Experimental Evidence on the Effects of Financial Education on Elementary School Students' Knowledge, Behavior, and Attitudes

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ABSTRACT

As the financial landscape for consumers becomes increasingly complex, the importance of facilitating financial capability increases. Although most financial decisions are made by adults, there is a burgeoning interest in providing financial education to children in the hope that they will develop the skills needed to successfully manage their finances in adulthood. This study uses an experimental design to evaluate a set of standardized financial education lessons delivered to fourth and fifth graders in two different school districts. We find that even a relatively brief program results in knowledge gains that persist one year later. While measuring financial behaviors in this age group is challenging, students exposed to financial education have more positive attitudes about personal finance and appear more likely to save. These results show that younger students can learn financial topics and that learning is associated with improved attitudes and behaviors which, if sustained, may result in increased financial capability later in life.

INTRODUCTION

The recent economic crisis has demonstrated the critical importance of consumers making informed and effective financial decisions. Having sufficient financial knowledge and skills is becoming even more crucial as financial products are becoming increasingly complex, and more responsibility for financial security falls on individual consumers. It is perhaps not surprising then, that policymakers have intensified calls to increase the financial capability of Americans. School systems are often cited as a natural context in which to deliver financial education, including education aimed at young children who have limited opportunities to engage in financial decisions. The evidence of the impact of financial education on student knowledge and behavior is relatively limited, however, especially among younger children. This study seeks to understand if financial education aimed at elementary-age students in fact translates into impacts on student financial knowledge, and then if that knowledge contributes to changes in financial behavior and financial attitudes.

To date, at least 35 states have adopted personal finance standards for their schools, with most efforts aimed at providing financial education for high school students. As of 2013, a high school course in personal finance was required for graduation in 17 states, and six states mandated testing of students' knowledge of personal finance concepts (Council for Economic Education 2014). Interestingly, the number of states offering high school courses in personal finance has almost tripled in the last decade despite mixed research evidence on the value of such classes. Meanwhile there is growing interest in financial education mandates at even younger grade levels, an area with even less research evidence.

This paper addresses this gap by evaluating a field experiment in which financial education was randomly assigned to fourth and fifth grade classrooms in two separate school districts. The education consisted of five in-class financial education lessons integrated into other curricula. The education intervention was standardized and limited in scope, making it highly replicable. The results suggest that a well-targeted education program can significantly increase measured financial knowledge, and that these knowledge gains are sustained up to a year later. Exposure to financial education also results in improvements in behaviors and attitudes that are associated with enhanced financial capability more broadly, including on students' attitudes towards saving and banking, as well as spending and saving behaviors.

PRIOR LITERATURE

While several authors have documented low levels of financial knowledge among teenagers (Lusardi, Mitchell, and Curto, 2010; Mandell, 2009; McCormick, 2009), this alone does not confirm the value of including personal finance and economics classes in schools. Ideally, two forms of evidence are required to support educational mandates – evidence that the mandated courses improve student knowledge, and evidence that this knowledge positively impacts future financial capability. Currently, neither conclusion is widely supported in the literature. While some studies document knowledge gains following specific financial education programs (e.g., Bruhn et al. 2011; Danes, Huddleston-Casas, and Boyce 1999; Walstad, Rebeck, and MacDonald 2010), other studies do not find significant impacts on financial knowledge (e.g., Mandell and Klein 2009; Peng et al. 2007). Likewise, research that examines the effect of state curricular standards finds conflicting evidence regarding the effectiveness of mandated high school

personal finance and economics courses on financial behavior in adulthood (e.g., Bernheim, Garrett, and Maki 2001; M. Brown et al. 2013; A. Brown, et al 2014; Cole, Paulson, and Shastry 2012; Tennyson and Nguyen 2001).

One challenge is that programs across states and schools are highly heterogeneous, as are the schools and classrooms in which financial education is taught. Walstad (2013) explains the mixed results of the literature on the impacts of high school economics classes by emphasizing that "high school courses appear to contribute significantly to economic understanding, but the amount of the contribution varies by the type of course and type of students taught" (p. 661). In a similar vein, Lusardi and Mitchell (2013) suggest that measuring the average effect of financial education is misguided given the heterogeneity of student needs and contexts. These author's human capital model of the demand for financial literacy acknowledges that some students will not benefit from financial education, but argues that the value to those who do benefit is sufficient to justify offering financial education broadly in schools.

Unfortunately, even studies that document positive impacts of economic or financial education may offer limited insights. Correlations between financial knowledge levels and financial behaviors do not necessarily imply a causal relationship (see Hastings, Madrian, and Skimmyhorn 2012 for a discussion). Moreover, recent work by Fernandes, Lynch, and Netemeyer (2013) suggests that the practical significance of the effects of financial education interventions tend to be alarmingly small even when they are statistically significant. Thus, it is difficult to conclude from the literature that broad financial education mandates are an optimal policy.

