Undergraduate Financial Knowledge

and the Role of Financial Education Programming

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Abstract

College is an increasingly risky investment for students due to increased cost burden placed on students and their families and the associated student debt. In response, colleges and universities have increased their financial education programming hoping to mitigate some of the deleterious effects of this change. Therefore, we conducted an exploratory analysis of financial education programming by examining its relationship with financial knowledge. After holding other characteristics constant, we found little efficacy of many types of financial education programming. The single program with a significant and positive relationship was student loan counseling, which had a small to trivial influence on financial knowledge. Consequently, colleges and universities should reevaluate their financial education efforts to examine if these resources are being spent wisely.

Keywords: Financial knowledge; financial education; higher education; college students; National Survey of Student Engagement
Undergraduate Financial Knowledge and the Role of Financial Education Programming

Despite the rising cost of higher education, undergraduates continue to enter college ill-prepared to manage their finances, inspiring some to call for financial literacy to be a more prominent liberal learning outcome (Chen & Volpe, 1998; Crain & Ragan, 2012; Mandell, 2008). Only one-third of states require a personal finance course as part of the high school curriculum, and only seven include standardized testing of such concepts (Council for Economic Education, 2016; Jump$tart Coalition for Financial Literacy, 2016). Survey results of high school students’ financial knowledge over time have demonstrated a decline in knowledge (Mandell, 2008). A recent market study focusing on millennials reinforces this finding: only one-in-four exhibited basic financial literacy (PricewaterhouseCoopers, 2015). Financial literacy has become ever more critical, yet remains lacking, as an increasing number of students attend college and require loans to pay for college costs.

The need for financially literate students has led to a rapid increase of financial education programming on college campuses in recent years. Congress’ decision to convert the state loan guarantee agencies to financial education providers also spurred the growth in financial education programming (Higher Education Opportunity Act of 2008, 2018). Despite the growth of financial education programming, little attention in the scholarly community has focused on its efficacy. This is troubling as financial education efforts have a poor track record regarding improving financial literacy in the general population (Fernandes, Lynch, & Netemeyer, 2014). Due to limited research focusing on the efficacy of financial education programming, this study examines how participation in various types of financial education programming is correlated
with students’ financial knowledge for a sample over 13,000 bachelors-seeking undergraduates attending 34 U.S. colleges and universities.

**Literature Review**

With the rapid proliferation of credit cards on university campuses in the 1990s and 2000s, financial literacy among undergraduates became the focus of much scholarly activity (e.g., Adams & Moore, 2007; Avard et al., 2005; Chen & Volpe, 1998; Robb, 2011; Warwick & Mansfield, 2000). These studies found substantial proportions of undergraduates failed to understand the terms of financial agreements and frequently were unable to make informed financial decisions. More recent national surveys examining college student financial literacy came to similar conclusions (Mandell, 2008; National Student Financial Wellness Study, 2015). However, it does appear that undergraduates’ financial knowledge improves slightly the longer students are enrolled in college (Mandell, 2008).

Despite the need for improvement, scant research has examined institutional efforts and programs to help students become financially literate. Beyond federally required student loan counseling, financial education programs only recently emerged as institutional responses to the student debt crisis, partly explaining the gap in the literature (Supiano, 2008; 2015). Congress mandated part of this reaction through the enactment of the Higher Education Opportunity Act of 2008 (2015) which required colleges and universities operating TRIO programs to embed financial education into their curricula and state guarantee agencies to collaborate with institutions to develop financial education programs.

Students who take out federal loans have long had to participate in entrance and exit loan counseling; however, the efficacy of the counseling has not been well documented. A recent national study found that a third of student borrowers did not remember participating in loan
entrance counseling (National Student Financial Wellness Study, 2015). Of those who could recall, about 80 percent said the training was helpful or somewhat helpful; however, this figure masks significant differences by institution type as students attending four-year institutions found the counseling substantially less beneficial than their peers attending two-year institutions and relies on suboptimal measures of program efficacy.

A national study examining the relationship between loan entry/exit counseling and student loan default observed no significant correlation (Flint, 1998); although, student loan counseling has since transitioned to an online model and thus may not represent the effectiveness of the counseling today. There is evidence that timely interventions providing financial knowledge to students who recently completed or withdrew from college helps reduce student loan default (Seifert & Wordern, 2004). In-person exit counseling was associated with an eight percent reduction in the probability of loan default at Texas A&M, while other forms of counseling had no appreciable impact (Steiner & Teszler, 2005). The contradictory findings suggest financial education efforts need to be timely, focused, and practical for students. Attempting to provide financial knowledge during hectic times like orientation or graduation may be misguided, as many students may be overwhelmed by life transitions and have little ability to pay attention to and retain information from financial lessons.

