Who takes personal finance?

Jaclyn J. Beierlein[a,*], Margot Neverett[b]

[a]*College of Business, East Carolina University, Greenville, NC 27858, USA*
[b]*Institutional Planning, Assessment, and Research, East Carolina University, Greenville, NC 27858, USA*

Abstract

Using a sample of 17,499 first-time, full-time students, we compare students who take an elective personal finance course to those that do not. Women, students with higher verbal SAT scores and GPAs, and arts and education majors are less likely to take the course, while men and business, human ecology, and social sciences majors are more likely. Mathematics SAT scores have no effect. Women earn slightly higher grades in the course than men do, on average. If enrollment can be considered a measure of interest, among traditional college students, women demonstrate less interest in personal finance than do men. © 2013 Academy of Financial Services. All rights reserved.

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1. Introduction

Making good financial decisions, or at least avoiding bad ones, can critically affect one's well-being. The stress of finding oneself unable to make mortgage payments or trying to live on insufficient retirement savings, for example, can negatively impact health and relationships. However, there is no shortage of surveys and academic articles that document the low financial literacy of the general population (see, e.g., National Council on Economic Education, 2005; Bumcrot, Lin, & Lusardi, 2011), of those approaching retirement (Lusardi & Mitchell, 2006, 2007), and of high school (Mandell & Klein, 2007) and undergraduate students (Chen & Volpe, 1998). Such studies tend to find that women are less literate than men (Peng, Bartholomae, Fox, & Cravener, 2007; Lusardi & Mitchell, 2006; Van Rooij,

* Corresponding author. Tel.: +1-252-737-1592; fax: +1-252-328-4093.
E-mail address: BEIERLEINJ@ecu.edu

Lusardi, & Alessie, 2011), and that undergraduate women are less literate, and perhaps less interested in personal finance, than undergraduate men (Chen & Volpe, 2002). The consequences of financial illiteracy, particularly for women, are also well documented (for example, see Lusardi & Mitchell, 2006, 2007; Van Rooij, Lusardi, & Alessie, 2011; Cheng, Lin, & Liu, 2011). However, less is known regarding why these gender differences in literacy persist or how financial literacy can most effectively be improved.

There are mixed results in the literature regarding the effect of financial education. Mandell and Klein (2009) and Xiao, Serido, and Shim (2010) find no evidence that high school personal finance courses affect financial literacy. However, Walsted, Rebeck, and MacDonald (2010) find that high school seniors who participated in a specific DVD-delivered personal finance program performed significantly better on a financial literacy test when compared to both their pretest scores and those of a control group. Similarly, Borden, Lee, Serido, and Collins (2008) report that a financial education seminar offered to undergraduate students improved participants' scores on a financial knowledge test after comparing pre- and posttests. Furthermore, college level courses may be more effective, on average, than high school courses. Peng, Bartholomae, Fox, and Cravener (2007) find that survey respondents who had taken a college level personal finance class scored significantly higher than others on a 10-question test related to investments, while those who had taken only a high school course did not.

Perhaps an important factor is student choice. Many high school financial education programs are mandated, while most college personal finance courses and seminars are elective. Mandell and Klein (2007) argue that motivation to be literate is an important driver of financial literacy. They find that high school seniors whose survey responses reflect better understanding of the importance of financial decisions also score higher on the Jump$tart financial literacy test.

On the other hand, a student's choice to take an elective personal finance class depends on more than just recognition of the importance of financial knowledge. Chen and Volpe (2002) find that although 89% of the 924 undergraduates surveyed agreed that personal finance is important for their quality of life, only 60% said they were at least somewhat likely to take a course on personal finance. Similarly, Lyons (2007) reports that while 87% of the 26,896 undergraduates surveyed said that personal finance and budgeting are important, only 12.4% said they would prefer to receive financial information in a formal college course.

When Personal Finance is offered as an elective college course, who elects to take it and perhaps more importantly, who does not? Using institutional data on 17,499 traditional undergraduate students, we analyze enrollment in our university's Personal Finance course from 2002 to 2011. We find that women, students with higher verbal SAT scores and GPAs, and arts and education majors are less likely to take the course, while men and business, human ecology, and social sciences majors are more likely to do so. When we split our sample into male and female subsamples, we find that Asian women are less likely to take the course than other women, and that compared to women in other majors, education majors are less likely to take the class, while business, human ecology, social science, science, and psychology majors are more likely. Mathematics SAT scores are unrelated to a student's likelihood of taking the course either in full sample or the gender subsamples. Though interest in a course is not the only determinant of enrollment, our results are consistent with

prior research that suggests that women show less interest in finance than men. Although this is both puzzling and discouraging, we also find that women who do take the class perform as well or better than men. This is also consistent with prior research and suggests that if future research can uncover ways to motivate greater interest in financial matters among women, we can begin to reduce the gender gap in financial illiteracy and its consequences.

2. Literature

2.1. Financial literacy is low on average

As noted in the Introduction, many surveys and academic articles have provided documentation that financial literacy is relatively low among general population. One such survey was conducted online by Harris Interactive in 2005 for the National Council on Economic Education. Participants, 3,512 adults aged 18 and above and 2,242 students in grades 9–12, took a 24 question quiz on economics and personal finance. The adults surveyed scored an average grade of 70%, while the students' average was 53%. Nearly 30% of the adults and 60% of the students failed the quiz. Ironically, although 97% of the adults and 93% of the students surveyed said they believed it is important for Americans to have a good understanding of economics, only 77% of the adults and 51% of students said they were interested in economics.

In another example, Bumcrot, Lin, and Lusardi (2011) analyze data from the state-by-state survey from the 2009 National Financial Capability Study, an online survey of about 28,000 adults. The survey included five multiple choice questions designed to assess knowledge of financial concepts necessary for financial decision-making. The questions required simple interest calculations, basic understanding of inflation, diversification, stocks and mutual funds, and mortgages and mortgage payments, and more advanced knowledge regarding the relationship between prices and interest rates. The questions, either together or separately, had all been used in previous surveys, including the 2004 Health and Retirement Study, the 2007–2008 National Longitudinal Survey of Youth, the 2008 American Life Panel, and the Der Nederlandsche Bank Household surveys of 2005 and 2006. The authors measure financial literacy using participants' scores on these five questions. They report that only 57% of respondents answered the two easiest questions on interest and inflation correctly, 39% answered those and the diversification question correctly, and 15% answered all five questions correctly. They also find that scores tend to vary across states, across gender with males scoring higher, and across race with Caucasians scoring highest. Scores also increase with education levels and decrease with a state's poverty level. They conclude that Americans lack financial literacy and relatively are ignorant about basic economic and finance concepts related to financial decision-making. They also note that variation in literacy across state lines cannot be fully explained by states' demographic and economic conditions.

