inflation*, *Bond*, *Mortgage*, and *Risk*) whereby a correct response is coded as 1. If the respondent incorrectly answered the question, responded "Don't know" or "Prefer not to say" the answer was coded as not correct (or 0).

ences hold across age groups (Lusardi and Mitchell, 2007; Lusardi, Mitchell, and Curto, 2010) and cross-nationally (Lusardi and Mitchell, 2011). Also consistent with the literature, there is an inverted U-shape relation between age and financial literacy and a positive relation between education levels and literacy levels (Lusardi and Mitchell, 2011).

3.3.2. Financial confidence (or perceived knowledge)

In the NFCS survey, participants rated their own financial knowledge on a 7-point Likert item scale whereby a "1" reflects low self-assessed levels of financial knowledge and a "7" reflects high self-assessed levels of financial knowledge. The question, as presented in the survey, reads, "On a scale from 1 to 7, where 1 means very low and 7 means very high, how

Table 3 Financial confidence

	Overall		Day-to-Day		Math	
	N	%	N	%	N	%
1–Very low/strongly disagree	500	2.0	947	3.8	1,177	4.7
2	506	2.0	574	2.3	704	2.8
3	1,329	5.4	865	3.4	991	3.9
4–Average/neither agree or disagree	3,792	15.3	3,207	12.8	2,924	11.6
5	8,461	34.2	3,287	13.1	3,403	13.5
6	6,652	26.9	5,698	22.7	5,896	23.4
7–Very high/strongly agree	3,479	14.1	10,518	41.9	10,099	40.1
Mean	5.15		5.65		5.57	
Median	5.00		6.00		6.00	
Standard Deviation	1.30		1.60		1.70	

Three questions in the NFCS survey touch on financial confidence: (1) “On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial knowledge?” (*Overall*); “How strongly do you agree or disagree with the following statements?” (2) “I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses.” (*Day-to-Day*); (3) “I am pretty good at math.” (*Math*) Respondent’s answering “Don’t Know” for overall financial knowledge (528, or 2.1%); day-to-day matters (204, or 0.8%); and math (136, or 0.5%). Respondent’s that “prefer not to say” for overall financial knowledge (790, or 3.1%); day-to-day matters (210, or 0.8%); and math (179, or 0.7%). Correlations between the confidence measures of 58.2% (*Day-to-Day* and *Math*), 41.8% (*Day-to-Day* and *Overall*), and 36.0% (*Overall* and *Math*). All correlations significant at the 1% level. An average financial confidence measure (*Average*) is also created and represents the average of responses to the three confidence questions (*Overall*, *Day-to-Day*, and *Math*).

would you assess your overall financial knowledge?” On average, individuals rated their financial knowledge (*Overall*) as 5.15 on a 7-point scale. Table 3 shows that only 9.4% of individuals self-assessed their knowledge level as below average, whereas 15.3% of individuals rated their knowledge as average and 75.2% rated their knowledge as above average.

Two additional questions, measured on a 7-point scale, assess confidence levels:

How strongly do you agree or disagree with the following statements?

- I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses.
- I am pretty good at math.

As seen in Table 3, the majority of individuals rate themselves as better than average: the mean and median responses are all above four. Robb, Babiarz, and Woodyard (2012) measure financial confidence as an average of the confidence responses. Following their method, an “average” financial confidence measure is created (*Average*) as the mean of the three responses (*Overall*, *Day-to-Day*, *Math*).³

3.3.3. Knowledge and confidence

Allgood and Walstad (2013) develop a measure that accounts for both an individual’s actual financial knowledge and perceived financial knowledge, arguing that the combination provides “more robust and nuanced insights” about how financial literacy affects financial

behavior. Following their methodology, a composite knowledge measure is created. First, “high” and “low” groups are established for both financial knowledge and confidence, where those individuals with above average scores are categorized as “high” and those individuals with below average scores are categorized as “low.”⁴ Then four additional variables are created to represent the four types of combined (knowledge-confidence) financial literacy (*High-High*, *High-Low*, *Low-High*, and *Low-Low*). About 28% and 20% of the sample are classified as *High-High* and *Low-Low* literacy, respectively. Approximately one-third of the sample has *High-Low* literacy and about 10% of the sample is overconfident (*Low-High* knowledge).