The literature identifies four main delivery methods for institutions to provide financial education. Crain and Ragan (2012) argue that a financial literacy course should be a required part of the curriculum for liberal arts majors, especially given the increased financial pressures today’s students face. The three other delivery methods include a financial counseling center, similar to an academic advising or job placement center; online resources like a tutorial website; and workshops (Goetz, Cude, Nielsen, Chatterjee, & Mimura, 2011). Of these types, a quarter of
undergraduates surveyed were interested in a financial counseling center, two in five were interested in workshops, and eight in ten were interested in online resources or would utilize a counseling center if they were in a financial crisis (Goetz et al., 2011). However, despite the availability of financial education offered by postsecondary institutions, students highly rely upon their parents for advice (Montalto, Heckman, Letkiewicz, 2016).

The effectiveness of these methods, however, remains unclear. Borden, Lee, Serido, and Collins (2008) found that workshops helped promote positive financial attitudes and behaviors, such as reading the terms to credit card offers, paying off credit card balances in full, and following monthly budgets. Gartner and Schiltz (2005) reported that a one-credit mini course could be effective in promoting financial knowledge among students. Requiring a financial education course in the K-12 curriculum appears to reduce loan defaults and improve credit scores (Brown, Collins, Schmeiser, and Urban, 2014). However, a meta-analysis of financial education efforts found negligible effects on financial knowledge, that the effects declined over time, and instead propose “just-in-time” interventions as a more practical and relevant educational method (Fernandes et al., 2014). A recent trend in financial education at postsecondary institutions has been through sending “Know Your Debt” letters to students that specify the amount of their current debt and the expected repayment terms (Lorin, 2014; Quinton, 2016). However, recent scholarship comes to alternating conclusions on the efficacy of this technique (Darolia & Harper, 2018; Schmeiser, Stoddard, & Urban, in press).

The mixed evidence for the efficacy of financial education programming, paired with the substantial expense of attending university and general deficit in student financial knowledge, demands continued scholarly focus on the subject to identify institutional efforts that can best help students make informed and reasoned financial decisions.
Theory

Student engagement theory guided this study. The current understanding of the theory was articulated by Kuh, Schuh, Whitt, and associates (1991) and combines both previous theory and research to explain how college students learn and grow during college (McCormick, Kinzie, & Gonyea, 2013). The theoretical underpinnings of the theory are based on Pace’s (1980, 1982) quality of effort concept and Astin’s (1984) student involvement theory. The quality of effort concept proposes that a student’s learning is the result of the amount of time spent and effort exerted by the student, and the quality of a student’s experiences, which are shaped by the institution. Student involvement theory postulates that learning and development is a result of students’ physical and psychological efforts. The empirical research embedded within the theory is that good educational practices can have dramatic effects on student learning and development. This portion of the theory is influenced by Chickering and Gamson’s (1987) work in identifying good educational practices and Kuh and associates’ (1991) research that highlights the benefits of co-curricular activities. Therefore, student engagement theory emphasizes the role institutions play in student learning and development through their role in organizing the curriculum and creating an environment that facilitates learning and development.

While student engagement theory does not discuss financial education directly, money plays a crucial role in student engagement. At a threshold level, money is a prerequisite for engaging in college, as students can not enroll without paying tuition and required fees. Money also shapes the student experience. A student without the means to purchase books will have difficulty preparing for class through required course readings. Similarly, many co-curricular activities require money to participate. Consequently, we extend student engagement theory to the personal financial realm by emphasizing that institutions can facilitate and increase
engagement by helping students manage their money, providing a financial backstop for students in emergency situations, and helping students pay for college through the financial aid process.

Research Questions

College, as a student experience, has become increasingly financially risky. While many financial pressures on students result from forces beyond the control of postsecondary institutions (e.g., reduced state appropriations, favoring of loans over grants, stagnant family incomes), institutions have an interest in, if not a responsibility, to help students deal with these financial challenges. Consequently, we investigated the following research questions:

1. How does participation in various financial education programs relate to students’ financial knowledge?
2. How does engagement in quantitative reasoning activities relate to students’ financial knowledge?
3. How does the financial knowledge of peers relate to students’ financial knowledge?
4. How do other student characteristics relate to students’ financial knowledge?