While some studies, such as the two articles noted above, draw data from a diverse sample of the population, others focus on specific target groups. For example, Chen and Volpe (1998) survey 924 college students from 13 college campuses using 52 questions designed to assess their knowledge of personal finance concepts and gather data on their opinions,

decisions, and demographic characteristics. The personal finance questions covered general financial knowledge, saving and borrowing, insurance, and investments. Measuring literacy by the percentage of correct answers, the authors conclude that college students' knowledge of personal finance is inadequate. They find that the overall average score is 52.87%. They also find that business students score significantly higher than nonbusiness students (60.72% vs. 49.94%), that men score significantly higher than women (57.4% vs. 50.77%), and that scores tend to increase with class rank, age, and work experience. They attribute the overall low levels of literacy to "the systematic lack of a sound personal finance education in college curricula" (p. 112) and the fact that the majority of students surveyed were under 30 and therefore at a very early stage in their financial life cycle.

2.2. The consequences of low financial literacy

Other studies not only document low literacy levels, but also examine the relationship between literacy and financial behavior. In two such studies, Lusardi and Mitchell (2006, 2007) focus on the financial literacy of those nearing retirement age and the effects of literacy on retirement planning. The authors created a module for the 2004 Health and Retirement Study, a survey targeted at respondents over age 50. The module includes questions regarding how participants made saving decisions and how they collected information for making decisions, as well as questions designed to test financial literacy. For their 2007 article, the authors focus on the responses of 1,700 adults aged 51–56. The financial literacy section consists of three questions that require respondents to apply a growth rate, to divide lottery winnings, and to compound interest for two years. While 80% of respondents could correctly apply a growth rate, only about 50% could correctly divide lottery winnings among five winners and 17.8% could correctly compound interest. More importantly, the authors find, after controlling for factors such as education, marital status, number of children, race, and sex, those who correctly answered the compound interest question were significantly more likely to have planned for retirement than were those who did not answer correctly.

For their 2006 article, Lusardi and Mitchell focus on the financial literacy and retirement planning of women, who are of particular concern, the authors note, because they tend to live longer than men and have shorter work experiences and lower earnings. Looking first at literacy scores, they find that the women's scores are significantly lower than the men's scores and that women were significantly more likely to answer questions with "don't know." Turning to the survey questions related to retirement planning, the authors define "committed planners" as those who indicated that they had tried to calculate how much they need to save for retirement, developed a saving plan, and were "mostly" able to stick to the plan. They classify only 17% of women in the sample as committed planners. They find that women were more likely than men to consult with family and friends and with financial planners, but that those who either consulted a financial planner or attended a retirement seminar were more likely to be committed planners than were those who reported consulting with family or friends. Finally, examining the relationship between financial literacy and retirement planning, they find that literacy scores are strongly and positively associated with affirmative responses to the planning questions.

Van Rooij, Lusardi, and Alessie (2011) find similar results in their study of the effects of

financial literacy on stock market participation. Specifically, they find that women are less literate than men and that those with lower literacy are more likely to rely on informal sources of information and less likely to invest in the stock market. To conduct the study, the authors designed two sets of questions that were inserted in the Der Nederlandsche Bank Household surveys of 2005 and 2006. The survey is taken annually in The Netherlands and includes over 2,000 households. The first set of questions consists of five basic financial literacy questions, covering numeracy, interest compounding, inflation, and time value of money. The second set consists of 11 more advanced questions on stocks, bonds, mutual funds, and diversification. The percentage of correct responses on each of the basic questions ranged from 71.8% to 90.8%, but only 40.2% of respondents answered all five basic questions correctly. The percentage of correct responses on each of the more advanced questions ranged from only 24.6% to 68.5%. The authors conclude that basic financial literacy is not widespread and note that although most models of portfolio choice assume that investors are knowledgeable and well-informed, such financial literacy should not be taken for granted. They find that literacy levels are related to gender, age, and education. Women score significantly lower than men, and scores increase with age and educational attainment. They also find that a high proportion of respondents with low basic literacy rely on informal sources of information such as friends and family when making financial decisions, while those with higher literacy are more likely to rely on newspapers, financial magazines, financial information on the Internet, and professional financial advisers. Finally, they examine the relationship between financial literacy and stock market participation. Using multivariate regression models that include demographic variables, education, wealth and income levels, and financial literacy scores, the authors find that the likelihood of stock market participation is significantly higher for men, those with higher levels of education, wealth and income, and those with higher literacy scores. To illustrate the importance of their findings, the authors cite Cocco, Gomes, and Maenhout (2005) who show that welfare loss from nonparticipation in the stock market can be sizeable.

    In addition to retirement planning and stock market participation, Cheng, Lin, and Liu (2011) examine a third area in which women appear to be at a disadvantage relative to men, mortgage rates. Using data from the 2004 Survey of Consumer Finances, which includes questions on mortgages, how borrowers selected their lenders, and other household finance and demographic information, the authors find that, on average, women pay mortgage rates that are about 40 basis points above those paid by men. While they attribute some of this difference to women's lower average income, higher average loan-to-income ratios, and greater average rates of credit application rejections and bankruptcy filings, they also find that women are much more likely than men to choose lenders based on personal recommendations (41.2% vs. 25.2%) and less than half as likely as men (20.5% vs. 42.1%) to search for the lowest rates available. Controlling for other variables including income, education, and credit history, they find that women pay about eight basis points more than men on average and that the difference is statistically significant at the 5% level. However, when they take into account whether respondents found their mortgage by shopping around or by recommendations from others, the gender difference in rates becomes statistically insignificant. Although they do not have the data needed to examine why women are less likely to shop around than men are, they cite studies that find that women tend to be less

certain about their abilities and thus more likely to rely on short-cuts such as advice from friends (Niederle and Vesterlund, 2007; Niederle and Yestrumskas, 2008; and Blau and Kahn, 2000). They recommend education programs to improve women's financial literacy and instill the self-confidence needed to face the complex task of searching for the best mortgage.