3.4. Measuring financial behaviors

The NFCS surveys numerous financial topics. The behaviors considered in this analysis are detailed in the Appendix. Although it is not appropriate to label financial behaviors with normative values (e.g., “good” and “bad” behaviors ultimately depend on individual preferences and circumstances), it is possible to discern whether or not an individual is engaging in a “good” or “recommended” financial practice. For example, checking your credit rating is a “good” financial practice while being involved in a foreclosure process is a “bad” financial practice. Applying Goel and Thakor’s (2008) theory, higher levels confidence will lead to “better” financial decisions, except in the riskiest of circumstances.

Financial behaviors classified as “risky” are costly behaviors that are riskier and pricier than other short-term loan alternatives, including: taking out an auto title loan; taking out a short-term payday loan; receiving a tax advance on a refund; using a pawn shop; and using a rent-to-own facility. If overconfident individuals underestimate risk, they will be more likely than other groups to engage in these costly behaviors that jeopardize their resources.

4. Results

Logistic regressions explore how the two components of financial literacy influence financial behaviors. In logistic regressions, the dependent variable is a binary variable and the models attempt to predict whether or not an individual engages in a specific type of financial behavior. The β coefficients are difficult to interpret; therefore, the odds ratio, a more useful measure of effect size, is reported. The measure is the ratio of the likelihood of an event occurring in one group to the likelihood of the same event occurring in another group.

In addition to the four financial knowledge groups, several other demographic factors are considered (almost all of which are dummy variables), including: gender (female = 1); age (18–24, 24–34, 35–44, 45–54, 55–64, or 65+); race (non-White = 1); education (<high school, GED, high school graduate only, some college, college graduate only, or postgraduate); employment status (self-employed, full-time, part-time, homemaker, student, unable, unemployed, or retired); marital status (single, married, divorced or separated, or widowed or widower); dependent children (no children or dependent children, one child, two children, or three or more children); annual income (less than \$15K, \$15–25, \$25–35, \$35–50, \$50–75, \$75–100, \$100–150, or \$150K or more); income-drop (= 1 if “experienced a large

Table 4 Financial literacy and financial behavior

	High knowledge, high confidence	High knowledge, low confidence	Low knowledge, high confidence
Savings and borrowing behaviors			
Calculate	1.459***	1.350***	1.609***
Compare credit cards	1.205***	1.456***	1.650***
Credit report	1.329***	1.131**	1.294***
Credit score	1.247***	1.218***	1.380***
Health insurance	1.055*	1.116*	1.133**
Life insurance	1.102***	1.051	1.215***
Investments	1.429***	1.569***	1.170***
Loan from retirement account	0.801***	0.724**	1.017
Home equity loan	0.943	1.176	1.393***
Foreclosure	0.892**	0.846	1.471***

Logistic regressions predicting financial behavior whereby the predictor variables control for gender, age, education, employment status, marital status, income, income-drop, and risk tolerance. The dependent variables are listed vertically and represent the financial behaviors (0 = did not engage in behavior; 1 = engaged in behavior), which are detailed in the Appendix. The odds ratio for three financial knowledge groups is reported, a ratio of the likelihood of an event occurring in one group to the likelihood of the same event occurring in another group. The omitted variable is the low actual knowledge and low confidence group. The odd ratios of the three reported knowledge groups are interpreted in reference to this omitted group. The results for the control variables are not reported. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

drop in income which you did not expect” in the past 12 months); and risk tolerance (scale from 1 to 10 whereby 1 means “not at all willing” to take risks with financial investments and 10 means “very willing”). The use of these demographic controls is established in the literature (e.g., see Allgood and Walstad, 2013 or Lusardi and Mitchell, 2011). Unless otherwise noted, the omitted variables are: the *Low-Low* group, 18–24 age group, college graduate, full-time employment, married, no dependent children, and annual income of at least \$50,000 but less than \$75,000. All variables are interpreted in reference to these groups.

4.1. Predicting financial behaviors

In Table 4, financial knowledge and confidence are both statistically significant predictors of financial behavior. Because the omitted variable is the *Low-Low* group, interpreting the odds ratio of the low knowledge and high confidence group reflects a difference in confidence, and interpreting the odds ratio of the high knowledge and low confidence group reflects a difference in actual knowledge. For example, those with high confidence (holding actual knowledge constant at a low level) are 1.131 times more likely to have obtained a credit report whereas those with high actual knowledge (holding confidence constant at a low level) are 1.294 times more likely to have obtained a credit report.