A related critique of current financial education mandates is that targeting high school students comes too late; habits are formed and social and familial influences have already taken hold. The suggestion is to begin personal finance instruction earlier in school, including financial education aimed at elementary school students. The concept of financial education at younger ages may not be unfounded. Children do often control some money (Doss, Marlowe, and Godwin 1995) and are encouraged by peers and the media to "participate actively as consumers" (Suiter and Maszaros 2005). Existing research in developmental psychology shows that even fairly young children can understand simple financial concepts (see Scheinholtz, Holden, and Kalish 2012 for a review). In addition, teaching younger children has the added benefits of beginning with a "blank slate" rather than trying to correct negative habits or misconceptions already acquired or observed at home. Launching financial education earlier could also support cumulative learning throughout subsequent grade levels and economic experiences. There are few rigorous evaluations of the efficacy of economic or financial education programs targeted to elementary school aged students, however. Exceptions include Harter and Harter (2009), Sherraden et al. (2011), and Go et al. (2012), who document increases in financial knowledge among upper-elementary students following classroom financial education. Go et al. (2012) find evidence of positive changes in student attitudes and behaviors, as well. Despite a promising narrative, the research support for targeting financial education to young students remains weak.

STUDY DESIGN

This study examines the effects of a classroom financial education program adapted from the Council for Economic Education's Financial Fitness for Life (FFFL) curriculum for grades 3

through 5. In the spring of the 2011-2012 and 2012-2013 school years, teachers in the Eau Claire, Wisconsin, Area School District taught the curriculum in their fourth and fifth grade classrooms. The program, which was delivered in five weekly lessons of approximately 45-minutes each, focused on savings, financial decision-making, and money management. In the first lesson, students consider trade-offs between present and future consumption using a version of the fable "The Grasshopper and the Ant" (FFFL Lesson 4). The next three lessons, adapted from FFFL Lesson 5, help students develop savings goals and savings plans and walk students through a savings account register. In the final lesson (FFFL Lesson 14), students are introduced to money management concepts including costs, benefits, and budgeting (see APPENDIX A for a detailed list of learning objectives). These lessons are not intended to be taught as special classes, but can be integrated into math (for example, lessons 2, 3 and 4), social studies (lesson 5), or language arts (lesson 1). This approach does not require additional class sessions or an extended school day.

Teachers attended a three-hour training session during a professional development in-service day and were compensated $100 for time spent preparing for lessons. About 12% of teachers were not willing or able to provide the instruction themselves (six out of 71 teachers). In these cases, educators from a local credit union delivered the lessons on the teachers' behalf. Regardless of who taught the course, the materials, curriculum, and timing of the lessons was standardized (see APPENDIX B for timelines and teacher instructions).

To ensure the fidelity of treatment, teachers and volunteers were asked to complete a questionnaire after teaching each lesson. The results of this survey showed that the average

lesson lasted 45 minutes, with a range of 35 to 65 minutes. Overall, 85% of respondents reported feeling "very" or "mostly prepared" to teach the lesson, and 93% reported that the course content was "very" or "mostly appropriate" for their students. A majority (58%) reported that the students in the class were "very interested" in the lesson, and 94% reported that this course was material the class had not experienced before. Notably, 74% of teachers indicated that they "would definitely teach the materials again." These summary results provide evidence that the course was well received, and that the program operated as intended for the study period.

The focus on fourth and fifth grade students in this study is intentional. From a developmental perspective, these students are 9 to 10 years old and past what is commonly referred to as the "5-to-7 shift," the period between ages 5 and 7 in which children experience marked growth in self-control, planning, and formal decision-making abilities (Morrison, Smith and Dow-Ehrensberger, 1995). This age group also has sufficient cognitive skills to be able to respond accurately to survey questions (Borgers, De Leeuw, and Hox, 2000).

There were approximately 1,500 fourth and fifth graders total in the Eau Claire Area School District in the 2011-2012 school year. Half of the district's 71 classrooms were randomly assigned to participate in the program during the study period (this is, in experimental language, the educational "treatment" group). The remaining classrooms did not deliver the education until *after* the study's follow-up assessment had been completed (this then becomes the non-education "control" group). Thus, all students received the financial education before the end of the year, the difference being in the timing of the lessons relative to the follow-up assessment. The same design was used during the spring 2013 semester for the 760 fourth graders in the district. The

fifth graders did not receive the education in 2013 as they had participated in the prior year, but they did complete the follow-up assessment a second time (roughly one year after receiving the education).

Some schools in this school district had in-school bank branches, where students could make weekly deposits or withdrawals in savings accounts. About half (6 out of 13) of the schools in Eau Claire had pre-existing bank branches that took deposits from students about once per week. The education did not directly recommend or guide students to use these accounts, although it seems possible that access to these accounts may have facilitated additional learning. Schools with bank branches were not randomly assigned, however, and schools with branches tended to be more affluent than those without branches. We are therefore careful to account for access to in-school banking as a potential confounding factor.