2.3. Mixed evidence on the effectiveness of financial education programs

Certainly a common recommendation when one is confronted with any type of illiteracy is more education. However, those who have studied the impact of various financial education programs find mixed results. Mandell and Klein (2009) and Xiao, Serido, and Shim (2010) are among those that find no evidence that financial education improves financial knowledge or behavior. Mandell and Klein (2009) surveyed the 2001–2004 graduates of three high schools that offered a full semester personal finance course. The 49-question survey included the entire 2004 Jump$tart questionnaire to evaluate the participants' financial literacy. Additional questions included whether the participant had taken a personal finance course and questions about financial behavior, attitudes toward risk, and demographics. They found that scores on the literacy test were unaffected by whether the participant had taken a personal finance course. Furthermore, they found that taking the class had no impact on reported financial behaviors such as paying credit cards in full and having adequate savings.

Xiao et al., (2010) surveyed first-year, full-time students at a southwestern university. The survey asked whether students had taken a personal finance course in high school or college, questions designed to test subjective and objective financial knowledge and to determine whether students engaged in risky credit behavior, and demographic questions. Subjective knowledge refers to the students' self-assessments of their overall understanding of personal finance. Objective knowledge was measured using eight credit-related, true-false quiz questions developed by Hilgert, Hogarth, and Beverly (2003). Credit behavior was assessed using questions about whether students paid bills on time, paid credit cards in full, maxed out credit cards, or borrowed money from credit cards or payday loan services. In multivariate regressions, they found that subjective knowledge scores were higher for men and for those who had taken either high school or college personal finance courses but these same variables were not significantly related to objective knowledge scores. They also found that the likelihood of engaging in risky paying behavior decreased with both subjective and objective knowledge scores but the likelihood of engaging in risky borrowing behavior only decreased with objective knowledge scores. Women were less likely than men to engage in risky borrowing behavior but surprisingly, students who had taken a college course in personal finance were more likely to do so.

Other articles have reported more encouraging evidence on the benefits of financial education at both the high school and college level. Peng, Bartholomae, Fox, and Cravener (2007) surveyed 11,800 alumni of a large Midwestern university. Their 46-question survey included 10 questions about stocks, bonds and returns designed to assess investment knowledge and other questions about savings behavior, whether the respondent had taken a personal finance course in high school, college, both or neither, past financial experiences,

current financial behaviors, income, inheritance, and demographics. They report low overall literacy, with an average score of 56.3% on the investment knowledge questions. Using multivariate regression, they found that scores on the investment knowledge questions were not affected by having taken only a high school class on personal finance, but were significantly higher among those who reported taking a college level personal finance class. They also found that men scored significantly higher than women after controlling for financial education, occupation, income, age, and marital status.

Walsted, Rebeck, and MacDonald (2010) administered pre- and posttests to a treatment group of senior high school students who participated in a DVD-delivered personal finance program and a control group of similar students who did not participate. The test consisted of 30 multiple choice questions related to the program materials. The treatment group's average score on the pretest (49.2%) was similar to that of the control group (49.5%). However, on the posttest, the treatment group's average significantly improved to 68.9%, while that of the control group (50.5%) did not. Using multivariate regression to control for other possible determinants of posttest scores, including plans to attend college, class level, work experience, and credit card use, they confirm that participation in the personal finance program increased scores significantly.

Borden, Lee, Serido, and Collins (2008) use pre- and postsurveys to gauge the effect of a financial education seminar, "Credit Wise Cats," on the attitudes, knowledge and intentions toward financial responsibility of undergraduate students taking the seminar. The presurvey, administered immediately before the one-day seminar, included demographic information and a series of questions regarding the participants' financial knowledge, attitudes towards the use of credit, and financial behaviors in the past two months. The postsurvey, administered immediately after the seminar, included similar questions reworded to assess changes in knowledge, attitudes, and intended behaviors. The authors computed each participant's financial knowledge score as the number of correct answers to seven items. The items included "Bouncing checks, Having a high APR credit card, Exceeding credit limits, and Making payments on time." They assessed participants' attitudes toward credit using three items, including "an excellent way to establish credit; I use them occasionally with this goal in mind." The authors report that postsurvey knowledge and responsible attitude scores were significantly higher than presurvey scores and that students significantly increased the number of effective financial behaviors they intended to follow relative to their past behaviors. The authors conclude that the seminar was effective in improving students' financial knowledge, attitudes, and intended behaviors.

Financial education in the workplace may also improve financial behavior. Bernheim and Garrett (2003) analyze data from 2,055 survey respondents between the ages of 30 and 48. The survey gathered typical demographic information and economic data, including household assets and liabilities, saving rates, earnings, income, pension coverage, and education, as well as specific questions about retirement education in the workplace. They find that respondents who indicated that their employer offers financial education[1] had significantly higher rates of participation in 401(k) plans, 401(k) balances, overall savings rates, and total retirement wealth. Using data from the Health and Retirement Study, Lusardi (2004) finds similar results. She finds that respondents who attended retirement seminars had significantly higher net worth using three different measures. She notes that the estimated effects were

particularly sizable for those in the lower wealth quartiles, for whom seminar attendance increased one measure of wealth by about 18%.

2.4. Motivation and financial literacy

Mandell and Klein (2007) argue that motivation is an important driver of financial literacy. They analyze data from the biannual Jump$tart survey administered to high school seniors across the United States. The survey consists of multiple choice questions designed by a committee of financial educators to evaluate financial literacy in the areas of income, money management, spending and credit, and saving and investing. It also includes questions on student demographics, parents' income and education, and students' aspirations with respect to education, occupation, and income. In 2006 three questions were introduced to measure a student's motivation to be financially literate. The authors report that surveys conducted between 1997 and 2006 consistently indicate that young adults have low literacy and that scores are not improving over time. However, they find that students who seem to understand the importance of financial decisions are more likely to have higher literacy scores. Specifically, students who believe that financial difficulties result from poor decisions, that it is important to have enough money to pay bills, and that retirees find it tough to live on Social Security alone tend to have higher literacy scores than those that do not. The authors conclude that students' motivation to be financially literate significantly explains differences in financial literacy.