Methods

Data

We utilized data from the 2017 administration of the National Study of Student Engagement (NSSE), a large, multi-institutional survey of undergraduates attending bachelors-granting institutions. NSSE captures data on student engagement in a variety of educationally beneficial behaviors and activities in- and outside the classroom and students’ perceptions of the educational environment. Due to the focus of the study, we restricted our analyses to students who received a set of supplemental items on their understanding of personal finances, financial stress, and utilization of campus financial educational resources. The students who received this
supplemental item set attended institutions randomly assigned the supplemental set from a pool of institutions that elected to not append two additional item sets (modules or consortium) to the core NSSE. Our sample consisted of 13,398 undergraduates attending 34 U.S. institutions that received the supplemental items after completing the core NSSE. The response rate for the sample was 20%. NSSE data at this response rate have been found to be relatively free from nonresponse bias (Fosnacht, Sarraf, Howe, & Peck, 2017).

The respondents were predominantly female (65%), in their senior year (59%), and enrolled full-time (87%). Just over half of the respondents were White (56%), roughly one in ten respondents were Black, 13% were Latin@, and 5% were Asian or a Pacific Islander. The remaining students were Native American, multi-racial, international, or with an unknown race/ethnicity. The majority of students were traditionally-aged (68%) and lived in university housing or within walking distance of campus (48%). Approximately one-in-five students were enrolled exclusively in online courses. The most common major fields were business (17%), health professions (15%), social sciences (11%), biological science (10%), and engineering (10%). Forty-seven percent of the students were the first in their families to pursue a baccalaureate degree. Sixty-two percent of the respondents attended public institutions. Half attended a doctoral university, 42% attended a masters-granting college or university, and 8% attended a baccalaureate college. Nearly two out of three students attended an institution with an undergraduate enrollment of 10,000 or more. One in four students attended an institution with a Barron’s rating of non-competitive or less competitive. A third attend institutions with a rating of competitive. Twenty-six percent attended an institution with a rating of very competitive, and 14% attended highly or most competitive rated institutions. The mean net price to attend college was $16,676 (SD=$7,525). Our dependent variable was students’ financial knowledge. We
created the variable by applying a two-parameter logistic (2PL) item response theory model (IRT) to five multiple-choice questions designed to gauge students’ financial knowledge. The questions were designed to apply to the student experience and thus focused on topics like student loans, credit cards, obtaining a credit report, and comparing interest and inflation rates. We choose to use these questions over pre-existing scales as the established scales frequently inquire about topics like retirement savings and mortgages that are not very applicable to many undergraduates.

---INSERT TABLE 1 ABOUT HERE---

IRT is a probabilistic framework used to quantify latent traits. The 2PL model is used for binary items and allows for the items to vary in both difficulty (the place on a latent trait distribution \( \theta \) where an individual has a 50% chance of answering the item correctly) and discrimination (the slope of the parameter curve, which represents the rate of change that an individual would be expected to answer the item correctly as you move up the latent trait distribution). Table 1 contains the discrimination and difficulty parameters for the 2PL model. The results indicate that the standard repayment period for federal loans question was the most difficult to answer. However, it was the least effective at discriminating between students. In contrast, the question about paying interest if you failed to pay off your credit card balance had the greatest ability to discriminate between students. Figure 1 contains the test character curve, which shows the number of questions a student would be expected to answer correctly throughout the latent trait distribution. The average student would be expected to correctly answer about three questions correctly, while 95% of the sample would be expected to answer between 1.4 and 4.2 items correctly. Figure 2 displays the test information function and standard error associated with a predicted score throughout the latent distribution. The figure indicates
that model has the most information about students with less than average financial knowledge and thus is more accurately estimate a student’s score in this range, although adequate information is available to predict students’ financial knowledge throughout much of the latent distribution. We tested the IRT assumptions of appropriate dimensionality and local independence by performing a factor analysis with the items used in the IRT model. The scree plot indicated a single factor and the residual correlations all had an absolute value less than .05. Additionally, we examined if the model met the assumption of monotonicity by examining if all of the item characteristic curves displayed non-decreasing trends. In our analyses, we used a standardized version of this variable that had a mean of 0 and SD of 1.

---INSERT FIGURES 1 AND 2 HERE---

The key independent variables utilized in the study were a set of dichotomous items inquiring if the student participated in the following financial education activities:

- for-credit courses taught by an instructor
- financial education taught as a topic in a course
- online tutorials or modules (e.g., webinar, podcast, self-paced program)
- individual or group counseling by faculty or staff
- peer counseling
- student loan counseling
- financial education provided through a student organization.

A second key independent variable was student engagement in quantitative reasoning activities represented by NSSE’s Quantitative Reasoning Engagement Indicator. This composite variable measures how often students did the following activities in their courses: reached conclusions based on your own analysis of numerical information, used numerical information to examine a
real-world problem or issue, and evaluated what others have concluded from numerical information. The Cronbach’s alpha for the scale was .83, and it was standardized with a mean of 0 and SD of 1.

