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Financial Literacy among the Young

We examined financial literacy among the young using the most recent wave of the 1997 National Longitudinal Survey of Youth. We showed that financial literacy is low; fewer than one-third of young adults possess basic knowledge of interest rates, inflation and risk diversification. Financial literacy was strongly related to sociodemographic characteristics and family financial sophistication. Specifically, a college-educated male whose parents had stocks and retirement savings was about 45 percentage points more likely to know about risk diversification than a female with less than a high school education whose parents were not wealthy.

Consumers must confront complicated financial decisions at a young age in today's demanding financial environment, and financial mistakes made early in life can be costly. Young people often find themselves carrying large amounts of student loans or credit card debt, and such early entanglements can hinder their ability to accumulate wealth. To aid younger consumers, it is critical for researchers to explore how financially knowledgeable young adults are. Understanding the factors that contribute to or detract from the acquisition of financial knowledge can help policymakers design effective interventions targeted at the young population.

To examine how well-equipped young people are to make financial decisions, we analyzed financial literacy questions newly added to the

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National Longitudinal Survey of Youth fielded in 2007–2008. This rich data set was used to study the relationship among financial literacy and respondents' sociodemographic characteristics, family characteristics and peer characteristics. Three key research questions were addressed: (1) how well-equipped are young people to make financial decisions? (2) what are the determinants of financial literacy among young people? (3) how can this information aid policymakers seeking to devise interventions aimed at young consumers?

BACKGROUND

The financial situation of today's youth is characterized increasingly by high levels of debt. Between 1997 and 2007, average undergraduate student loan debt rose from $9,250 to $19,200—a 58% increase after accounting for inflation; average debt for college students graduating with loans rose 6% in just one year between 2006 and 2007, from $18,976 to $20,098 (Reed 2008). In addition, median credit card debt among college students grew from $946 in 2004 to $1,645 in 2009 (both figures in 2004 dollars), a 74% increase (Sallie Mae 2009).

Recent survey results suggest that these debt loads are causing anxiety among young people and influencing major labor decisions. A 2006 *USA Today*/National Endowment for Financial Education (NEFE) poll of young adults aged 22–29 found that, of those with debt, 30% said they worried about it frequently; 29% had put off or decided against furthering their education because of debt; and 22% had taken a job they would not have taken otherwise because of debt. There are other potentially costly consequences of accumulating high levels of debt early on, such as bankruptcy (Roberts and Jones 2001). For instance, the US Senate Committee on Banking, Housing and Urban Affairs reported in 2002 that the fastest-growing group of bankruptcy filers was those aged 25 and younger (US Congress Senate Committee on Banking, Housing, and Urban Affairs 2002). These high levels of debt also may prevent young workers from taking advantage of employer-provided pensions, tax-favored assets or building a buffer to insure against shocks: 55% of young adults report they are not saving in either an individual retirement account (IRA) or a 401(k) account and 40% do not have a savings account that they contribute to regularly (*USA Today*/NEFE 2006).

These debt loads are of particular concern given recent evidence that young people may lack sufficient knowledge to successfully navigate their financial decisions. For instance, a National Council on Economic Education study of high school students and working-age adults showed

widespread lack of knowledge among respondents regarding fundamental economic concepts (NCEE 2005), confirming evidence provided by the Jump$tart Coalition for Personal Financial Literacy (Mandell 2004). Policymakers have become so concerned about young people's finances that the credit card accountability, responsibility, and disclosure (CARD) act of 2009 included several provisions specifically targeted at protecting younger credit card consumers. For instance, credit cards will no longer be issued to young people under the age of 21 unless they have an adult co-signer or can show proof that they have the means to repay the debt; college students will be required to receive permission from parents or guardians to increase credit limits on joint accounts; and those under 21 will be protected from pre-screened credit card offers unless they specifically opt in for the offers (US Congress Senate 2009).

Previous research has found that financial literacy can have important implications for financial behavior. People with low financial literacy are more likely to have problems with debt (Lusardi and Tufano 2009), less likely to participate in the stock market (van Rooij, Lusardi, and Alessie 2007), less likely to choose mutual funds with lower fees (Hastings and Tejeda-Ashton 2008), less likely to accumulate wealth and manage wealth effectively (Hilgert, Hogarth, and Beverly 2003; Stango and Zinman 2007) and less likely to plan for retirement (Lusardi and Mitchell 2006, 2007a, 2009). Financial literacy is an important component of sound financial decision making, and many young people wish they had more financial knowledge. In a 2009 survey on credit card usage among undergraduate students, 84% of students said they needed more education on financial management topics, 64% would have liked to receive information about financial management topics in high school and 40% would have liked to receive such information as college freshmen (Sallie Mae 2009). Understanding financial literacy among young people is thus of critical importance for policymakers in several areas; it can aid those who wish to devise effective financial education programs targeted at young people as well as those writing legislation to protect younger consumers.