However, motivation, or at least acknowledgment of the importance of financial literacy, may be insufficient to induce students to seek formal instruction in personal finance. Chen and Volpe (2002) examine the financial literacy of undergraduate and graduate students using a survey sent to students at 14 colleges and universities across the United States. They designed the multiple choice questions on the survey to test participants' knowledge of personal finance topics, including savings, borrowing, insurance, and investments, to get their opinions about the importance of personal finance knowledge, and to gather demographic information. They find that women are significantly less knowledgeable than men, on average, after controlling for other factors related to literacy including the student's major, class rank, work experience, and age. Notably, they find that although 90% of the female participants either strongly agree or agree that financial literacy and planning will help improve their quality of life, only 48% rated themselves as very or somewhat knowledgeable about personal finance, compared to 60% of men, and only 76% of women, compared to 84% of men, ranked personal finance as a very or somewhat important college-level subject. Even more notably, despite the differences in importance assigned by women and men to personal finance as a college-level subject, nearly the same, relatively low percentage of women and men (60% vs. 61%) indicated that they were very or somewhat likely to take a personal finance course if it were offered as an elective.

Perhaps students would prefer other, less formal ways of learning about personal finance. Indeed, Lyons (2007) finds that a formal college course is the least preferred method of financial instruction among students in her study. She analyzes data from a 2003 survey emailed to all undergraduate students on 10 Midwestern campuses. The response rate was 17.6% for a total of 29,474 student responses. Ninety-five percent of respondents were under

the age of 25. Sixty percent were female, about 80% were White, 5% Black, 9% Asian, and 4% Hispanic. Fewer than 5% reported being married. Respondents came from all class ranks, in roughly even numbers. Seventy-two percent of respondents had a credit card, while 19% reported having four or more cards and 16% reported having credit card debt of $1,000 or more. Forty-eight percent had federal student loans. When asked about their own financial knowledge, only 52% felt they understood saving and investment, 22% shopping for a car loan, and 60% personal finance and budgeting. When asked to select their top three choices regarding how they would like to receive financial information, only 12% chose a formal college course while 52% chose one on one discussion, 48% chose the Internet, 41% chose a packet of printed materials, and 22% chose a campus workshop or seminar. Similarly, when asked for their top three choices regarding from whom they would like to get information, only 16% said professors, but 58% said financial experts, 50% parents, 45% financial aid counselors, and 18% other students/peers.

In summary, research suggests that the consequences of financial illiteracy are significant, and that most people agree that financial literacy is an important determinant of quality of life. However, college students, like the general population, earn low scores on objective tests of financial knowledge, report relatively little understanding of financial topics, and show relatively little interest in taking a formal personal finance course. Women may be even more likely than men to either reap the benefits of financial literacy or suffer the consequences of illiteracy, given that they have a longer average life expectancy[2] and are much more likely to be single parents.[3] However, research indicates that, on average, women are less financially literate than men, participate less in the stock market, pay more for mortgages, and assign a lower importance to personal finance as a college-level course than men do.

Are female undergraduates less likely than male undergraduates to choose a formal university course on personal finance? What can we learn about the typical characteristics of students who choose to take such a class and those who do not that might help us either broaden the appeal of the class or design alternative learning opportunities to reach more students? These are the questions that prompt our study.

3. Data

We accessed institutional data from admission applications and transcripts on all students ($N = 17,499$) in the 2002 to 2006 first-time, full-time cohorts at East Carolina University (ECU). First-time, full-time is an administrative classification that denotes students who are enrolling as full-time students and who have never taken courses at any postsecondary institution. Therefore, our data does not include transfer students or students who begin their studies as part-time students. We chose these cohort years because data from earlier cohorts is not available, and we did not want to draw data from later cohorts to ensure that we had at least six years of transcript data for all students in the sample. Thus, transcript data are from 2002 to 2011. The variables we collected are listed and explained in Table 1. Descriptive statistics for the sample are in Table 2. As expected, the data in Table 2 reflects a typical traditional[4] student. The average age is 18.39 years with a standard deviation of

Table 1 Variables collected

Variable	Description	Reason included
Personal finance	Indicator set to 1 if student took the course; 0 otherwise.	Our primary dependent variable to investigate the characteristics of students who choose to take it and those that do not.
Final grade	Grade earned in personal finance. A = 4, B = 3, C = 2, D = 1, F = 0	Our secondary dependent variable to investigate whether student characteristics are related to the grades they earn.
Sex	Indicator set to one if the student self-identifies on application documents as female, zero if male.	Prior research has reported that men tend to be more financially literate than women.
Race indicators	Separate indicators set to one if the student self-identifies on application documents as African American, Asian, Hispanic, or other non-White, respectively.	Chen and Volpe (1998), Lyons (2004), and Grable and Joo (2006) have reported relationships between race or ethnicity and financial knowledge and/or behavior.
Age	Age at matriculation	Prior research has found that financial literacy improves with age. However, our sample is relatively homogeneous in age.
Academic statistics	Verbal SAT score, math SAT score, high school GPA	We investigate whether "better" students are more likely to take the class. We also include them as controls for our secondary dependent variable.
Majors	Indicator variables for 12 popular majors by two-digit program code.	Prior research has found that business majors are more financially literate than nonmajors. We expand this question to other popular majors to see if interest in personal finance varies across them.
Big county, small county, out of state	Indicators set to 1 if the student is from one of the five largest counties in North Carolina, one of the several counties in North Carolina that has fewer than 50,000 residents, or is an out of state student.	Students living in or near larger cities (Charlotte, Raleigh, Greensboro, Winston-Salem, and Fayetteville) may be more financially literate than others due to more exposure to big business. Students from smaller counties may have less business exposure. Out of state students pay higher tuition, so they may be more interested in managing their personal finances.