As a robustness check to ensure that confidence affects financial behaviors regardless of the level of actual financial knowledge, Table 5 reconsiders the regressions in Table 4. Instead of using the four knowledge groups as predictors, continuous variables are used to measure *Knowledge* (ranging from 0 of 5 questions correct to 5 of 5 correct) and *Confidence*

Table 5 Robustness checks for confidence measure

	Overall		Average	
	Knowledge	Confidence	Knowledge	Confidence
Savings and borrowing behaviors				
Calculate	1.236***	1.372***	1.227***	1.226***
Compare credit cards	1.115***	1.276***	1.102***	1.206***
Credit report	1.118***	1.297***	1.111***	1.201***
Credit score	1.099***	1.241***	1.088***	1.190***
Health insurance	1.089***	1.033*	1.082***	1.021
Life insurance	0.990	1.157***	0.981	1.129***
Investments	1.324***	1.298***	1.320***	1.169***
Loan from retirement account	0.776***	1.060	0.706***	0.857***
Home equity loan	0.925***	1.120***	0.935**	0.991
Foreclosure	0.703***	1.161***	0.725***	0.920**

The logistic regressions from Table 4 are reconsidered. Instead of using the four knowledge groups, continuous variables are used for financial knowledge and financial confidence. The financial knowledge measure reflects the number of correctly answered questions, and thus ranges from 0 to 5. Several confidence measures are considered: *Overall*, *Day-to-Day*, *Math*, and *Average*. In all regressions, both the financial knowledge variable and the respective financial confidence variable are standardized for ease of interpretation of the odds ratios. The control variables gender, age, education, employment status, marital status, income, income-drop, and risk tolerance are not reported. The financial behaviors (0=did not engage in behavior; 1=engaged in behavior) are listed vertically along the left panel and are detailed in the Appendix. The odds ratio represents reflects how a one standard deviation above or below the average affects financial behaviors. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

(self-assessed rating from 1 to 7). Confidence is measured using overall financial confidence (*Overall*) and an average financial confidence (*Average*). For interpretation purposes, standardized variables are used in the regression so that the odds ratio reflects how a one standard deviation above or below the average affects financial behaviors. Echoing the results of Table 4, Table 5 also demonstrates that both knowledge and confidence are important components of financial behaviors. For example, with a one standard deviation increase above the mean in knowledge and confidence an individual is 1.236 and 1.372 times more likely, respectively, to have calculated how much he or she needs to save for retirement.

Higher levels of financial literacy lead to “better” financial decision making. However, learning from the consequences of past financial decisions, particularly learning from mistakes, may also lead to higher levels of financial literacy. For example, financial knowledge is positively related to seeking financial advice (Collins, 2012; Robb, Babiarz, and Woodyard, 2012). Herein lies a potential endogeneity problem: financial literacy levels predict financial behaviors and financial behaviors (experience) may predict financial literacy levels.

To address the potential simultaneity issue, correlations examine the inter-relation between different financial behaviors. Then, two-stage least squares regressions use high school financial education to instrument for financial literacy. Similarly, van Rooij, Lusardi, and Alessie (2011) use economic education in high school as an instrumental variable, arguing that it is correlated with financial literacy (the independent variable) but not correlated with stock market participation (the dependent variable). First, there is not a clear statistical

Table 6 Financial literacy and risky behavior

	High knowledge, high confidence	High knowledge, low confidence	Low knowledge, low confidence
Risky, high-cost behaviors			
Title-loan	0.484***	0.656***	0.575***
Pay-day loan	0.595***	0.719***	0.745***
Tax advance	0.496***	0.602***	0.588***
Pawn shop	0.656***	0.804***	0.780***
Rent-to-own	0.630***	0.586***	0.769***

Logistic regressions predicting financial behavior whereby the predictor variables control for gender, age, education, employment status, marital status, income, income-drop, and risk tolerance. The dependent variables are listed vertically and represent the financial behaviors (0 = did not engage in behavior; 1 = engaged in behavior), which are detailed in the Appendix. The odds ratio for three financial knowledge groups is reported, a ratio of the likelihood of an event occurring in one group to the likelihood of the same event occurring in another group. The omitted variable is the low actual knowledge and high confidence group. The odd ratios of the three reported knowledge groups are interpreted in reference to this omitted group. The results for the control variables are not reported. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

relationship across financial behaviors, suggesting that financial behaviors are not distinct predictors of financial literacy (see also Allgood and Walstad, 2013). Second, in all specifications, the financial confidence variable is still statistically and economically significant. Moreover, previous research has also not found reverse causality to be an issue (Allgood and Walstad, 2013; van Rooij, Lusardi, and Alessie, 2011).