The present study extends the literature in three important ways. First, levels of financial literacy among the young were evaluated using a new nationally representative data set, the latest wave of the NLSY97. Second, we used this data set to examine how levels of financial literacy differ across a wide range of sociodemographic characteristics, family characteristics and peer characteristics. Third, multivariate analysis was used to identify several key determinants of financial literacy among young people. In what follows, we describe our study of financial literacy in a nationally representative sample of young people.

DATA

The NLSY97 is a nationally representative sample of the US youth population aged 12–17 in 1997. The survey was designed to document young adults' transition from school to work and to identify defining characteristics of that transition. Consequently, the survey reports extensive information on respondent labor market behavior, educational experience, and family and community characteristics. In addition to the youth interview, the NLSY97 includes a separate interview with each youth's parent, designed to provide detailed parental characteristics as well as information about the home environment (Bureau of Labor Statistics 2006). We introduced a small set of financial literacy questions in Wave 11 of the survey, fielded in 2007–2008 when respondents were 23–28 years old. To construct the final sample, we considered all respondents interviewed in Wave 11 and deleted the one observation which had a missing value for one of the financial literacy questions. For all other variables we added a dummy if observations had missing values and imputed a mean value. The analysis sample included 7,417 respondents. Wave 11 weights were used for all of the analyses. Our work made use of the nationally representative sample of youths as well as the black, Hispanic, low-income white and military oversamples (see Appendix for summary statistics).

METHOD

The three financial literacy questions included in Wave 11 of the NLSY were questions Lusardi and Mitchell (2006, 2008) originally designed for the 2004 health and retirement survey (HRS) and that have been added to many surveys in the United States and abroad. The wording of the questions was:

- *Suppose you had $100 in a savings account and the interest rate was 2% per year. After five years, how much do you think you would have in the account if you left the money to grow: more than $102, exactly $102 or less than $102?* {*Do not know; refuse to answer*}
- *Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, would you be able to buy more than, exactly the same as or less than today with the money in this account?* {*Do not know; refuse to answer*}
- *Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund."* {*Do not know; refuse to answer*}

These questions tested the knowledge of basic but fundamental financial concepts. The first two questions, which we refer to as the "interest rate" and "inflation" questions, tested whether respondents were knowledgeable about inflation and possessed basic financial numeracy. The third question, on "risk diversification," evaluated respondents' knowledge of risk diversification, a crucial element of an informed investment decision. These questions have been shown to differentiate well between naïve and sophisticated respondents (Lusardi and Mitchell 2006, 2008). In what follows, we first describe responses to the three financial literacy questions across a wide range of characteristics by performing *t*-tests for differences in means between different subgroups of the categorical variables (e.g., male vs. female, white vs. black, white vs. Hispanic, etc.). A multivariate analysis followed to determine which of the variables measured during the respondents' teenage years were determinants of financial literacy later in life.

Several considerations guided our selection of the variables for the empirical analysis. First, we included standard demographic characteristics (e.g., gender and race/ethnicity) to see whether these were related to financial literacy. Second, we were interested in a variable that could proxy for time preferences which might influence whether young people invest in financial knowledge. Researchers have hypothesized that those who discount the future more heavily may be less willing to invest resources in acquiring financial knowledge, because such an investment has a delayed payoff. For instance, a recent study found that it is disproportionately those who are patient who self-select into financial education programs (Meier and Sprenger 2007). As a proxy for time preference in this study, we used an indicator of whether a respondent had ever smoked. Prior research has reported that impatience is associated with higher rates of smoking (Fuchs 1982), and current smokers discount the value of delayed hypothetical monetary outcomes more than a comparison group (Bickel, Odum, and Madden 1999). Benjamin, Brown, and Shapiro (2006) also used smoking as a proxy for time preferences in their examination of NLSY79 data.

Third, we considered variables related to costs and opportunities for learning, such as cognitive ability, schooling and exposure to financial knowledge via family and peers. Previous research has found a strong association among cognitive ability and labor market outcomes, schooling decisions and social behavior (Heckman, Stixrud, and Urzua 2006). Given the link between cognitive ability and the acquisition of other types of human capital, it is important to examine the relationship between cognitive ability and the acquisition of financial knowledge. One advantage

of the NLSY is that it administered the armed services vocational aptitude battery (ASVAB), commonly used as an indicator of cognitive ability. The ASVAB consists of several subtests that measure vocational aptitude in twelve areas.[1] The ASVAB variable that we examined was an aggregated percentile score based on four subtests: mathematical knowledge, arithmetic reasoning, word knowledge and paragraph comprehension. This variable was similar to the armed forces qualifying test (AFQT) score in the NLSY79 data set that other researchers have used as a proxy for cognitive ability (see Benjamin, Brown, and Shapiro 2006; Cole and Shastry 2009). During Round 1 of the NLSY97, 79.3% of respondents completed the computer-adaptive form of the ASVAB; we included a missing variable dummy for those lacking a score.