Table 2 Descriptive statistics

Variables	N		Mean	Median	Standard deviation	Minimum	Maximum
	Valid	Missing					
Age at matriculation	17,486	13	18.39	18.07	1.04	16.05	60.07
SAT verbal	16,028	1,471	512.49	510.00	68.82	270.00	800.00
SAT math	16,028	1,471	528.38	520.00	68.13	280.00	800.00
High school GPA	17,400	99	337.46	334.00	47.69	65.00	527.00
Female = 1	17,486	13	.611			.00	1.00
African American = 1	17,377	122	.137			.00	1.00
Asian = 1	17,377	122	.025			.00	1.00
Hispanic = 1	17,377	122	.018			.00	1.00
Other non-White race = 1	17,377	122	.020			.00	1.00
Business = 1	17,499	0	.090			.00	1.00
IT/Computer Science = 1	17,499	0	.006			.00	1.00
Engineering = 1	17,499	0	.003			.00	1.00
Human Ecology = 1	17,499	0	.029			.00	1.00
Biology/Bio-Based Sciences = 1	17,499	0	.037			.00	1.00
Recreation and Fitness = 1	17,499	0	.021			.00	1.00
Non-Bio-Based Sciences = 1	17,499	0	.006			.00	1.00
Psychology = 1	17,499	0	.022			.00	1.00
Social Sciences = 1	17,499	0	.032			.00	1.00
Arts = 1	17,499	0	.026			.00	1.00
Health and Medical = 1	17,499	0	.091			.00	1.00
Education = 1	17,499	0	.074			.00	1.00
Big county = 1	17,499	0	.252			.00	1.00
Small county = 1	17,499	0	.120			.00	1.00
Out of state = 1	17,499	0	.177			.00	1.00
On campus = 1	17,499	0	.843			.00	1.00

Table 2 presents descriptive statistics for our full sample of all first-time, full-time students who matriculated between 2002 and 2006. N is the number of students in our sample for which we have the data necessary to code each variable. Female is coded 1 if the student's record identifies her as female, 0 if male. Race identifiers are coded 1 if the student is identified as African American, Asian, American Indian, Hispanic or Other, 0 otherwise. Major identifiers are coded 1 if the student graduated in that major. Big county, small county, and out of state are set to 1 if the student's permanent address at matriculation is in one of North Carolina's five biggest counties, in one of the several counties in North Carolina that has fewer than 50,000 residents, or is an out of state address, respectively. The means for the categorical variables represent the percentage of the sample that are coded 1 for that variable. For example, females constitute 61.1% of our sample, and 13.7% of our sample are African-Americans.

only 1.04. Sixty-one percent are women, and 84% live on campus. The sample consists mostly of North Carolina residents; only 17.7% are from out of state.

The subject of our study is enrollment in the university's personal finance course, Personal Finance (FINA 1904), a three credit hour elective course that fills to its 500-student capacity each semester. It is taught by finance department faculty, but is open to all majors and is not required for any major; no majors have priority when registering. Topics include investing and retirement planning, career planning, money management and budgeting, taxes, consumer credit, and purchasing strategies (home, auto, and insurance). Grades in the course tend to be high, as shown in Table 3. In a recent online article,[5] the instructors explained the course as such, "We begin the semester by discussing jobs, careers, and the importance of internships. From there we move into basic financial topics such as how to create a college

Table 3   Distribution of grades in personal finance

Grade	N	%
4 A	927	66.40%
3 B	263	18.84%
2 C	116	8.31%
1 D	44	3.15%
0 failure	43	3.08%
Withdrawal	3	0.21%
Total	1,396	100.00%

Grades in personal finance are on a 0 to 4 scale with 0 indicating a failure and 4 indicating an A; plus or minus grades were not utilized at the university during our data period.

budget, how to pay for college, how to save on the cost of a car, how to buy insurance, and many other personal finance topics." "Our goal is to teach students enough about money so they know the right questions to ask and where to find the answers they need. We want our students to know enough so that no one can take advantage of their financial inexperience."

4. Analysis and results

Our primary research question is what are the characteristics of traditional undergraduate students that take the university personal finance class? We first run independent sample t tests to compare students who took the class to those who did not. The results in Table 4 suggest that women, students with higher verbal SAT scores and high school GPAs, and majors in engineering, bio-based sciences, arts, health and medical disciplines, and education are less likely to take the class, while men, majors in business, human ecology, and social sciences are more likely to take it. Relative to White students, Hispanics appear less likely and African Americans more likely to take the class. The subsamples do not differ with respect to age at matriculation or math SAT scores.

To control for spurious relationships among our variables, we run a logistic regression with Personal Finance as the dependent variable. Personal Finance is set to one for students who took the class and zero otherwise. The results in Table 5 confirm many of the results found in the means tests. Women, students with higher verbal SAT scores and high school GPAs, and arts and education majors are less likely to take the class. Asian and Hispanic students may also be less likely to take the course, but the association is only significant at the 10% level. Business, human ecology, and social sciences majors and students from the five biggest counties of North Carolina are more likely to take the class.

As noted in Section 2, Chen and Volpe (1998, 2002) find that undergraduate women tend to score lower on financial literacy tests and to rank the importance of personal finance as a college-level subject lower than men do. We find complementary evidence that among traditional undergraduates women are less likely than men to take a college-level course on personal finance. However, some women do take it. How do they differ from the women who do not? We split our sample into male and female students and run the same logistic regression on each subsample to see if the characteristics of women who take the course

Table 4   Differences in means

	Took Personal Finance (Yes = 1)	N	Mean	Standard deviation	Difference	t	P-values (2-tailed)
Female = 1	0	15,935	.625	.484	−.160***	−12.120	.000
	1	1,551	.465	.499			
African American = 1	0	15,833	.135	.342	.028***	2.904	.004
	1	1,544	.163	.370			
Asian = 1	0	15,833	.025	.157	−.006	−1.548	.122
	1	1,544	.019	.138			
Hispanic = 1	0	15,833	.019	.135	−.007**	−2.354	.019
	1	1,544	.012	.107			
Other non-White Race = 1	0	15,833	.020	.139	−.000	−.091	.927
	1	1,544	.019	.138			
Business = 1	0	15,946	.073	.259	.200***	17.441	.000
	1	1,553	.273	.446			
Engineering = 1	0	15,946	.003	.056	−.002***	−3.189	.001
	1	1,553	.001	.025			
Human Ecology = 1	0	15,946	.026	.161	.026***	4.441	.000
	1	1,553	.052	.222			
Biology/Bio-Based Sciences = 1	0	15,946	.038	.191	−.011**	−2.456	.014
	1	1,553	.027	.162			
Social Sciences = 1	0	15,946	.029	.167	.038	5.836	.000
	1	1,553	.066	.249			
Arts = 1	0	15,946	.027	.162	−.016***	−5.456	.000
	1	1,553	.011	.104			
Health and medical = 1	0	15,946	.095	.293	−.034***	−5.243	.000
	1	1,553	.061	.239			
Education = 1	0	15,946	.080	.271	−.060***	−14.730	.000
	1	1,553	.019	.138			
Age at matriculation in years	0	15,935	18.390	1.066	−.008	−.278	.781
	1	1,551	18.382	.665			
SAT verbal score	0	14,618	513.802	68.934	−14.972***	−7.817	.000
	1	1,410	498.830	66.088			
SAT math score	0	14,618	528.412	68.327	−.341	−.180	.857
	1	1,410	528.071	66.106			
High school GPA	0	15,860	338.161	47.856	−7.861***	−6.470	.000
	1	1,540	330.299	45.286			