The results in Tables 4 and 5 provide support for H1, that financial confidence predicts financial behavior. In addition, these findings support Remund's (2010, p. 284) definition of financial literacy as "a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances" and the work of Courchane, Gailey, and Zorn (2008, p. 137) who find that "optimistic self-assessments, not accurate ones, lead to better financial outcomes."

4.2. Risky behaviors

H2 proposes that overconfident individuals are most likely to engage in risky financial behaviors. Table 4 hints that this may be the case: the *High-High* knowledge group is less likely than the *Low-Low* knowledge group to have experienced a foreclosure process while the *Low-High* (overconfident) knowledge group is more likely than the *Low-Low* group. Because of an underestimation of risk, overconfident individuals likely have an increased propensity to engage in risky behaviors.

The omitted knowledge group in this next series of regressions is the overconfident group, or those with low knowledge and high confidence (*Low-High*). If the overconfident are *more* likely to engage in risky behaviors, then the odds ratios of the other knowledge groups should be below one, indicating that these groups are *less* likely to engage in risky behaviors than the *Low-High* group. After controlling for many other factors, including risk tolerance, Table 6 shows that "overconfident" individuals are more likely than other knowledge groups to take these financial risks. Compared with "overconfident" individuals, those with low perceived

Table 7 Robustness checks overconfidence measure

	Knowledge	Confidence	Knowledge*Confidence
Risky, high-cost behaviors			
Title-loan	0.673***	1.060**	0.897***
Pay-day loan	0.713***	0.966	0.923***
Tax advance	0.652***	1.066**	0.886***
Pawn shop	0.770***	0.949**	0.926***
Rent-to-own	0.667***	1.074***	0.884***

The logistic regressions from Table 6 are reconsidered. Instead of using the four knowledge groups, continuous variables are used for financial knowledge and financial confidence. The financial knowledge measure reflects the number of correctly answered questions, and thus ranges from 0 to 5. The *Overall* confidence measure (1–7) is considered. In all regressions, both the financial knowledge variable and the financial confidence variable are standardized. An interaction term, *Knowledge*Confidence*, considers the relation between the two financial literacy components, knowledge, and confidence. The control variables gender, age, education, employment status, marital status, income, income-drop, and risk tolerance are not reported. The financial behaviors (0 = did not engage in behavior; 1 = engaged in behavior) are listed vertically along the left panel and are detailed in the Appendix. The odds ratio represents reflects how a one standard deviation above or below the average affects financial behaviors. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

and low actual knowledge are about 25% less likely to have obtained a payday loan and 22% less likely to have taken a tax advance. Because actual knowledge is low across these two groups, the increased propensity to engage in these risky behaviors is because of the high-perceived knowledge (confidence), that is, overconfidence.

As a robustness check, Table 7 reconsiders the regressions in Table 6, but instead of using the four knowledge groups as predictor variables, standardized continuous variables are used to measure *Knowledge* and *Confidence*. An interaction term, *Knowledge*Confidence*, considers the relation between the two financial literacy components. The statistically significant interaction terms in Table 7 indicate that confidence influences the relationship between knowledge and financial behavior, affecting the strength and/or direction of the relationship.

Fig. 1 illustrates one of the interactions from Table 7, how confidence affects the use of payday loans. The slope of the high confidence line is steeper than the low confidence line indicating that the affect of knowledge on payday loan behavior is different for different confidence levels. When knowledge is low, those with high confidence are more likely to engage in the risky behavior and when knowledge is high, those with high confidence are less likely to engage in the risky behavior. This illustrates that confidence is good, but too much confidence is harmful.