In addition to cognitive ability, we also included respondent educational attainment, gathered from Wave 11.[2] We were interested in examining whether financial knowledge in young adulthood might be related to educational experiences during the school years. Accordingly, we measured this by respondent reports as to whether their teachers were interested in the students.

We also added variables measuring exposure to financial knowledge via family and peers to the regressions. Much prior work has argued that individuals learn via interaction with others, in particular, family and friends. For instance, Mandell (2008) reported that financially literate high school students were disproportionately those whose parents had college degrees. Our analysis therefore included the mother's educational attainment.[3] Sharing among family members also can play an important role in household financial decisions; for instance, Li (2009) found that one's likelihood of entering the stock market within five years was 30% higher if one's parents or children had entered the market in the previous five years. Interestingly, the finding that children are more likely to invest in stocks if the family of origin invested in stocks holds true even among minorities (Chiteji and Stafford 1999). Because we were interested in the influences of family financial circumstances, we also examined whether the respondent's parent owned a home, had retirement savings (pensions or retirement plans, tax-deferred plans such as thrift/savings,

1. The areas were arithmetic reasoning, assembling objects, auto information, coding speed, electronics information, general science, mathematics knowledge, mechanical comprehension, numerical operations, paragraph comprehension, shop information and word knowledge.

2. Note that this was the only control variable measured during Wave 11; the remainder were measured in Wave 1.

3. Similar results were obtained when we considered data about the father. Nevertheless, because there were many missing observations for father's education, we relied instead on mother's education for which the missing data problem was far less pervasive.

401(k)s, profit sharing or stock ownership plans and IRAs or Keogh plans), was banked or unbanked (had checking accounts, saving accounts or money market mutual funds) and owned stocks or mutual funds during the respondent's teenage years.[4] The first two variables were indicators of family wealth, whereas the latter two variables proxied for financial sophistication. In light of research by Hong, Kubik, and Stein (2004) showing that churchgoers are more likely to invest in stocks, we also looked at whether the respondent's parents attended church regularly as a proxy for social interactions with nonfamily members. Our analysis improved upon previous work as it allowed us to assess whether the interaction with others influences financial knowledge, which can in turn affect financial behavior.

To pursue this issue further, we considered the influence not just of family or other adults, but also of peers. In several studies of saving and financial decision making, peers were one of the key contributors of information and financial advice (Brown et al. 2008; Hong, Kubik, and Stein 2004). For example, when asked how they make financial decisions, a high fraction of respondents reported consulting friends and colleagues (Lusardi and Mitchell 2006; van Rooij, Lusardi, and Alessie 2007). Peers also were important in decisions concerning pension participation and contribution (Duflo and Saez 2003, 2004). This led us to investigate the question of whether peer influences—even those that happen early in life—could be linked to levels of financial knowledge later in life.

We also included several peer characteristics: percentage of peers going to college (as a proxy for peer educational attainment), percentage of peers attending church (as a proxy for peer social involvement) and percentage of peers who smoked (as a proxy for peer time preferences). These percentages were reported by the respondent. Note that the peers in this study were not "current peers," but rather peers from the respondent's teenage years. Our models therefore examined the long-term effects of high school peer influences on subsequent financial literacy (as opposed to the influences of current peers).

DESCRIPTIVE FINDINGS

Panel A of Table 1 reports results from the three questions that measured respondent levels of financial literacy. Although 79% of

4. Parental information was missing for approximately 10% of the sample. Statistics reported in the tables refer to the sample for which parents' wealth was available. We added a dummy for missing data about parents' wealth in our regressions. For a detailed analysis of the wealth data in the NLSY97, see Lusardi, Cossa, and Krupka (2001).

TABLE 1
Patterns of Responses to Financial Literacy Questions

	Correct	Incorrect	Do Not Know
Panel A: Distribution of responses to financial literacy questions (%)			
Interest rate	79.3	14.7	5.9
Inflation	54.0	30.4	15.4
Risk diversification	46.7	15.8	37.4
$N = 7417$			
	If Correct on Interest Rate Question	If Correct on Inflation Question	If Correct on Risk Diversification Question
Panel B: Correlation between correct responses			
Probability correct on interest rate question	100.0	84.7	84.6
Probability correct on inflation question	57.7	100.0	67.0
Probability correct on risk diversification question	49.8	57.9	100.0
Column *N*	5805	3700	3293

Note: All statistics calculated using sample weights.

respondents answered the interest rate question correctly, only 54% answered the inflation question correctly and 15% responded that they did not know the answer to the inflation question. Only 47% answered the risk diversification question correctly and 37% responded that they did not know the answer. The large "do not know" response rate was particularly troubling, as in previous research "do not know" answers identified respondents with very low levels of financial knowledge (Lusardi and Mitchell 2006, 2007a; Lusardi and Tufano 2009; van Rooij, Lusardi, and Alessie 2007). In any case, the low correct response rates, particularly to the inflation and risk diversification questions, indicated that many young people lack knowledge of basic financial concepts. Moreover, only 27% of respondents answered all three questions correctly, and only about 46% got the first two questions right. Thus, our findings show that lack of financial knowledge is widespread among the young.