To enroll in the study, each student was required to sign an assent form, and their parent or guardian was required to sign and return a mailed consent form giving permission to use their child's assessment survey data. Parents were also asked to complete a survey consisting of questions about their family and their child, including the family's income, the parents' level of education, and perceptions of the student's academic performance. A total of 746 parents signed the consent form, and 564 parents completed both the survey and consent form. A number of strategies were used to inform parents about the project, including brochures, fliers, letters sent home with students, school newsletter articles, emails sent directly to parents, and local media coverage. Despite this level of communication, only half of the parents completed the required consent forms. The final sample for the study consists of the 740 assenting students with parental

consent at baseline and 705 at follow-up. A total of 700 of these students completed both the baseline and follow-up assessments, of whom 380 are in the education treatment group and 320 are in the non-education control group. A subset of 277 of the fourth graders in 2012 also completed a second follow-up assessment survey as fifth graders in spring 2013, providing a one-year follow up sample.

The assessment includes a 13-point financial literacy quiz (see APPENDIX C). The financial quiz questions are drawn from the FFFL curriculum materials. There are a range of other measures of general financial and economic knowledge in use among students (see Huston 2010), but the intent of this set of questions was to directly measure the content of the course learning objectives. The assessment survey also included questions to measure student attitudes, beliefs, and experiences with financial issues. The follow-up and baseline questions are identical, making the difference between the changes in responses for the treatment and control groups the measure of interest.

This experimental design randomized by classroom allows us to test whether students' understanding of financial concepts increases measurably after participating in a modest financial education intervention. We also are able to track students over time to test the persistence of any measured knowledge gains. Because of the randomized design and a clearly defined control group of students, this study provides a causal estimate of the impact of financial education on short and medium term outcomes.

DATA

The data are organized such that the unit of observation is a student. Student assessment surveys each had identification codes to facilitate matching across periods and matching to parent surveys. In addition, characteristics of each elementary school were collected, including the percentage of students eligible for free or reduced-price school lunches or public assistance, the percentage of students from minority racial backgrounds, and the percentage of students with limited English language skills.

In addition to the 13 question financial quiz, for which the measure of interest is the number of correct answers, responses to 17 questions about financial behavior and attitudes were collected. Of these, four focused on savings attitudes and three on attitudes about financial institutions. An evaluation with many dependent variables increases the potential for false positive findings because one or more of the planned comparisons is likely to be statistically significant at a 5% significance level simply by chance. To mitigate this potential multiple comparisons bias, we create two aggregated composite scale measures—one for savings attitudes and the other for attitudes about financial institutions (see Table 1 for details). The composite scale of savings attitudes is made up of one dichotomous variable ("are you saving for the future") and three variables measured on five-point scales: "it is easy to save," "it is good to save," and "saving money is only for adults." All variables are coded such that a higher score corresponds to a more positive financial attitude. The scale reliability coefficient is (0.58) as estimated by Cronbach's alpha, an estimate of internal consistency, or the interrelatedness of the items that make up the scale. Desirable ranges of alpha tend to lie between 0.70 and 0.95, but can vary widely based on the application (see Tavakol and Dennick 2011 for an accessible discussion). This scale is relatively low but still marginally acceptable. The scale of financial institution or "banking"

attitudes is made up of three variables, each also measured on a five-point scale with a higher score corresponding to a more positive response: "banks are only for adults," "banks are useful," and "banks keep money safe." The scale reliability coefficient is 0.62, which is also low but marginally acceptable. While these are less than robust scales from an internal reliability perspective, alternative models using each item in the scales individually yield similar results to those shown in the analysis below. Other variables used in this analysis are taken directly from the survey with no further transformations. We focus primarily on student knowledge gains, as well as the effects of the financial education on student banking status, savings levels, the impulse to spend, and savings and banking attitudes. These indicators are each consistent with components of financial capability more broadly and therefore appropriate given the broader goals of this study.