This link between overconfidence and risky behaviors helps elucidate the discrepancy that Parker, Bruin, Yoong, and Willis (2012) could not explain: They found that confidence is positively associated with “good” financial decisions, yet prior research demonstrates a negative association between overconfidence and trading behaviors (e.g., Barber and Odean, 2000; Grinblatt and Keloharju, 2009). People tend to have unrealistic self-perceptions, but these positive-illusions can be advantageous (Sedikides, 1993). This self-efficacy gives individuals the confidence to act (Bandura, 1997). Thus, as Parker, Bruin, Yoong, and Willis (2012, p. 387) suggest, “confidence may play a role in reducing hesitation and increasing risk taking.” However, in some financial circumstances, inaccurately assessing the level of risk

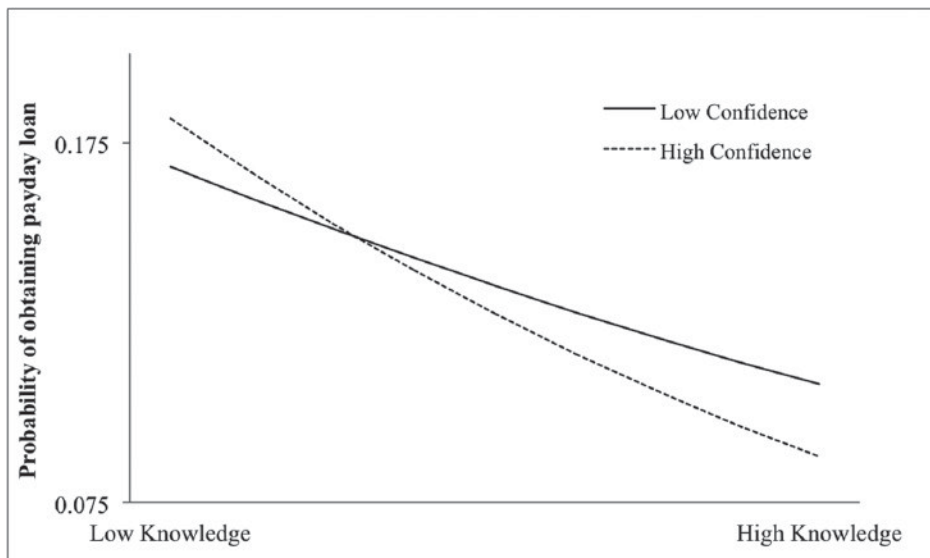


Fig. 1. Confidence and the probability of obtaining a payday loan by knowledge level. This figure illustrates the interaction between knowledge and confidence and the effect on the probability of obtaining a payday loan. Graph created using the regression coefficients, including control variables, from Table 7 and the website: <http://www.jeremydawson.co.uk/slopes.htm>.

can lead to risky decisions. The results in Table 6, Table 7, and Fig. 1 support H2, that overconfident individuals are most likely to engage in risky financial behaviors. Together, these findings align with Goel and Thakor's (2008) theoretical model: some overconfidence is good, but too much is bad.

5. Conclusion

This analysis examines two components of financial literacy, knowledge, and confidence. Not surprisingly, individuals with both high knowledge and confidence are more likely to make "good" financial decisions than individuals with both low knowledge and confidence. Somewhat surprising, however, is *how* influential perceived knowledge is on financial behavior. Additionally, when confidence is high and actual knowledge is low, individuals are more likely to take financial risks by engaging in costly behaviors. These findings are robust to measurement changes for the four knowledge groups, confidence, and overconfidence.

This article makes two noteworthy contributions. First, confidence, or self-perceived knowledge, is an important component of financial literacy. Prior studies found a positive association between an individual's self-assessed level of confidence with investing, retirement planning, and credit card behaviors. This analysis extends these findings by demonstrating, with a large nationally representative sample, that confidence affects additional savings and borrowing behaviors. In most financial circumstances, higher confidence is beneficial. However, the second contribution of this article is the clarification of when confidence can be detrimental. Overconfident individuals tend to overestimate the precision of their knowledge and underestimate risk; thus, perhaps even unbeknownst to them, overconfident individuals are more likely to engage in risky and costly financial behaviors.