Panel B of Table 1 shows that the correct answers to these three financial literacy questions were highly positively correlated. Those able to answer one of the financial literacy questions correctly were also more likely to answer the other questions correctly.

Who Is Financially Illiterate?

Although the overall level of financial knowledge was low among the young, there were significant differences according to sociodemographic, family and peer characteristics. Table 2 shows the differences in means between different subgroups of our sample. The significance of these differences is also indicated in the table. We highlight some of the more salient results below.

TABLE 2
Differences in Means (%)

	Interest Rate	Inflation	Risk Diversification
Gender			
Male vs. Female	4.9***	10.9***	11.6***
Race			
White vs. Black	3.4***	18.7***	12.3***
White vs. Hispanic	6.8***	16.0***	8.5***
Cognitive ability			
ASVAB: 75+ vs. 50–75	12.2***	30.5***	23.6***
ASVAB: 50–75 vs. 25–50	2.0	3.5**	4.3***
ASVAB: 25–50 vs. 0–25	4.9***	14.0***	7.3***
Teachers' interest in students			
Teachers interested in students vs. not	2.9**	6.1***	3.3**
Smoking			
Never smoked vs. ever smoked	2.8***	2.7**	3.0**
Education			
Educ: college grad vs. HS grad	2.8***	7.9***	7.4***
Educ: HS grad vs. < HS	8.4***	22.9***	17.8***
Family background characteristics			
Parents church vs. not	1.2	4.5***	5.0***
Mom's educ: college grad vs. some college	2.9**	7.6***	7.3***
Mom's educ: some college vs. HS grad	2.0**	6.3***	5.2***
Mom's educ: HS grad vs. < HS	5.3***	18.2***	11.5***
Parents owned home vs. not	4.1***	15.0***	11.7***
Parents owned stocks vs. not	6.7***	17.2***	19.1***
Parents retirement savings vs. not	4.7***	17.3***	15.3***
Parents banked vs. not	2.7***	14.5***	11.1***
Peer characteristics			
High percentage of peers att. college vs. not	3.2***	7.1***	6.1***
High percentage of peers att. church vs. not	1.0	6.2***	5.4***
Low percentage of peers smoked vs. not	4.4***	9.1***	7.8***
$N = 7417$			

*$p < .1$; **$p < .05$; ***$p < .01$.

Sociodemographic Characteristics

There were large differences in financial literacy between women and men. Women were less likely to respond correctly to each of the three questions, and there was an 11%–12% gap for correct response rates to the inflation and risk diversification questions. These differences between women and men were statistically significant. Lusardi and Mitchell (2008) found similar sex differences among older HRS respondents. This finding is corroborated by Lusardi and Tufano (2009), who explored debt literacy for a representative US sample; in studies of narrower samples (Agnew and Szykman 2005; Lusardi, Keller, and Keller 2008) and in studies of other countries (Lusardi and Mitchell 2007b; Smith and Stewart 2008; van Rooij, Lusardi, and Alessie 2007). Consequently, there is now fairly robust evidence confirming that many women do not do well in financial calculations and do not have a firm grasp of inflation and risk diversification.

Table 2 also reveals differences in financial literacy according to race and ethnicity: whites were more likely than black and Hispanic respondents to answer all three financial literacy questions correctly. The gap in the correct response rate between black respondents and white respondents was about 19% for the inflation question and 12% for the risk diversification question. The corresponding gaps for Hispanic respondents were about 16% and 9%. These differences were statistically significant. This finding was consistent with other studies that found differences in financial literacy according to racial and ethnic differences among high school students (Mandell 2008) and other age groups (Lusardi and Mitchell 2007a; Lusardi and Tufano 2009).

Table 2 also reveals a strong association between financial literacy and cognitive ability. Correct response rates increased substantially for higher levels of cognitive ability. The difference between the third quartile (ASVAB: 50–75) and the fourth quartile (ASVAB: 75+) was particularly notable: the correct response rate for risk diversification questions was about 24 percentage points higher for those who were in the fourth quartile instead of the third, and the differences were statistically significant. Our finding that cognitive ability was strongly linked to financial literacy corroborates preliminary findings from another survey of financial literacy among young people.[5]

5. We thank Lewis Mandell for sharing with us preliminary results from the 2008 wave of the Jump$tart Coalition for Personal Financial Literacy, where he linked financial literacy with the score on the ACT or SAT exam. His preliminary findings indicated that these scores were very powerful predictors of differences in financial literacy among high school seniors.

There are also differences in the responses according to whether the respondent is a smoker. Those who do not smoke are more likely to respond correctly to the financial literacy questions. Moreover, those who had teachers interested in students also were more likely to answer correctly. There were also large differences in financial literacy according to educational attainment, especially for those who attended college—their correct response rates were about 7–8 percentage points higher than for those who graduated from high school for the inflation and risk diversification questions, and the differences were statistically significant.