METHOD

We measure the impact of financial education on knowledge, attitudes, and behaviors using ordinary least squares regressions that control for the baseline level of the dependent variable (LaLonde, 1986). The assignment of financial education to classrooms was randomized—lists of classrooms/teachers were assigned a random number and those with odd numbers provided the education during the study period (students had no options to change classrooms/teachers after assignment). Unlike a non-randomized approach, this method allows for causal estimates of the effects of the financial education program when comparing to students in classrooms in which financial education was not offered during the study period. By controlling for baseline levels, the regressions estimate changes in the dependent variables from baseline to follow-up. The regression uses the following reduced form specification:

$$Y_{it2} = \alpha + \beta_1 \text{Treatment}_i + \beta_2 Y_{it1} + \beta_3 \mathbf{X}_i + \beta_4 \mathbf{S}_i + \beta_5 \mathbf{P}_i + \varepsilon \qquad \text{[Eq. 1]}$$

where the dependent variable, Y_{it2}, is the outcome for student *i*, at follow up time *t2*, and the

Treatment variable is a dichotomous indicator that equals 1 for students in classrooms offering

the curriculum during the study period (and zero otherwise). Thus, the causal effect of the

education is estimated by the coefficient β_1. The counterfactual comparison is to a student

assigned to a classroom in which no financial education is offered in the study period. All

models control for the baseline value of the dependent variable, Y_{it1}. Vectors of controls are

included at the student ($\mathbf{X}_i$), the school ($\mathbf{S}_i$), and the parent ($\mathbf{P}_i$) levels. In each model, errors (ε)

are clustered at the classroom level (the level at which the education treatment is assigned and

taught).

The first set of dependent variables includes the number of financial knowledge questions the

student answered correctly, an indicator of whether the student reports being banked, and if the

student reports being banked, the student's self-reported level of savings ($1-5, $26-50, $51-100,

$101-200, $201-500, $500+). The next dependent variable is a question about spending habits

("How often do you find it hard to avoid spending money immediately, like within 1 or 2 days?")

measured on a five-point scale (with a score of 1 corresponding to "never" and 5 to "always");

thus, this is the only variable for which we predict a negative coefficient. The final dependent

variables are the savings and banking attitude scales described above. While some of these

variables can also be estimated using probit or ordered probit models, we use linear models

largely for ease of interpretation. (Estimates from probit-based models are similar in direction

and available from the authors upon request.)

Since we control for the baseline value of the outcome variable, Y_{it1}, the coefficients on the other control variables in the model affect the rate of change rather than the level of the outcome. The first student-level control variable is a scale made up of a five-item index measuring how well the student performs in school, as reported by the student (the scale reliability coefficient alpha statistic was 0.71, which suggests a relatively consistent scale). Items were measured on five-point scales for questions about self-assessed motivation ("I want to do well in school," "I pay attention in class," "I take school seriously," "I expect to attend college," and "I want to go to college"). This scale is measured at baseline proxies for school performance. Other variables in $\mathbf{X}_i$ include the gender of the student and two questions designed to measure how much the student believes financial issues are only the responsibility of their parents ("how often to you feel you don't need to save because your parents will buy the things you like" and "how often do you feel you don't need to save because the money your parents give you is for spending").

School level variables ($\mathbf{S}_i$) include a dichotomous variable for the school having a bank branch present on campus, the percentage of students in the school designated as economically disadvantaged (free or reduced price school lunch eligible), the percentage of students who are designated members of minority racial groups, and the percent of students in families with limited English language skills.

Finally, parent level controls ($\mathbf{P}_i$) are available for the subset of assenting students with parents who consented and completed their own surveys. $\mathbf{P}_i$ includes an indicator of whether either

parent has a bachelors degree or higher, the respondent parent's self-reported credit rating, the household's estimated savings level, and an indicator of whether the parent holds a checking account.

The 277 fourth graders from 2012 who completed the survey for a third time as fifth graders in 2013 (as shown in Panel C of Table 1) provide additional data with which to evaluate the effects of the education program. First, 121 of these students were in the control group in 2012, meaning the third follow-up survey is the first opportunity to measure the effects of the program. Second, it is possible that the effects of the education could atrophy between the delivery of the education in spring 2012 and the third survey in spring 2013. To investigate these issues, we incorporate data from all three periods and estimate a panel model. In this approach each student is an observation in the data, but is then repeated each time data are observed. Specifically, the student assessment is recorded at baseline and in each of the two follow-up periods. Of course each student-observation is not independent, so we have to account for the panel structure in our model. We use a panel regression with the following reduced form:

$$Y_{it} = \alpha + \beta_1 \text{Post-education}_{it} + \beta_2 t + \gamma_i + \varepsilon_{it} \hspace{3cm} \text{[Eq. 2]}$$

Here the outcome, Y_{it}, is measured for each student i in each period, t. In period $t=1$, no student was exposed to financial education, in period $t=2$, about half of all students had been exposed to the financial education, and in period $t=3$, all students had received the financial education. As above, the estimate for β_1 captures the post-education effect for students exposed to education. Because students would be expected to learn and develop additional skills over time, we estimate

14

a linear time trend (β_2) as an additional control. The student fixed effect (γ_i) controls for both

unobserved and observed student characteristics across all three periods. As in Equation 1, all

standard errors are clustered at the classroom level (the level of treatment assignment). Because

this model includes a student fixed effect it leaves out the explicit student, parent, and school-

level control variables (which would be absorbed by the fixed effect). The panel approach offers

an alternative specification to verify the estimates in Equation 1.