These findings are based on survey data. As such, the results are only as good as the survey design and participant veracity. Survey responses are “vulnerable to social desirability,” meaning that if financial behaviors are viewed as having “a normative valence” then respondents are apt to overstate “good” financial behaviors and understate ‘bad’ financial behaviors (Willis, 2008). Additionally, financial decisions are not strictly about money but involve balancing life’s tradeoffs, and it is possible that some of these omitted factors, such as personality characteristics, may play a role in shaping financial behaviors. As predicted, confidence is an important part of financial decision making. The strength of the findings may relate to survey design issues: the confidence measure may pick up on a more “general” financial knowledge (or perhaps financial resourcefulness or experience) that the actual knowledge measure misses or may also reflect other confidence issues such as trust or general life outlook. Future experimental research may help explicate these measures and their respective affects on financial behaviors.

What is clear from the analysis, however, is that financial literacy encapsulates more than just numeracy knowledge. Understanding that confidence is just as important as knowledge is of paramount value to educators and policy makers, helping to structure more effective financial literacy initiatives and improve individuals’ everyday financial decision making. The risky financial behaviors addressed in this article are complex and require numeracy knowledge; however, based on Carpena et al.’s (2011) findings, more exposure to these financial topics will increase awareness and hopefully positively affect decision making. Although numeracy and math-based skills are necessary for specific, concrete calculations, exposing individuals to financial topics and products may help individuals make more informed financial decisions. The challenge then is to create education initiatives that help individuals find a healthy dose of confidence.

Notes

- 1 The three questions (*Risk*, *Interest*, and *Inflation*), developed by Annamaria Lusardi and Olivia Mitchell, first appear in the 2004 cross-section of the Health and Retirement Study. Lusardi and Mitchell (2011) describe their rationale for using these three questions as a measure of financial literacy, emphasizing that the measures were chosen keeping four principles in mind: (1) *Simplicity*, that is, basic financial concepts; (2) *Relevance*, that is, pertinent to daily financial decision-making; (3) *Brevity*, that is, small number of questions for widespread adoption; and (4) *Capacity* to differentiate, that is, distinguish different levels of knowledge.
- 2 Lusardi and Mitchell (2011) also report that not only are women less likely than men to correctly answer the financial literacy questions, but women are also less likely to respond, that is, women are more likely to answer that they “do not know.” Similarly, Beierlein and Neverett (2013) find that women are less likely to enroll in an elective personal finance course.

- 3 Using FINRA's 2009 survey, Robb, Babiarz, and Woodyard's (2012) average financial confidence measure is computed as an average of four confidence variables. "I regularly keep up with economic and financial news" is not included in the 2012 survey, and thus the average confidence variable is computed as an average of three confidence variables.
- 4 Individuals are classified as having high confidence if they self-assessed their *Overall* financial knowledge as a 6 or 7 on a 7-point scale and classified as having low confidence if they self-assessed their financial knowledge as 5 or lower on a 7-point scale (mean = 5.15; median = 5.00). Individual are classified as having high actual financial knowledge if they answered 3, 4, or 5 of 5 questions correctly and as low actual financial knowledge if they answered 2 questions or less correctly (mean = 2.88; median = 3.00).

Appendix: FINRA's 2012 National Financial Capability Study: Selected Survey Topics and Questions

Savings and loan behaviors

Calculate	Have you ever tried to figure out how much you need to save for retirement?
Compare CCs	Thinking about when you obtained your most recent credit card, did you collect information about different cards from more than one company in order to compare them?
Credit report	In the past 12 months, have you obtained a copy of your credit report?
Credit score	In the past 12 months, have you checked your credit score?
Health insurance	Are you covered by health insurance?
Life insurance	Do you have a life insurance policy?
Investments	Not including retirement accounts, do you have any investments in stocks, bonds, mutual funds, or other securities?
Retirement loan	In the last 12 months, have you or your spouse/partner taken a loan from your retirement account(s)?
Home equity loan	Do you have any home equity loans?
Foreclosure	Have you been involved in a foreclosure process on your home in the last 2 years?

Risky, high-cost behaviors

Auto title loan	In the last two years, have you taken out an auto title loan?
Payday loan	In the last two years, have you taken out a short term "payday" loan?
Tax advance	In the last two years, have you gotten an advance on your tax refund?
Used pawn shop	In the last two years, have you used a pawn shop?
Used rent-to-own	In the last two years, have you used a rent-to-own store?

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