Family Characteristics

Mother's education was strongly associated with financial literacy, especially if a respondent's mother graduated from college. Those whose mothers had some college education had correct response rates that were about 6 percentage points higher for the inflation question and 5 percentage points higher for the risk diversification question with respect to those whose mothers graduated from high school and the differences were statistically significant. Each of the proxies for family wealth and family financial sophistication also was associated with financial literacy. For instance, the difference in correct response rates to the inflation and risk diversification questions was at least 11 percentage points for each of these variables, and these differences were statistically significant. Whether it was wealth, financial sophistication or both that mattered for respondents' financial literacy is analyzed in more detail in the next section, where we considered all of these variables together. Nevertheless, this simple analysis underscored the importance of considering family characteristics when analyzing financial literacy among young people.

Peer Characteristics

Table 2 also revealed associations between peer characteristics and financial literacy. Those with a high percentage of peers who planned to attend college scored about 6–7 percentage points better on the inflation and risk diversification questions; those with a higher percentage of peers who attended church did better on all three questions and those with a low percentage of peers who smoked also did substantially better on each of the three questions, with correct response rates about 9 percentage points higher for the inflation question. All of these differences were statistically significant (except with whether peers attended church for the interest rate question). Thus, peer characteristics also may play a role in explaining differences in financial literacy.

RESULTS OF MULTIVARIATE ANALYSIS

A multivariate analysis permitted us to assess which factors were linked to financial literacy after controlling for many other characteristics. Three different specifications were examined: Specification I considered only basic sociodemographic characteristics; Specification II included sociodemographic characteristics as well as family characteristics and Specification III included sociodemographic characteristics, family characteristics, peer characteristics and cognitive ability.[6] These specifications allowed us to compare our results with other work as well as to assess the relationship between financial literacy and a rich set of characteristics describing the individual and the environment in which she/he grew up. The regression model was as follows:

$$y^* = \mathbf{x}\boldsymbol{\beta} + \varepsilon, \quad \text{y} = \begin{cases} 1 & \text{if } y^* > 0 \\ 0 & \text{else} \end{cases} \tag{1}$$

where y^* is an unobservable characteristic: a respondent's propensity to answer a financial literacy question correctly, and y is a binary outcome variable indicating that a respondent gave the correct response if his propensity to respond correctly was above zero. The vector $\mathbf{x}$ contained respondent characteristics that depend on the specification, $\boldsymbol{\beta}$ is a vector of parameters to be estimated, ε is a continuously distributed variable independent of $\mathbf{x}$, and the distribution of ε is symmetric about zero.

We used a probit model for our analysis that gave rise to a binary response model of the form:

$$\text{P}(y = 1|\mathbf{x}) = \Phi(\mathbf{x}\boldsymbol{\beta}) \tag{2}$$

where Φ is a cumulative distribution function (cdf). Our primary goal was to explain the effects of the respondent characteristics x_j on the probability of responding correctly to a financial literacy question. In our model, if x_K was a binary explanatory variable, then the marginal effect from changing x_K from 0 to 1, holding all other variables fixed, was simply

$$\begin{aligned} &\Phi(\beta_1 + \beta_2 x_2 + \cdots + \beta_{K-1}x_{K-1} + \beta_K) \\ &\quad - \Phi(\beta_1 + \beta_2 x_2 + \cdots + \beta_{K-1}x_{K-1}). \end{aligned} \tag{3}$$

Note that this expression depends on all other values of the other x_j. We calculated the marginal effects by setting all of the other

6. Because data were missing for family characteristics and respondent's educational level, we included dummies for missing observations in all of our regressions. For brevity, these estimates are not reported in the tables.

independent variables to their mean values. Our model therefore allowed us to interpret the marginal effect from changing a discrete explanatory variable x_K from 0 to 1 as the change in the probability of responding correctly to the financial literacy question. If x_j was continuous, as was the case for the ASVAB variable, then

$$\frac{\partial \mathrm{P}(y = 1|x)}{\partial x_j} = g(\mathbf{x}\boldsymbol{\beta})\beta_j, \tag{4}$$

where $g(z) \equiv (\mathrm{d}\Phi/\mathrm{d}z)(z)$.

However, Φ is a strictly increasing cdf, so that $g(z) > 0$ for all z. Therefore, the sign of the marginal effect of a change in x_j is given by the sign of β_j. Our model closely followed the probit model specified by Woolridge (2002). The marginal effects that we calculated are reported in Table 3.

Several important findings emerged from our estimates. Even after accounting for many sociodemographic, family and peer characteristics, women still were substantially less financially literate than their male counterparts. Women were about 6 percentage points less likely to answer the interest rate question correctly, 15 percentage points less likely to answer the inflation question correctly and nearly 16 percentage points less likely to answer the risk diversification question correctly. This result showed that sex is a strong predictor of financial literacy, even after accounting for many other characteristics.

Race and ethnicity was another predictor of financial literacy, with blacks and Hispanics displaying a lower knowledge of interest rates, inflation and risk diversification. However, the differences among racial groups were barely or not statistically significant after accounting for the rich set of variables in Model III.