The estimates can be described as the pooled average change in outcomes from pre-education to

post-education, controlling for student fixed effects and a time trend. Since this approach used

the data more fully, we have more statistical power and we expect to be able to estimate

treatment effects with greater precision. In addition, if β_1 estimated from Equation 2 is smaller

than that from Equation 1, this would suggest that the effects of the education are degrading over

time, dragging down the average effect.

FINDINGS

Financial Knowledge

Figure 1 displays the average number of questions (out of 13 total) answered correctly by

students in the education and control (non-education) groups. As shown in Table 1 Panels A and

B, the average baseline financial knowledge score increased from 6.27 to 8.25 for students who

received the financial education, while the average score increased from 6.49 to 6.91 for the

control group. Exposure to financial education appears to produce a large improvement in

financial knowledge—an increase of about two additional questions answered correctly. This is

close to a full standard deviation (a 0.77 effect size). Given the modest intensity of the

educational intervention, this is perhaps larger than expected; it is at least larger than found in

prior studies of financial education (e.g. Fernandes, Lynch, and Netemeyer 2013). Table 2 shows the regression-adjusted estimates, with each column progressively adding more control variables. Estimates range from 1.4 to 1.5 additional questions answered correctly. The average treatment effects of education on financial knowledge are positive and statistically significant at the 1% level. The coefficient estimates increase slightly when controls for student, school, and parent characteristics are included. Statistical significance also remains strong despite reduced sample sizes when including the parent controls (which were reported by a subset of parents). Table 1 Panel C shows the convergence of quiz scores by the second follow-up, also shown graphically in Figure 1 for the follow up period. The education treatment group also appears to retain knowledge gains measured a full year later, which supports the persistence of effects. The magnitude of the knowledge gains are also reasonably large, a gain of about 1.5 questions is about a 20% marginal effect. Students in the control group also show similar gains after receiving the education. All of these patterns are consistent with increasing student knowledge after exposure to the five, 45-minute instructional modules.

<center>Behaviors and Attitudes</center>

The goals of financial education extend beyond knowledge gains, however, to encompass broader aspects of financial capability (Johnson and Sherraden 2007). Table 3 shows the results for the dependent variables that measure financial behaviors and attitudes. All regressions include student, school, and parent level controls as indicated. With the exception of attitudes toward financial services ("banks"), none of the estimates are statistically significant in this table. Although there is an (insignificant) increase in students reporting having a bank account following the education, savings level – which is only reported conditional on having a bank

<center>16</center>

account – has a small negative coefficient. This result is counter to what was predicted, perhaps because the variable was self-reported and the sample size limited. About one-third of students did not answer the question about the account balance (or answered "don't know"), limiting the sample size and likely introducing some measurement error. The coefficient on students' impulse to spend is small and negative, and the estimate for attitudes about saving is small and positive, both consistent with a slight improvement in behavior but again not statistically significant. It should be noted that running the regressions with no controls does not substantively change the magnitude or significance of the coefficients, despite the increase in power associated with a larger sample size.

Panel Model

Table 4 shows estimates from the three-period panel model. Here the coefficient of interest is the indicator of the student assessment being measured in a post-education period. With a larger sample of students receiving education, the statistical power of these models results in all of the estimates being significant. These specifications also include student fixed effects and a time trend so that these estimated changes are for each student relative to their status in the prior period.

By the second follow-up, all students received the education program; the linear time trend serves as the counterfactual to compare students to the average in the pre-education periods. This seems to be a reasonable assumption, since there were no other factors that would have differentially shifted financial knowledge and behavior during the study period.

The magnitude of effects for the knowledge quiz score and banking attitudes are largely the same as in Table 3, which suggests that effects are consistent over time controlling for student-invariant characteristics and time trends—that is we do not see an atrophy of effects. This is encouraging and consistent with the graphical analysis and prior estimates. Effects on student banking status, savings levels, the impulse to spend, and savings attitudes all now have the predicted signs and are statistically significant, although all are fairly small in size relative to the effects on the financial quiz questions—around one-tenth of standard deviation. While small, the effects of education on attitudes and behavior persist into the second follow-up period, consistent with Table 1 Panel C and Figure 1, which show little difference in outcomes between periods two and three for students who were in the original treatment group (education delivered between periods one and two). These estimates support the idea that education has a positive impact not just on financial knowledge but also on spending attitudes and behaviors such as having a bank account and savings levels.

The estimates of increasing student saving behavior are perhaps most encouraging as a tangible impact on a valued behavior. However, the conditional nature of these estimates among students reporting a bank account and potentially "guessing" their account balance may raise concerns. For a small sub-sample of students, we were able to match account balances at the in-school credit union branch at the start of the study period. Table 7 shows the median savings balance of students with bank accounts at school (based on administrative data on a sub-group of about 53 students) by students' self-reported savings levels. Self-reports appear to be a decent rough approximation for students who answered the question about savings levels.