Independent sample t tests reported. The sample is all first-time, full-time students who matriculated between 2002 and 2006. N for each variable provides in the 0 (1) row the number of students who did not (did) take the Personal Finance class who reported data necessary to code that variable. For example, we are able to identify the race/ethnicity of 15,946 students who did not take the class and 1,553 students who did take the class. Means for the categorical variables represent the percentage of the sample that are coded 1 for that variable. Therefore, 62.5% of students who did not take the class were female, while only 46.5% of students who took the course were female. Differences are calculated as 1–0. Thus a positive (negative) difference and t statistic for a categorical variable indicates that students that are coded 1 for that variable are more (less) likely to take Personal Finance. ***, **, and * indicate that differences are significant at the 1%, 5% and 10% level, respectively. Means for IT/Computer Science, Recreation and Fitness, Non-Bio-Based Sciences, Psychology, Big County, Small County, Out of State, and On Campus were insignificant and are not displayed for brevity.

Table 5	Logistic regression: who takes personal finance?

	B	SE	Wald	Significance
SAT verbal score	−.003***	.001	37.905	.000
SAT math score	.001	.001	1.078	.299
High school GPA	−.002**	.001	5.174	.023
Age at matriculation in years	−.042	.048	.767	.381
Female = 1	−.599***	.065	84.898	.000
African American = 1	.102	.087	1.361	.243
Asian = 1	−.394*	.209	3.543	.060
Hispanic = 1	−.430*	.258	2.785	.095
Other non-White Race = 1	−.079	.210	.142	.706
Business = 1	1.578***	.074	451.977	.000
IT/Computer Science = 1	−.329	.425	.598	.439
Engineering = 1	−1.407	1.013	1.930	.165
Human Ecology = 1	1.146***	.144	63.307	.000
Biology/Bio-Based Sciences = 1	.142	.176	.654	.419
Recreation and Fitness = 1	−.071	.217	.106	.745
Non-Bio-Based Sciences = 1	.392	.358	1.201	.273
Psychology = 1	.346	.211	2.690	.101
Social Sciences = 1	1.048***	.124	71.022	.000
Arts = 1	−.569**	.277	4.240	.039
Health and Medical = 1	.085	.124	.466	.495
Education = 1	−1.020***	.213	22.986	.000
Big county = 1	.140*	.073	3.682	.055
Small county = 1	.117	.094	1.568	.210
Out of state = 1	.110	.085	1.674	.196
Constant	.230	.962	.057	.811
−2 Log Likelihood	8629.954			
Cox & Snell R^2	.051			
Nagelkerke R^2	.113			

Presented are results from a logistic regression with the dependent variable set to 1 if the student took Personal Finance at any time during our data period, 2002–2011; 0 otherwise. The sample is all first-time, full-time students who matriculated between 2002 and 2006. Female is coded 1 if the student's record identifies her as female, 0 if male. Race identifiers are coded 1 if the student is identified as African American, Asian, American Indian, Hispanic, or Other, 0 otherwise. Major identifiers are coded 1 if the student graduated in that major. Big county, small county, and out of state are set to 1 if the student's permanent address at matriculation is in one of North Carolina's five biggest counties, in one of the several counties in North Carolina that has fewer than 50,000 residents, or an out of state address, respectively. ***, **, and * indicate that coefficients are significant at the 1%, 5% and 10% level, respectively.

mirror those found in the full sample. The results, shown in Table 6, are indeed similar to those in Table 5. They indicate that among the women in the sample, Asians, those with higher verbal SAT scores, and education majors are less likely to take the class. Business, human ecology, biology-based, and nonbio-based sciences, psychology, and social sciences majors are more likely to take the class. Comparing the characteristics of the women who take the class to those of the men who take it, we find many similarities. However, for the men in the sample, fewer majors are significant. Among men, business and social science majors are more likely to take the class, while arts and education majors are less likely to take it. Another difference between men and women shown in Table 6 is that high school GPA and age at matriculation are important only among men, who are less likely to take the class

Table 6 Logistic regression: who takes personal finance? Split by sex

	Sex = male				Sex = female			
	B	SE	Wald	Significance	B	SE	Wald	Significance
SAT verbal score	−.004***	.001	26.923	.000	−.003***	.001	12.498	.000
SAT math score	.001	.001	.684	.408	.000	.001	.275	.600
High school GPA	−.281***	.100	7.909	.005	−.048	.109	.195	.659
Age at matriculation	−.106*	.063	2.862	.091	.081	.079	1.051	.305
African American = 1	.143	.125	1.296	.255	.047	.123	.146	.703
Asian = 1	−.273	.263	1.078	.299	−.606*	.352	2.967	.085
Hispanic = 1	−.377	.360	1.093	.296	−.443	.372	1.420	.233
Other = 1	.184	.261	.496	.481	−.441	.371	1.420	.233
Business = 1	1.624***	.097	278.542	.000	1.531***	.117	172.003	.000
IT/Computer Science = 1	−.473	.465	1.036	.309	1.017	1.072	.900	.343
Engineering = 1	−1.290	1.016	1.613	.204	−18.362	16397.2	.000	.999
Human Ecology = 1	.386	.568	.462	.497	1.237***	.153	65.497	.000
Biology/Bio-Based Sciences = 1	−.314	.286	1.208	.272	.516**	.225	5.269	.022
Recreation and Fitness = 1	−.019	.255	.005	.942	−.222	.423	.274	.601
Non-Bio-Based Sciences = 1	.135	.477	.080	.778	.925*	.539	2.945	.086
Psychology = 1	−.114	.524	.047	.827	.482**	.233	4.292	.038
Social Sciences = 1	1.120***	.147	57.806	.000	.863***	.241	12.828	.000
Arts = 1	−.927*	.513	3.267	.071	−.361	.330	1.197	.274
Health and Medical = 1	−.003	.279	.000	.990	.109	.143	.582	.446
Education = 1	−2.014***	.715	7.940	.005	−.847***	.227	13.932	.000
Big county = 1	.164	.100	2.678	.102	.107	.108	.973	.324
Small county = 1	.111	.131	.713	.398	.139	.134	1.070	.301
Out of state = 1	.157	.118	1.772	.183	.062	.123	.259	.611
Constant	1.977	1.284	2.372	.124	−3.170	1.540	4.236	.040
−2 Log Likelihood	4275.41				4323.63			
Cox & Snell R^2	.065				.029			
Nagelkerke R^2	.123				.076			