Teachers' interest in students (as reported by the respondents) had a small but significant positive effect on a respondent's probability of answering the inflation question correctly, even after controlling for cognitive ability and educational attainment. The result suggests that quality of schooling may influence financial literacy among young people, consistent with the findings of Lusardi and Mitchell (2009) that those who lived in states that mandated financial literacy and spent more on education per pupil were more likely to display higher financial knowledge later in life.

There was a strong positive relationship between educational attainment (measured in Wave 11 of the NLSY97) and financial literacy, in particular for those who had attended some college. Estimates from Model III indicate they were 4 percentage points more likely to answer

TABLE 3
Multivariate Analysis of Financial Literacy: Probit Marginal Effects of Association with Correct Answers

	Interest Rate			Inflation			Risk Diversification		
	I	II	III	I	II	III	I	II	III
Female	−0.061***	−0.059***	−0.059***	−0.156***	−0.152***	−0.153***	−0.165***	−0.161***	−0.161***
	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Black	−0.016	−0.006	0.026**	−0.128***	−0.101***	−0.029*	−0.075***	−0.046***	−0.006
	(0.012)	(0.013)	(0.012)	(0.015)	(0.016)	(0.017)	(0.015)	(0.017)	(0.018)
Hispanic	−0.049***	−0.036**	−0.020	−0.086***	−0.049***	−0.014	−0.036**	−0.004	0.017
	(0.014)	(0.015)	(0.014)	(0.017)	(0.018)	(0.018)	(0.017)	(0.018)	(0.019)
Mixed race	0.040	0.044	0.043	−0.115*	−0.108*	−0.115*	−0.020	−0.008	−0.011
	(0.045)	(0.044)	(0.044)	(0.062)	(0.062)	(0.063)	(0.063)	(0.063)	(0.063)
Teachers interested	0.016	0.015	0.010	0.034**	0.032**	0.030*	0.000	−0.003	−0.008
	(0.012)	(0.012)	(0.012)	(0.015)	(0.016)	(0.016)	(0.015)	(0.015)	(0.016)
Ever smoked	−0.021*	−0.020*	−0.009	−0.009	−0.007	0.016	−0.009	−0.006	0.010
	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Educ: HS grad	0.033**	0.029**	0.019	0.103***	0.085***	0.063***	0.057***	0.040**	0.033
	(0.014)	(0.015)	(0.014)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)
Educ: some col+	0.088***	0.077***	0.038***	0.218***	0.183***	0.110***	0.228***	0.194***	0.148***
	(0.012)	(0.012)	(0.013)	(0.015)	(0.016)	(0.017)	(0.015)	(0.016)	(0.017)
Parents church		−0.007	−0.011		0.013	0.004		0.019	0.015
		(0.011)	(0.011)		(0.015)	(0.015)		(0.015)	(0.015)
Mom: HS grad		0.004	−0.005		0.022	0.001		−0.004	−0.014
		(0.015)	(0.015)		(0.020)	(0.021)		(0.020)	(0.021)
Mom: some college		0.004	−0.003		0.039**	0.028		0.020	0.013
		(0.014)	(0.014)		(0.018)	(0.019)		(0.018)	(0.018)

TABLE 3
(Continued)

	Interest Rate			Inflation			Risk Diversification		
	I	II	III	I	II	III	I	II	III
Mom: college grad+		0.034**	0.012		0.056***	0.014		0.053**	0.023
		(0.017)	(0.018)		(0.021)	(0.022)		(0.021)	(0.021)
Parents owned home		0.017	0.016		0.005	0.001		−0.002	−0.005
		(0.013)	(0.013)		(0.016)	(0.017)		(0.016)	(0.017)
Parents stocks		0.021	0.009		0.023	0.002		0.089***	0.076***
		(0.017)	(0.017)		(0.021)	(0.022)		(0.021)	(0.021)
Parents retirement savings		0.004	−0.006		0.041**	0.022		0.071***	0.061***
		(0.013)	(0.013)		(0.017)	(0.017)		(0.017)	(0.017)
Parents unbanked		0.013	0.016		−0.017	−0.010		0.003	0.006
		(0.013)	(0.013)		(0.016)	(0.017)		(0.016)	(0.017)
ASVAB score			0.486***			0.599**			0.311
			(0.181)			(0.256)			(0.246)
ASVAB squared			−1.085**			−1.076*			−0.892
			(0.444)			(0.606)			(0.579)
ASVAB cubed			0.964***			1.126***			0.980**
			(0.306)			(0.409)			(0.386)
Peers college			0.008			−0.024*			0.002
			(0.011)			(0.014)			(0.014)
Peers church			−0.009			−0.008			−0.004
			(0.012)			(0.016)			(0.016)
Peers smoked			−0.010			−0.027*			−0.010
			(0.012)			(0.016)			(0.016)
Pseudo R^2	0.026	0.029	0.052	0.074	0.081	0.122	0.062	0.074	0.092
$N = 7417$									

Note: Marginal effects calculated with respect to means of independent variables.
*$p < .1$; **$p < .05$; ***$p < .01$.

the interest rate question correctly, 11 percentage points more likely to answer the inflation question correctly and 15 percentage points more likely to answer the risk diversification question correctly. Even having graduated from high school was associated with higher financial literacy: those who graduated from high school were 6 percentage points more likely to answer the inflation question correctly. Educational attainment was clearly a strong determinant of financial literacy.