We also utilized data on a variety of student characteristics. These data were primarily gathered on the core NSSE instrument and include race/ethnicity, sex, educational aspirations, age, parental education, class standing (first-year or senior), student-athlete status, enrollment status, greek-life participation, transfer status, major field, time spent working, and on-campus residency. Institutions reported data on race/ethnicity, sex, class standing and enrollment status, but we used student reported data when missing these variables were missing. Standardized test scores (SAT I/ACT) were not included in the analyses, as the institutions for roughly 2 out of 3 students did not report their students’ scores.

The analyses also used data on a variety of institutional characteristics. Data on the undergraduate enrollment, percentage of enrolled students that were female and White, institutional control (public vs. private), and the net institutional price (in-state for public institutions; all students for private institutions) were obtained from the Integrated Postsecondary Education Data System (U.S. Department of Education, n.d.). Barron’s Educational Series (2016) ratings represented institutional selectivity. To preserve institutional confidentiality, the categorical institution variables were collapsed to ensure that at least five institutions were in each category. We also used an aggregated variable that contained the institutional mean of the financial knowledge variable.

Analyses

We began our analyses by performing two-group t-tests that compared financial knowledge by participation in any financial education programming and each of the financial
education types described above. Next, we developed a series of multivariate models to examine the associations between financial education programming participation, engagement in quantitative reasoning, and student and institutional characteristics with students’ financial knowledge. We utilized multi-level modeling with a random-intercept, as the intra-class correlation coefficient for financial knowledge was .09. Four multivariate models were developed. The first contained just student characteristics like race, sex, and age. The second model added college experience variables like major field, time spent working, and greek-life participation. The third model added participation in financial education programming and engagement in quantitative reasoning. The fourth model added institutional characteristics. All of the models adjusted the standard errors to account for the nesting of students within institutions. We estimated the amount of variance explained by calculating Snijders and Bosker’s (1994; 1999) level one and two R\(^2\) coefficients. We checked for multicollinearity by replicating the final model via ordinary least squares regression and analyzing the variance inflation factor estimates. Finally, we deviated from NSSE’s standard practice of analyzing first-year and senior students discretely. We chose to analyze a combined sample that would allow for the assessment of how maturation (beyond aging up) through college influences financial knowledge.

**Results**

We began our analyses by comparing financial knowledge by participation in any financial education programming. Students who did not participate in any form of financial education (\(M=-0.01, SD=0.98, N=5,686\)) exhibited slightly, but not significantly lower levels of financial knowledge than students who participated in some form of financial education programming (\(M=0.01, SD=1.03, N=7,308\)); \(t(11931)=0.92, p=0.36, \text{two-tailed}\). Table 2 summarizes the t-test results that compared financial knowledge by participation in specific types
of financial education programming. The mean differences were significant for each type of programming, however, the direction varied. Students who participated in online tutorials or modules and student loan counseling exhibited higher levels of financial knowledge than non-participants. However, students who participated in a for-credit financial education course received financial education as part of a course’s content, received financial education counseling by faculty or staff, or peers, and financial education through a student organization displayed lower levels of financial knowledge than their peers.

---INSERT TABLE 2 HERE---

Next, we estimated a series of multi-level models to assess the predictors of financial knowledge, holding constant other characteristics. Table 3 summarizes the models. Unless otherwise mentioned, all results discussed refer to the final model and hold other characteristics constant. As shown by the $R^2$ coefficients, the vast majority of the variance explained at the student level was due to differences in student characteristics. The student experiences, financial education programming, quantitative reasoning, and institutional characteristics (models 2 through 4) only explained an additional 3 percentage points of the total variance (compared to 17 percentage points for the student characteristics).