Of course, children are rarely responsible for making higher-stakes financial decisions, so we are ultimately interested in how financial education delivered to students will affect their behavior as they gain more financial responsibility. To date, no studies have attempted to follow the effects of financial education over the years, or even decades, it would take for them to fully manifest as adult behaviors. Still, there are reasons to believe that outcomes measured in youth could have lasting effects on behavior. For example, the theory of planned behavior (Ajzen 1991) argues that subjective intentions and attitudes, such as those measured in this study, lead to future actions. The theory has received empirical support among elementary students, particularly in the area of diet and exercise (for example, Lautenschlager and Smith, 2007; Foley et. al., 2008; Bélanger-Gravel and Godin, 2010). We also know that children develop financial attitudes early, largely by observing their parents (Rizzolatti and Craighero, 2004; Whitebread and Bingham, 2013; Beutler and Dickson, 2008; Kuhlmann, 1983). In addition, young adults cite their parents as a strong influence on their financial attitudes and behaviors (Jorgensen and Savla, 2010; Shim and Serido, 2011). Combining these findings suggests there is continuity in financial attitudes and behaviors over time. While the long-term effects of youth financial education certainly merits further study, the evidence shown in this study is promising.

Replication: Amarillo

One potential problem with a field study based in one school system is that the estimated effects may depend on unmeasured characteristics of the particular district, limiting the generalizability of the study. In an attempt to alleviate this concern, we replicated the study in another school district.

In 2013, fourth graders in the Amarillo Independent School District were taught the same basic FFFL curriculum used in the Eau Claire field study, with the lessons spread out over six in-class sessions rather than five, but still about the same amount of instructional time. Other aspects of the curricular content, assessment survey, and procedures were the same as in Wisconsin, with the exception of the parent survey, which was not administered in Amarillo. A total of 36 elementary schools took part during the spring semester. Half of the district's schools were randomly assigned to participate in the program during the study period, and the remaining schools participated after the follow-up student assessment survey. As in Eau Claire, all teachers were trained during an in-service on how to use the lessons and materials provided. Because some math teachers in Amarillo teach more than one section of students, the financial education was randomized by teacher rather than by classroom as in Eau Claire. These minor differences in protocol necessitate changes to the specification in Equation 1. In particular, parent and school level controls are no longer included, and standard errors are clustered at the school level (the level of treatment assignment). In addition, we only have two periods of assessments for students, preventing a three-period panel model described in Table 4.

It should be noted that the education and approaches to training teachers and recruiting students for the study were also largely the same as those in Eau Claire. One difference was that parental consent forms were sent home with students and could be returned to school or mailed back, with a follow up mailing to non-responders. Also, instead of written student assent, verbal student assent was used. These methods did not result in qualitatively different response rates than in Eau Claire.

Figure 2 shows the mean quiz scores for baseline and follow-up, with the education group answering nearly two more questions correctly following the intervention. The results of the Amarillo study, summarized in Tables 5 and 6, are consistent with the findings from the Eau Claire study in Tables 1 through 3. The pre- and post-program assessments of knowledge gains are well supported, as are attitudes about banks. Again, we find positive effects on students' attitudes about savings and their banking status, but these effects are not statistically significant. The size of the effects of education on the financial knowledge quiz continues to be relatively large, about three-quarters of a standard deviation. As in Eau Claire, the sample size limits the power to estimate effects on non-knowledge based outcomes, but the results related to student banking status, savings levels, and the impulse to spend are suggestive that with a larger sized study, we may have been able to detect statistically significant effects.

Overall the results of the Texas based study are supportive of the results found in Wisconsin. These are differing contexts for the delivery of the curriculum in terms of overall student and teacher populations, local economic conditions, and school administrations, yet the knowledge gains from the financial education were consistent.

CONCLUSION

This study contributes to the limited body of rigorous evidence on the impact of elementary school-based financial education programs. We find that a well-supported intervention consisting of five classroom financial instruction lessons increases fourth and fifth graders' financial knowledge relative to a control group. The effect sizes are relatively large, at three-quarters of a

standard deviation. This is larger than found in prior studies of financial education and larger in magnitude than effects in education more generally (see Fernandes, Lynch, and Netemeyer 2013 for a discussion of effect sizes). Importantly, these gains are found to persist a year after receiving the financial education and therefore do not simply reflect students being "taught to the test." Moreover, financial education is linked to improved student attitudes and, at least in the panel model, positive financial behaviors. The findings provide encouraging evidence of the potential for financial education offered to elementary students. This study also offers one of the first attempts to track student financial knowledge and behavior across grade levels, showing persistence beyond the immediate post-education time period.