Family characteristics were also important determinants of financial literacy. In particular, parents' education was a strong predictor of financial literacy: those whose mothers graduated from college were nearly 6 percentage points more likely to answer the inflation and risk diversification questions correctly in Specification II. However, this effect went away when controlling for cognitive ability in Specification III. Family financial sophistication also played an important role: those whose parents owned stocks were more than 8 percentage points more likely to answer the risk diversification question correctly, and those whose parents had retirement savings were 6 percentage points more likely to answer this question correctly. Because retirement savings referred to 401(k)s, profit sharing or stock ownership plans, and IRA or Keogh plans, in which individuals have to decide how to allocate retirement wealth, this variable is likely to proxy for knowledge and experience in dealing with stocks. Stocks and retirement savings were most likely not mere proxies for wealth; we controlled for wealth in our specifications by including dummies for whether the parents owned a home or had a checking account, two of the most common components of wealth (Lusardi, Cossa, and Krupka 2001). The result that children whose parents owned stocks (either in private wealth or retirement wealth) were more likely to understand risk diversification suggests that some financial knowledge may be passed on directly from parents to their children, as other researchers have found (Chiteji and Stafford 1999; Li 2009).

Financial literacy was also strongly associated with cognitive ability, and this relationship was highly nonlinear; returns for financial literacy increased sharply with increasing cognitive ability for those in the upper values of the ASVAB score. These results showed that cognitive ability was a strong determinant of financial literacy.

Finally, although peer characteristics were not strongly associated with financial literacy after controlling for so many other variables, there still was a negative relationship between having a high percentage of peers who smoked and answering the inflation question correctly. This suggests that characteristics of peers when respondents are teenagers can influence respondents' levels of financial literacy later in life.

According to these estimates, some groups of respondents were substantially more likely to be financially knowledgeable than others. For example, a college-educated male whose parents had stocks and retirement savings was about 45 percentage points more likely to know about risk diversification than a female with less than a high school education whose parents were not wealthy.

Admittedly, the 10-year gap between the measurement of the dependent and independent variables places some limitations on the interpretation of our results. For instance, one might be wary of assigning a causal interpretation to our estimated coefficients, and it is worth noting that the low pseudo R^2 values in our regressions indicated that included explanatory variables leave much variation unaccounted for. The latter is unsurprising given the many factors that likely influence the accumulation of financial knowledge, especially over the course of 10 years. Nonetheless, it is remarkable that many of the characteristics examined, even when measured at a young age, still determined levels of financial knowledge later in life to some extent.

WHAT HAVE WE LEARNED?

This paper added to existing knowledge by exploring what younger adults know and do not know as determined by a set of simple questions that assessed their financial literacy. We found that financial literacy was severely lacking among young adults; only 27% knew about inflation and risk diversification and could do simple interest rate calculations. Moreover, women proved to be the least financially literate. Differences between women and men persisted even after accounting for many demographic characteristics, family background characteristics and peer characteristics. Prior work showed that women tended to display low financial literacy later in life (Lusardi and Mitchell 2006, 2008). Thus, financial illiteracy seems to persist for long periods and sometimes throughout the lifetime. Given the strong link between financial literacy and financial and retirement planning found in other studies (Hilgert, Hogarth, and Beverly 2003; Lusardi and Mitchell 2007a, 2008), it may be important to foster financial knowledge in the population as a whole and among more disadvantaged groups. Similarly, it may be important to develop programs targeted specifically to women, because they display not only much lower financial knowledge but also large differences in investment and saving behavior (Hira and Loibl 2008; Lusardi, Keller, and Keller 2008).

Our study also found an important channel through which young adults acquire financial knowledge: parents. Specifically, those whose

mothers had high education or whose families had stocks or retirement savings were more financially literate, specifically on questions related to advanced financial knowledge, such as the workings of risk diversification (estimates from Model II). These findings confirmed the results of work analyzing financial knowledge among high school students. The small fraction of students (7%) deemed financially literate in the 2006 Jump$tart Coalition for Personal Financial Literacy survey were disproportionately white males whose parents had college degrees (Mandell 2008). It also confirmed findings of previous work among college students, where again parents played a role in students' financial socialization (Cude et al. 2006).

We also found that cognitive ability was a strong predictor of financial literacy; those with higher cognitive ability, as measured by ASVAB scores in high school, were more likely to display higher financial knowledge as young adults. However, many other variables remained statistically significant after accounting for cognitive ability; thus, cognitive ability was not the sole determinant of financial knowledge. In other words, there was a lot of heterogeneity in financial literacy, even when examining a narrow age group in the population.