---INSERT TABLE 3 HERE---

Compared to White students, Asian and Pacific Islander, Black, Latin®, international, and other racial/ethnic students exhibited lower levels of financial knowledge. Students who did not plan to complete a bachelor’s degree displayed less financial knowledge than students seeking to earn a bachelor’s degree. However, students who aspired to earn a graduate degree exhibited higher levels of financial knowledge than their peers who aspired to earn just a bachelor’s degree. Financial knowledge was substantially and positively correlated with age.
Parental education was not correlated with financial knowledge. Seniors on average exhibited higher levels of financial knowledge than first-year students. Student-athlete status was negatively correlated with financial knowledge. In contrast, greek-life membership was positively related to financial knowledge. No significant difference was attributable to enrolling in college part-time or transferring. Students majoring in the physical science, business, and engineering exhibited higher levels of financial knowledge than social science majors. Every 10 hours of time spent working was correlated with a .02 SD increase in financial knowledge. On-campus residency was positively related to financial knowledge. An SD change in engagement in quantitative reasoning was associated with a .03 SD reduction in financial knowledge. The following types of financial education were not significantly related to financial knowledge: for-credit courses, financial education taught as a topic in a course, and online tutorials. Counseling provided by faculty or staff, or peers and financial education provided by a student organization were negatively related to financial knowledge; however, student loan counseling was positively related to financial knowledge. Few institutional characteristics were significant, as financial knowledge was not related to undergraduate enrollment, institutional control, the percentage of White and female students enrolled, or net price. One exception was that students attending highly or most competitive colleges or universities (Barron’s rating) exhibited higher levels of financial knowledge than their peers attending competitive institutions. Additionally, financial knowledge aggregated at the institutional level was positively correlated with financial knowledge at the student-level.

**Discussion**

For many years, finances were not viewed as a significant barrier to college enrollment or completion (Leslie & Brinkman, 1987; Tinto, 1987). However, the cost of attending college
relative to family incomes has dramatically increased over the past few decades leading to a rethinking of how finances impact students. Financial issues, from paying for course materials to managing credit card debt, can present significant hurdles to students and prevent their enrollment or full participation in educationally beneficial activities (Goldrick-Rab, 2016). Over the past decade, financial education programming has dramatically expanded in recognition of the increasing role finances play in higher education experiences and to help moderate the influence of money on students (Supiano, 2008; 2015). Financial education can play an essential role in students’ lives as much research demonstrates low rates of financial literacy among college students and financial literacy is not a topic frequently discussed in the K-12 curriculum (Council for Economic Education, 2016). However, previous research on the efficacy of financial education programming on financial literacy in the general population suggests that financial education may not be particularly impactful (Fernandes et al., 2014). Consequently, in this study, we investigated how various forms of financial education activities relate to undergraduates’ financial knowledge using a large, multi-institution sample of bachelors seeking students. We also examined which student and institutional characteristics were correlated with financial knowledge.

Our descriptive results indicated that participation in a financial education activity was not correlated with financial knowledge. However, we did observe significant differences in specific financial education activities. Students who participated in a financial education online tutorial or module or student loan counseling exhibited higher levels of financial knowledge than non-participants. In contrast, participation in a variety of other activities like a for-credit course or financial education provided by a student organization was negatively related to financial knowledge.
As these differences may be a product of personal circumstance (students with financial difficulties are probably more likely to seek out financial education counseling), we estimated a series of multi-level regression models that allowed us to control for student background characteristics that may predispose students to participate in financial education activities. Our multivariate results paint a different picture than the descriptive results. Students who participated in student loan counseling on average exhibited higher levels of financial knowledge. In contrast, participation in financial education via counseling by faculty or staff, or peers, and via a student organization was negatively related to students’ financial knowledge. We also examined if engagement in quantitative reasoning activities as part of a course was related to financial knowledge. Our model indicates a negative relationship between quantitative reasoning engagement and financial knowledge. In combination, these results suggest that undergraduates resemble the general population in that financial education programming has little influence on financial knowledge. While we did observe significant differences, the relationships between financial knowledge and financial programming and quantitative reasoning engagement were small or trivial.

It is important to note that the results represent broad averages of program efficacy and we expect substantial variation in the impacts of specific programs. These findings do not necessarily suggest that institutions discontinue financial educational programming or providing educational resources. Instead, administrators and student affairs professionals might consider how to better utilize existing resources and programming to be more salient to students, deploying them “just-in-time” (as federal student loan counseling is) instead of providing resources and assuming the information passed on will stick. Further, efforts might be refined and tailored for students who face additional challenges in understanding finances.
While our models indicate that financial education programming does substantially influence financial knowledge, student background characteristics clearly do. Our models indicate 17% of the student-level variance in financial knowledge was attributable to fixed background characteristics, compared to an additional 3% for college experience variables, financial education participation, and institutional characteristics combined. This finding is not surprising, given the high reliance on parents for financial advice (Montalto et al., 2016). In particular, age and race appear to be significant determinants of financial knowledge. Students aged between 30 and 39 exhibited financial knowledge levels a half SD higher than students aged between 20 and 23 (the difference for older age groups was even greater). Compared to White students, international, Asian/Pacific Islander, Black, and Latin@ students exhibited financial knowledge levels .53, .31, .19, and .09 SDs lower. Surprisingly, our best proxy for socio-economic status, parental education, was not correlated to financial knowledge, suggesting that race is a more potent influence in this realm than parental education. However, educational aspirations were positively correlated with financial knowledge. Students planning to earn a graduate degree exhibited higher levels of financial knowledge than their peers aspiring to earn just a bachelors degree. This suggests that students with higher aspirations may be more active in financial planning, given their need to borrow more to pay for college costs over the long term.