Presented are results from logistic regressions with the dependent variable set to 1 if the student took Personal Finance at any time during our data period, 2002–2011; 0 otherwise. Sex = male (female) is the subsample of all first-time, full-time students who matriculated between 2002 and 2006 and identified themselves as male (female). Race identifiers are coded 1 if the student is identified as African American, Asian, American Indian, Hispanic, or Other, 0 otherwise. Major identifiers are coded 1 if the student graduated in that major. Big county, small county, and out of state are set to 1 if the student's permanent address at matriculation is in one of North Carolina's five biggest counties, in one of the several counties in North Carolina that has fewer than 50,000 residents, or an out of state address, respectively. ***, **, and * indicate that coefficients are significant at the 1%, 5% and 10% level, respectively.

as GPA and age increase. Consistent with the full sample results, SAT math scores are not significant in either the male or female sample.

We have found that enrollment in an elective college-level personal finance course is associated with gender, after controlling for SAT scores, grades, major, age at matriculation, and race/ethnicity. Others have found that women score lower on financial literacy tests. Do women tend to be less literate because they are less likely to seek out financial information? Our results and those of Lusardi and Mitchell (2006), who find that women are less likely to be "committed" retirement planners; Cheng, Lin, and Liu (2011), who find that women are less likely to shop around for mortgages; and Chen and Volpe (2002), who find that

undergraduate women are less likely to consider personal finance an important college-level subject, may be consistent with this hypothesis. However, despite these discouraging findings, research suggests that among those who actively seek financial knowledge, such as by consulting financial planners, searching for lower rates, or enrolling in formal finance courses, women perform as well men. Lusardi and Mitchell (2006) find that among those who consult financial planners, women are at least as likely as men to be "committed" retirement planners. Cheng, Lin, and Liu find that among those who shop around for mortgage rates, women and men pay statistically equal rates after controlling for income, education and credit history. Didia and Hasnat (1998) found that gender had no effect on grades in seven sections of an introductory financial management course after controlling for cumulative GPA and age. Pritchard, Romeo, and Saccucci (2000) found that women earned higher grades than men in five sections of a Principles of Finance course after controlling for age and student scores on pretests to measure computational and algebra skills. Beierlein and Neverett (2013) find no significant association between gender and grades among 1,795 students who took the introductory financial management course between 2002 and 2011 after controlling for prior GPA, math and verbal SAT scores, and demographic variables.

To test the hypothesis that women who demonstrate interest in personal finance by enrolling in a formal course will perform as well as their male classmates, we use an ordinal regression model[6] with students' grades in Personal Finance as the dependent variable. We include all the explanatory variables from our previous analyses and add the student's cumulative college GPA calculated at the end of the semester before taking Personal Finance. Our results, in Table 7, are consistent with those of Didia and Hasnat (1998), Pritchard, Romeo, and Saccucci (2000), and Beierlein and Neverett (2013). Women earn grades that are as high or slightly higher (significance level <0.1) than men's. Students majoring in business, bio-based sciences, social sciences, and health and medical fields also tend to earn higher grades than other students, and grades significantly increase with a student's prior GPAs in high school and college. Of course, we must interpret these results with caution. As shown in Table 3, there is relatively little variation in grades for this course.

5. Discussion and conclusion

Prior research indicates that, on average relative to men, women are less financially literate and less likely to be "committed" retirement planners, to invest in the stock market, and to shop around for mortgages rates. Research focused on college students indicates that female students score lower on financial literacy tests, report less financial knowledge in self-assessments, and are less likely to rate personal finance as an important college level subject. Together, the results of prior research in this area suggest a link between interest in finance and financial literacy. In this vein, Mandell and Klein (2007) find that students who seemed to understand the impact of financial decisions on quality of life were more likely to have higher literacy scores. They conclude that motivation to learn is an important driver of financial literacy, though causality could flow both ways.

If enrollment in a university level course on personal finance is a measure of interest, then we find evidence that women are less interested in personal finance than men are in a sample

Table 7   Ordinal regression: characteristics associated with grades in Personal Finance

Independent variables	Estimate	Standard error	Wald	Significance
Age at matriculation in years	−.075	.126	.356	.551
SAT verbal score	−.001	.001	1.646	.200
SAT math score	−.001	.001	.260	.610
High school GPA	.005***	.002	10.058	.002
Cumulative GPA before Personal Finance	1.380***	.108	163.916	.000
Female = 1	.265*	.147	3.237	.072
African American = 1	.040	.183	.047	.829
Asian = 1	−.299	.456	.429	.512
Hispanic = 1	−.320	.565	.321	.571
Other non-White race = 1	1.111*	.665	2.794	.095
Business = 1	1.105***	.174	40.363	.000
IT/Computer Science = 1	−.237	.903	.069	.793
Engineering = 1	18.107	.000	.	.
Human Ecology = 1	.172	.297	.336	.562
Biology/Bio-Based Sciences = 1	1.685**	.714	5.564	.018
Recreation and Fitness = 1	.311	.440	.501	.479
Non-Bio-Based Sciences = 1	.861	1.026	.704	.401
Psychology = 1	.640	.512	1.566	.211
Social Sciences = 1	.515**	.231	4.949	.026
Arts = 1	−.842	.623	1.823	.177
Health and Medical = 1	1.851***	.512	13.053	.000
Education = 1	−.267	.485	.303	.582
Big county = 1	.199	.161	1.512	.219
Small county = 1	−.023	.205	.013	.909
Out of state = 1	−.029	.183	.026	.872
Cox and Snell Pseudo R^2	.286			
Nagelkerke R^2	.331			
McFadden R^2	.169			