Implications for Researchers and Consumers

Overall, the findings from this study have important implications for research related to financial literacy and household financial security. As the government and employers continue to shift the responsibility for saving and investing onto workers, it is becoming more and more important to equip workers with basic tools to make financial decisions. Although young workers face or will soon face decisions about mortgages, college funds and retirement savings, their financial knowledge seems dangerously low and potentially inadequate to deal with the complexity of current financial markets and products. It is also important to recognize that the population of young adults displays very large differences in financial knowledge. Thus, young adults should not be considered one homogeneous group of consumers. Rather, the differences by race, sex, educational attainment and other observable characteristics should be considered both in research and public policy initiatives geared toward improving financial literacy.

Given the low levels of financial knowledge documented in this work, simplification of financial decisions could be very beneficial to young adults. For example, this study supports the findings of Choi, Laibson, and Madrian (2006) that simplifying the way in which workers enroll

into pension plans can foster pension participation, particularly among disadvantaged groups, such as blacks and low-income workers. It also supports the findings of Lusardi, Keller, and Keller (2008) that providing a planning aid to new employees can more than double participation in supplementary retirement accounts. New employees at the not-for-profit institution considered in that study were disproportionately young women who had very low levels of financial literacy.

Implications for Financial Education Programs

The findings from this study also have implications for financial education programs. Several findings in this paper support financial education in high school. First, if financial knowledge is acquired from parents or via interaction with others, it may be particularly beneficial to provide financial education in high school to those whose parents or friends do not have college degrees or are not financially knowledgeable. According to our estimates, respondents whose parents did not have a college degree and lacked financial sophistication (did not have stocks or retirement savings) were 16 percentage points less likely to know about risk diversification, an essential concept for making saving and investment decisions.

Second, while cognitive ability plays a role in explaining the differences in financial knowledge among the young, it is not the only relevant factor. Thus, education can improve financial knowledge. Third and most important, it is likely beneficial to provide financial education *before* individuals engage in financial contracts and *before* they start making financial decisions. In this respect, it may be important to improve the effectiveness of financial literacy programs currently offered in high school.

This study also illuminated the importance of parental influences on young people's acquisition of financial knowledge. Involving parents in a financial education program could be more effective than only involving young adults. First, parents who are engaged in such a program may take a more active role in guiding their children's financial behaviors. Second, such a program could aid those parents who lack sufficient financial knowledge to provide their children with sound financial advice.

Given the low level of financial knowledge displayed by young adults who are already out of school, it also may be important to pursue other financial education initiatives. Several firms, particularly those offering defined contribution pensions, have offered financial education programs (Bernheim and Garrett 2003; Lusardi 2004). The findings from this study show that young workers particularly need these programs. Other studies also show that the young are more susceptible to making financial

mistakes (Agarwal et al. 2007). Given the substantial differences that exist among the young, "one-size-fits-all" programs are unlikely to be effective. Instead, programs should be targeted to women, minorities, such as blacks and Hispanics, and those with low educational attainment.

We also would like to highlight, as already argued in Lyons and Neelakantan (2008), that it may be particularly difficult to evaluate the effectiveness of financial education among the young. For example, according to the life-cycle model of saving, young individuals facing an upward-sloping age-earnings profile should borrow rather than save to smooth consumption over the life cycle. However, many financial education programs simply assess whether individuals increase their saving after having been exposed to financial education programs. In this respect, it is important to develop new ways to assess the impact of financial education on the young, including examining levels of debt and borrowing behavior among the young.[7]

APPENDIX

Statistical Summary of Variables

	Mean	SD	*N*
Interest rate: correct response	0.79	0.41	7417
Inflation: correct response	0.54	0.50	7417
Risk diversification: correct response	0.47	0.50	7417
Female	0.49	0.50	7417
Black	0.15	0.36	7417
Hispanic	0.13	0.33	7417
Mixed	0.01	0.11	7417
ASVAB score	0.51	0.29	6009
Teachers' interest in students	0.24	0.43	7396
Ever smoked a cigarette	0.42	0.49	7396
Educ: HS grad	0.83	0.37	7407
Educ: Some college and college	0.55	0.50	7407
Parents attended church regularly	0.37	0.48	6620
Mother's Educ: HS	0.83	0.38	6617
Mother's Educ: some college	0.48	0.50	6617
Mother's Educ: college grad+	0.22	0.42	6617
Parents owned home	0.69	0.46	6604
Parents owned stocks	0.17	0.38	6525
Parents had retirement savings	0.54	0.50	6519
Parents unbanked	0.33	0.47	6531
High percentage of peers planned to attend college	0.57	0.50	7318
High percentage of peers attended church regularly	0.25	0.43	7253
High percentage of peers smoked	0.28	0.45	7323

Note: All statistics calculated using sample weights.

7. See also the discussion of financial education programs and their evaluation in Lyons et al. (2006).

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