Our model also suggests that males exhibited higher levels of financial knowledge than females. We also found that some student experience variables were correlated with financial knowledge. Seniors exhibited higher levels of financial knowledge than first-year students, suggesting that financial knowledge increases as students progress through their college education, even after accounting for age, which comports with previous research (Mandel, 2008). Student-athletes on average had lower levels of financial knowledge. This may be due to the
benefits received by student-athletes like scholarships, book allowances, and meals that lead to less financial planning by student-athletes. Students majoring in fields that focus on quantitative skills, like the physical sciences, business, and engineering, had higher levels of financial knowledge than social science majors. Time spent working was positively correlated with financial knowledge indicating that need to work may lead to more financial knowledge. Living on-campus was positively related to financial knowledge, an unexpected finding, as students living on campus typically pay for a bundled product (room and meals) and thus may have fewer money management responsibilities. However, this finding could be due to financial education programming conducted by residence halls or student exposure to peers with more financial knowledge.

Our models found that most institutional characteristics (undergraduate enrollment, institutional control, the percentage of White and female students enrolled, and net price) were not significantly related to financial knowledge. However, students attending institutions rated highly or most competitive by Barron's Educational Series (2016) exhibited higher levels of financial knowledge than students attending institutions rated competitive. A possible rationale for this finding is that students attending highly selective institutions have been groomed to attend college for a long period of time and received frequent lessons on how to pay for college. We also found that peers can influence students’ financial knowledge. The institutional aggregated mean of financial knowledge was positively correlated with student financial knowledge. An SD change at the institution level was correlated with a .39 SD increase at the student level, suggesting that financial knowledge can be spread from student to student.

Limitations
This study has some limitations that should be kept in mind when interpreting its results. First, it did not examine the effectiveness of a specific implementation of a financial education program. Therefore, the results should be viewed as broad averages of efficacy by type and not directly applicable to a specific type of program. Second, the results are correlational. We were unable to assign students to financial education programming in this study randomly and consequently cannot make causal claims. Future research should try to replicate the findings using experimental or quasi-experimental methodologies. Third, our analyses relied on student self-reported data and not administrative records of financial education program participation and thus may be subject to misreported data of program participation, as has been previously found in financial education programming (National Student Financial Wellness Study, 2015). Fourth, relevant data points such as parental income, financial aid records, and standardized test score data were not fully available to the researchers. Consequently, our results may be subject to omitted variable bias. Although, it should be noted that our models were able to account for a substantial portion of the variance considering that no pre-test data was available and we had a large and diverse sample. Finally, correlational research on financial education programming may be subject to the classic “chicken and egg problem.” Our failure to find substantial positive impacts may be due to students with low financial knowledge seeking out financial education programs because they are financially illiterate.

**Implications for policy and practice**

Our results suggest that financial education programming may have limited efficacy on students’ financial knowledge. Thus, institutional investment in such programming may be better placed on directly improving students’ financial conditions through direct spending on financial aid or just-in-time interventions like emergency lending. Similarly, Congress’ mandate to
convert the former loan guarantee agencies to financial education providers may have been misguided (Higher Education Opportunity Act of 2008, 2018). However, given the relatively limited research in this area, replication of our findings is needed before making wholesale changes. The one bright spot of our results was for student loan counseling, which had a positive influence on financial knowledge. While the influence of this activity was not large in magnitude, the results suggest that it should be continued, especially when the viability of other financial education models is not promising. A main finding from the study was that students’ background characteristics play a significant role in their level of financial knowledge, which was not particularly surprising as previous research indicates that students highly rely on parents for financial advice (Montalto et al., 2016). Consequently, a better pathway to increase financial knowledge might be via parent to child transmission. If this pathway is effective, financial education programming should target parents, not students.

**Implications for future research**

Our results suggest that many of the predominant financial education models on average have little influence on student financial knowledge. Thus, future research should focus on identifying if a particular type of program is effective and then examining if its model can be replicated at scale. Additionally, research should examine the viability of other types of financial education programming. One possibility is text message reminders or “nudging” that can be delivered inexpensively and on a just-in-time basis. Text message reminders have been shown to improve college-going, Free Application for Federal Student Aid (FAFSA) completion, and persistence (Arnold, Chewning, Castleman, & Page, 2015; Castleman & Page, 2015; 2016). A similar method gaining attention has been “Know Your Debt” letters which provide students with the amount borrowed and expected repayment terms around the time of receiving financial
aid award letters. These letters have been both associated and not associated with reduced borrowing by students (Darolia & Harper, 2018; Schmeiser et al., in press), and more research is needed to clarify their effects.