The fact that these estimates are based on five lessons integrated into existing classroom instruction supports the notion that financial education need not be a stand-alone class to be effective. We emphasize, however, that the implementation of this program required an investment of time on the part of teachers and schools; we believe that the training and support offered to teachers was critical to the fidelity of implementation and the success of the program and is therefore necessary for replication.

These lessons were all taught in relatively traditional modes—lectures and activities. Further impacts on learning and behavior may result from more novel approaches. For example, a theme emerging from the financial education literature is the importance of experiential learning, including more applied experiences, simulations, case studies, and other 'hands-on' type pedagogy (see Hinojosa et al. 2007).

Methodologically, this study also highlights the challenges of obtaining parental consent for student participation in research as required under human subjects oversight. Because of the minimum sample size needed for statistical power and to control for school and teacher effects, high consent rates are critical. Innovative methods to obtain consent, such as streamlining the process into school administration procedures or obtaining consent online, warrant further investigation.

The idea that schools ought to teach financial management to children remains a topic worthy of debate. On the one hand, integrating topics into curricula is one of the primary avenues for reaching the largest segments of future consumers. However, financial management is one topic among many that might be mandated in state curricular standards. The notion that financial topics would substitute for math or language seems misguided; as Fernandes et al. (2014) suggest, students must not be exposed to financial management at the expense of other high-value coursework. Moreover, expansions of financial content in schools may preclude education on other socially relevant topics. These opportunity costs, while potentially large, can likely be substantially reduced by integrating financial content into other subjects. One tractable approach entails using financial management examples in core subjects (see Lusardi and Wallace, 2013 for a discussion of a math course for college students with integrated financial capability content). Such an approach has the potential to not only improve financial knowledge, but to increase learning in the core subjects by providing the context needed to demonstrate relevance to students. Establishing strong, lasting partnerships with community financial institutions can also ease the burden on schools, as community-based institutions may provide support for instruction and instructional tools in the classroom out of regulatory motivations or corporate responsibility.

Even if financial content is expanded, schools certainly cannot replace parental instruction and guidance on personal finance habits. However, since many parents themselves feel unqualified to manage their own finances, school curricula could become a venue for dual-generational learning as students discuss lessons with their parents.

The 2013 President's Advisory Council on Financial Capability for Young Americans has embraced the theme of "starting early" (Executive Order 13646), but the ultimate role of financial education in the classroom is yet to be decided. More research is clearly needed to fully understand both the near-term impact and longer-term outcomes of school-based financial education programs for elementary students (see Collins and Odders-White 2014 for additional discussion). Ideally, studies could follow students from elementary grades through young adulthood, documenting the influence of financial education along the life course. Such a longitudinal approach could provide evidence of the cumulative effects of programs, allowing schools to optimally select the economics and finance content to include in the K-12 curriculum.

This study contributes to the research base by demonstrating that field trials are feasible, and that causal effects of education on outcomes beyond knowledge can be rigorously estimated. Elementary schools may in fact be an appropriate context to target financial education; these results should fuel further dialogues about the most efficacious mechanisms to enhance financial capability starting early. We hope that by demonstrating the effects of a modest (less than 4 hours) integrated curriculum supported by financial institutions, this study begins to set the stage for the important work that is to come.

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APPENDIX A: Learning Objectives

- Define opportunity cost and interest.
- Analyze the trade-offs and opportunity cost in a decision about saving.
- Identify reasons to save.
- Explain how savings can be used to satisfy future wants.
- Use the concept of opportunity cost to compare the advantages and disadvantages of saving, and to make informed decisions about saving.
- Explain how interest serves as an incentive to save.
- Define savings, economic want, incentive, short-term goals, long-term goals, and interest.
- Explain the elements of a savings plan.
- Give examples of short-term and long-term goals.
- Give examples of incentives.
- Compare the advantages and disadvantages of various savings options.
- Define income, expenses, savings, costs, and benefits.
- Explain that because of limited income, people must make choices.
- Analyze the costs and benefits of alternatives.
- Explain how a budget can help people manage income and expenses.

APPENDIX B: Teacher Instructions and Timeline (2012)

Teachers attended a training session on the curriculum during a professional development in-service day to introduce the lessons. Participants broke into groups to practice completing student activities and addressing discussion questions about individual lessons. The breakout groups reported their perspectives back to the large group. During the training session, teachers were given a training binder that included the following materials:
- Handouts for the training presentations and breakout sessions
- A detailed teacher's guide to the lessons with step-by-step teaching instructions
- Copies of all visual aids
- Copies of lesson worksheets
- A program factsheet and timeline

The schedule differed depending on the classroom's assignment to Group A or Group B. Before any lessons are taught, the first student assessment questionnaire is administered to students. **Group A** lessons were delivered between the first and second questionnaires, and **Group B** lessons after the second questionnaire. Within 3 days of the delivery of each lesson, teachers were asked to completed a survey to provide feedback about the lessons. Teachers receive $25 for their completing all five surveys.