Presented are results from an ordinal regression with the dependent variable set to 0 to 4 to represent grades of F to A, respectively. Plus/minus grades were not utilized at the university during our data period, 2002–2011. The sample is all first-time, full-time students who matriculated between 2002 and 2006 and took Personal Finance at any time during our data period. Female is coded 1 if the student's record identifies her as female, 0 if male. Race identifiers are coded 1 if the student is identified as African American, Asian, American Indian, Hispanic or Other, 0 otherwise. Major identifiers are coded 1 if the student graduated in that major. Big county, small county, and out of state are set to 1 if the student's permanent address at matriculation is in one of North Carolina's five biggest counties, in one of the several counties in North Carolilna that has fewer than 50,000 residents, or an out of state address, respectively. ***, **, and * indicate that coefficients are significant at the 1%, 5% and 10% level, respectively.

of 17,499 first-time, full-time students who matriculated between 2002 and 2006. Of course, there are other possible reasons besides lack of interest that could explain why a given student does not take the class, including: the chosen field of study permits few free electives, student intended to enroll but classes were always full, time conflicts with work or other classes, the student already felt sufficiently knowledgeable about the topic, the student was unaware of the class or would prefer to learn about personal finance in ways other than a formal college course. In our multivariate analysis, we find that arts and education majors are less likely than other majors to take the course. These students may have more scheduling conflicts than others or perhaps the course is mentioned less by advisers. We also find that

students with higher high school GPAs and verbal SAT scores are less likely to enroll. It could be that these students already feel sufficiently comfortable with personal finance topics, and/or are pursuing courses that they expect to offer more challenge.[7] As shown in Table 3, more than 66% of students earn A's in this course. On the other hand, why women are less likely to enroll is more difficult to explain. We can think of no reason why women would be less aware of the class than men or have more scheduling conflicts, after controlling for majors, and research certainly does not suggest that women are more likely to feel sufficiently knowledgeable about finance than men. Even if we take our results as evidence that female students are less interested than male students in personal finance topics, we cannot explain why this would be true given their relevance to one's well-being. Certainly more research needs to be done to investigate whether women are indeed less interested than men in finance, on average, and if so, why and what can be done to motivate greater interest.

Given that the Personal Finance course at our university fills to capacity each semester, the motive behind our research is not to drum up business; there enough takers. Instead, we are concerned that specific groups of our students may not be getting the financial education they need. Now that we have identified those groups of students that may be less likely to enroll in the class, we must consider the causes, particularly whether lack of interest is a driving factor, and if so, ways to motivate their interest and provide financial learning opportunities that are more likely to reach them.

The first step would be to use survey methods to gauge financial literacy among our students and examine the relationships between literacy, the characteristics identified in this article, and interest in the course. If obstacles to enrollment, such as lack of awareness or inability to get the class or fit it in with other classes, are significant, we must consider more advertising, perhaps targeted at these groups, and consider offering more sections. If lack of interest is the driver of lower enrollments among these groups, we must explore why they lack interest to design motivational campaigns that could be delivered through freshmen orientations, Freshman Seminar,[8] the university advising centers, and student organizations, particularly those that focus on either students having the characteristics associated with lower enrollment or those that focus on career and professional development.

If students are interested but prefer instructional methods other than a formal class as Lyons (2007) indicates, perhaps finance instructors can design or identify existing online modules that can be provided on the university Web site and on those of student organizations. Freshman Seminar and professional development instructors can be informed of online modules in case they want to include them in classes. Alternatively, perhaps the student members of the Financial Management Association can reach out to other student organizations and offer workshops. Topics could include: student loan and credit card management, how to build your credit score, car loans, and how to maximize your employer's retirement benefits (hint: start early!).

Finally, given the necessity of having financial knowledge at one's finger tips when making decisions, combined with the ever-growing ubiquity of smart phones, perhaps mobile applications can be found and publicized or designed jointly by finance and computer science faculty and students to walk users through typical calculations that can aid in financial decision-making. One such application could ask users to enter the purchase price of an item

and their credit card interest rate and then show them how much that item would really cost if they make only the minimum payment or if they take X months to pay it off. Credit cards provide this information on statements *after* the purchase; a mobile application could give consumers that information *before* the purchase. One can imagine similar applications for computing loan payments and total interest if paid according to loan terms, and estimating retirement savings and income.

The public in general appears to lack the financial knowledge necessary to make good financial decisions. Women in particular seem to be less likely than men to be literate and more likely to pay the price of illiteracy, in the form of insufficient retirement savings and higher interest rates on loans. We find that among traditional college students, females on our campus are less likely than their male counterparts to enroll in a formal college course on personal finance. Whether this result and the relative illiteracy reported in other research stem from a comparative lack of interest in personal finance among women, and if so, what can be done to increase interest in this important subject, are essential questions for future research.

Notes

1 They use the *availability* of financial education rather than the *use* of these programs as their key explanatory variable to address the endogeneity problem that arises because those who are more likely to save may also be more likely to attend financial education programs. In contrast, the employer's decision to offer the program is less likely to be correlated with an employee's underlying predisposition to save.

2 Center for Retirement Research at Boston College.

3 "Custodial Mothers and Fathers and Their Child Support: 2007," a report released by the U.S. Census Bureau in November 2009 (U.S. Census Bureau, 2009). (available at http://www.census.gov/prod/2009pubs/p60-237.pdf).

4 For brevity, throughout the remainder of the article we will use the term "traditional" to mean first-time, full-time.

5 Stocknotes, Spring 2012, "ECU Personal Finance Instructors Inspire Students to save $100,000," p. 5. (available at http://www.ecu.edu/cs-bus/upload/Stocknotes-Spring-2012.pdf).

6 Spector and Mazzeo (1980), Becker (1983), and Borg, Mason, and Shapiro (1989) suggest that ordered-probit may be a more appropriate regression technique than OLS, given the discrete nature of the dependent variable. In SPSS, the Ordinal Regression Procedure is used to run ordered-probits. Norusis (2012) includes students' grades as an example of ordinal variables that should be analyzed using ordinal regression.

7 We thank an anonymous reviewer for suggesting this possibility.

8 The Freshmen Seminar (COAD 1000) is an elective course designed to help freshmen succeed in their first year of college and beyond. It focuses on the transition from high school to college, student development and motivation, goal-setting, learning styles, memory development, listening skills, note-taking skills, study skills, test-taking

skills, communication, critical-thinking skills, academic rules and regulations, and career development issues.

Acknowledgments

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