**Conclusion**

College is an increasingly risky investment for students due to increased cost burden placed on students and their families and the associated student debt. In response, colleges and universities have increased their financial education programming hoping to mitigate some of the deleterious effects of this change. Therefore, we conducted an exploratory analysis of financial education programming by examining its relationship with financial knowledge. After holding other characteristics constant, we found little efficacy of many types of financial education programming. The single program with a significant and positive relationship was student loan counseling, which had a small to trivial influence on financial knowledge. Consequently, colleges and universities should reevaluate their financial education efforts to examine if these resources are being spent wisely.
References


Table 1.

2PL model for students’ financial knowledge

<table>
<thead>
<tr>
<th>Item</th>
<th>Discrimination</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Est.</td>
<td>SE</td>
</tr>
<tr>
<td>In the standard repayment plan for federal loans, the length of the repayment period is:</td>
<td>0.22</td>
<td>0.03</td>
</tr>
<tr>
<td>Which of the following types of federal student loans do NOT accrue interest while you are enrolled as a student?</td>
<td>1.02</td>
<td>0.05</td>
</tr>
<tr>
<td>What is the best way to access your credit report from the three major credit reporting agencies for free?</td>
<td>0.82</td>
<td>0.04</td>
</tr>
<tr>
<td>If you cannot pay off a credit card balance in full in one month, the immediate consequence is that you will:</td>
<td>1.31</td>
<td>0.08</td>
</tr>
<tr>
<td>If the inflation rate is 5% per year and the interest rate for your savings account is 2% per year, how much would you be able to buy with the money in your account after one year, compared to today?</td>
<td>1.00</td>
<td>0.05</td>
</tr>
</tbody>
</table>
Table 2.

Two-tailed t-test results comparing financial knowledge by financial education participation

<table>
<thead>
<tr>
<th></th>
<th>Non-participants</th>
<th>Participants</th>
<th>95% CI</th>
<th>ΔM</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>For-credit courses taught by an instructor</td>
<td>0.02 1.00</td>
<td>1.04 1.07</td>
<td>-0.10</td>
<td>0.07 0.17</td>
<td>4.60 ***</td>
<td>2632</td>
</tr>
<tr>
<td>Fin. ed. taught as a topic in a course</td>
<td>0.01 1.00</td>
<td>1.04 1.03</td>
<td>-0.09</td>
<td>0.03 0.16</td>
<td>2.80 **</td>
<td>1211</td>
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<tr>
<td>Online tutorials or modules</td>
<td>-0.02 1.00</td>
<td>1.04 1.07</td>
<td>0.12</td>
<td>-0.19 -0.08</td>
<td>-4.90 ***</td>
<td>12992</td>
</tr>
<tr>
<td>Counseling by faculty or staff</td>
<td>0.02 1.00</td>
<td>1.02 1.07</td>
<td>-0.17</td>
<td>0.12 0.25</td>
<td>6.01 ***</td>
<td>12992</td>
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<tr>
<td>Peer counseling</td>
<td>0.02 1.00</td>
<td>1.04 1.04</td>
<td>-0.31</td>
<td>0.26 0.40</td>
<td>9.18 ***</td>
<td>12992</td>
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<td>Student loan counseling</td>
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<td>1.00 1.00</td>
<td>0.23</td>
<td>-0.32 -0.24</td>
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<td>Fin. ed. provided via stud. org.</td>
<td>0.01 1.00</td>
<td>1.06 1.06</td>
<td>-0.20</td>
<td>0.13 0.30</td>
<td>5.09 ***</td>
<td>724</td>
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</table>

* p < .05, ** p < .01, *** p < .001
Table 3.

*Multi-level models predicting students’ financial knowledge* (*N*=11,728)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
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<tr>
<td></td>
<td>Est.</td>
<td>Est.</td>
<td>Est.</td>
<td>Est.</td>
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<tr>
<td><strong>Fixed Effects</strong></td>
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<td>Race [White]</td>
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<td>-0.33 ***</td>
<td>-0.31 ***</td>
<td>-0.31 ***</td>
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<td>-0.19 ***</td>
<td>-0.17 ***</td>
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<td>-0.09 **</td>
<td>-0.09 **</td>
<td>-0.09 **</td>
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<td>-0.21 **</td>
<td>-0.20 **</td>
<td>-0.20 **</td>
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<td>-0.55 ***</td>
<td>-0.52 ***</td>
<td>-0.52 ***</td>
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<td>0.14 ***</td>
<td>0.15 ***</td>
<td>0.16 ***</td>
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<td>-0.12 ***</td>
<td>-0.12 **</td>
<td>-0.12 **</td>
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<td>0.13 ***</td>
<td>0.13 ***</td>
<td>0.13 ***</td>
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<tr>
<td>Doctoral or professional</td>
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<td>0.22 ***</td>
<td>0.23 ***</td>
<td>0.23 ***</td>
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<tr>
<td>Age [20-23]</td>
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<tr>
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<td>-0.19 ***</td>
<td>-0.18 ***</td>
</tr>
<tr>
<td>24-29</td>
<td>0.37 ***</td>
<td>0.35 ***</td>
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<td>0.32 ***</td>
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<tr>
<td>30-39</td>
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<td>0.60 ***</td>
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<td>40-55</td>
<td>0.78 ***</td>
<td>0.74 ***</td>
<td>0.72 ***</td>
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<td>Over 55</td>
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<td>0.82 ***</td>
<td>0.80 ***</td>
<td>0.77 ***</td>
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<tr>
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<tr>
<td>Associate's</td>
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</tr>
<tr>
<td>Master's</td>
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<td>0.02</td>
<td>0.02</td>
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</tr>
<tr>
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<td>-0.01</td>
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<td>0.00</td>
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<tr>
<td>Senior [First-year]</td>
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<td>0.09 **</td>
<td>0.10 **</td>
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<td>Athlete</td>
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<td>-0.15 ***</td>
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<td>Part-time enrollment</td>
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<td>0.05</td>
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<tr>
<td>Greek-life member</td>
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<td>-0.09 ***</td>
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<td>Transfer student</td>
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<td>0.02</td>
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<tr>
<td>Time spent working (10 hrs)</td>
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<td>0.02 **</td>
<td>0.02 **</td>
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<tr>
<td>On-campus resident</td>
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<td>0.05</td>
<td>*</td>
<td>0.06</td>
</tr>
<tr>
<td>Major field [Social Sciences]</td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
<td>Model 4</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
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<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Arts &amp; Humanities</td>
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<td>0.00</td>
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<tr>
<td>Biological Science</td>
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<td>0.05</td>
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<td>0.17 ***</td>
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<tr>
<td>Business</td>
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<td>0.17 ***</td>
<td>0.16 ***</td>
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</tr>
<tr>
<td>Communications</td>
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<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Education</td>
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<td>-0.08</td>
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<td>Engineering</td>
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<td>0.16 ***</td>
<td>0.15 ***</td>
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<td>-0.06</td>
<td>-0.06</td>
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<td>Social Service Prof.</td>
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<td>-0.08</td>
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<td>All Other</td>
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<td>0.03</td>
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<tr>
<td>Undecided</td>
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<td>-0.12</td>
<td>-0.11</td>
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</tr>
</tbody>
</table>

Quantitative Reasoning (z-scored)  
Model 1: 0.02 **; Model 2: 0.03 **

Financial education types

- For-credit course: -0.02
- Financial education taught as a topic in a course: 0.04
- Online tutorial: 0.02
- Counseling by faculty or staff: -0.07 *
- Peer counseling: -0.12 **
- Student loan counseling: 0.14 ***
- Financial education by student organization: -0.12 **

Barron's rating [Competitive]

- Non or less competitive: -0.07
- Very competitive: 0.04
- Highly or most competitive: 0.16 *

UG enrollment (1,000s): 0.00
Private: -0.01
% White: 0.04
% female: 0.22
Net price ($1,000s): 0.00
Inst. mean financial knowledge: 0.39 ***
Constant: -0.28 ***; Model 2: -0.39 ***; Model 3: -0.41 ***; Model 4: -0.56 ***

Random Effects

\( \sqrt{\psi} \): 0.16; -1.99; -2.00; -3.24
\( \sqrt{\theta} \): 0.89; -0.12; -0.12; -0.12
<table>
<thead>
<tr>
<th></th>
<th>Model 1 Est.</th>
<th>Model 2 Est.</th>
<th>Model 3 Est.</th>
<th>Model 4 Est.</th>
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<tbody>
<tr>
<td>R² level 1</td>
<td>0.17</td>
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<tr>
<td>R² level 2</td>
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<td>0.74</td>
<td>0.92</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

Note: Reference group in []. Snijders and Bosker’s (1994; 1999) R² coefficients.
Figure 1.

Test characteristic curve for students’ financial knowledge
Figure 2.

*Test information function and associated standard error*