Group A

March 12	Student questionnaires delivered to partnership coordinators
Week of March 12	1st student questionnaire administered by teachers
Week of March 26	Lesson 1 delivered in classrooms
Week of April 2	Lesson 2 delivered in classrooms
Week of April 9	Lesson 3 delivered in classrooms
Week of April 16	Lesson 4 delivered in classrooms
Week of April 23	Lesson 5 delivered in classrooms
Week of April 30	2nd student questionnaire administered by teachers

Group B

March 12	Student questionnaires delivered to partnership coordinators
Week of March 12	1st student questionnaire administered by teachers
Week of March 26	(1st student questionnaire administered by teachers, if necessary)
Week of April 30	2nd student questionnaire administered by teachers
Week of May 7	Lessons delivered in classrooms (lessons may begin as soon as the

APPENDIX C: Financial Quiz Questions

The next questions are about money, and some of the words people use when talking about money. Please choose one answer for each question.

10. Juan put his money in a savings account. The payment that the bank makes to Juan for the use of his money while it is deposited in the bank is called…
    - o **…interest**
    - o …wages
    - o …credit
    - o …profit
    - o …don't know or not sure

11. Shawna got $20 for her birthday. She wants to either save her money for a radio, or spend it on a shirt. If she buys the shirt, saving for the radio is her…
    - o …expense
    - o …revenue
    - o …human capital
    - o **…opportunity cost**
    - o …don't know or not sure

12. Ming wanted to buy a fancy notebook for school and save her money to buy a computer. Ming decided to buy a plain notebook that is less expensive so she can save more money for the computer. Ming's decision is an example of…
    - o …paying interest
    - o …depositing money
    - o **…making a tradeoff**
    - o …choosing a service
    - o …don't know or not sure

13. Duane earned $25 raking leaves. He spent $20 of the $25 on a video game. The $5 that he did not spend is called his…
    - o …interest
    - o **…saving**
    - o …profit
    - o …wage
    - o …don't know or not sure

14. Marisa had $50 in her checking account. She made a withdrawal of $10 and a deposit of $20. What is Marisa's balance in her checking account?
    - o $10
    - o $20
    - o $50
    - o **$60**
    - o Don't know or not sure

15. Janis wants to save $75 for a CD player. She plans to save $5 a month. What else does Janis need in her savings plan?
    - o A checking account
    - o A certificate of deposit
    - o The number of stores selling CD players

- o **The number of months that she must save**
- o Don't know or not sure

16. Scott plans to save the same amount of money each week for 10 weeks to buy his mom a $30 necklace. How much money should Scott save each week?
- o $1
- o $2
- o **$3**
- o $4
- o Don't know or not sure

17. The best example of a long-term goal would be saving for a…
- o …video game
- o …birthday present
- o **…college education**
- o …pair of basketball shoes
- o …don't know or not sure

18. Sara Wilson earns an income of $3,000 per month as an elementary school teacher. She has expenses of $2,000 each month. The amount she has left over each month is called…
- o …profit
- o …credit
- o **…saving**
- o …budget
- o …don't know or not sure

19. The Walker family went on a summer vacation in the mountains. They must have decided that the benefits of the vacation were…
- o **…greater than the cost**
- o …less than the cost
- o …equal to the cost
- o …zero
- o …don't know or not sure

20. A plan for managing income, spending and saving is called…
- o **…a budget**
- o …an investment
- o …a credit account
- o …an account balance
- o …don't know or not sure

21. Which one of the following families is saving money each month?
- o The Smiths have $750 in income, and $800 in expenses
- o The Suiters have $1,500 in income, and $1,500 in expenses
- o **The Wilburns have $1,000 in income, and $900 in expenses**
- o The Jacksons have $1,200 in income and $1,300 in expenses
- o Don't know or not sure

22. Imagine you open a bank account and deposit $100. The account earns 10 percent interest per year. How much would you have in the account at the end of two years?
- o Exactly $102
- o Exactly $120
- o Less than $120

- ○ **More than $120**
- ○ Don't know or not sure

Appendix D: Comparison of Features by Study Site

Feature	Eau Claire	Amarillo
Year(s)	2012, 2013	2013
Grades	4th, 5th	4th
Student Survey		
Baseline	March	February
Follow-up	April	March
2nd Follow-up	April 2013	None
Parent Survey	January 2012	None
Teacher Training	February 2012	January 2013
Teacher In-service	3 hours	6 hours
Lesson Modules	5	6
Total Lesson Time	4.5 hours	5 hours
Lessons Delivered	March-April	February-March
# Schools	13	36
# Classrooms	71	78
Schools with Banks	6	18
Number of Students	700	703
Follow-up Students	277	None
Caucasian	81%	38%
Free/Reduced Lunch	44%	79%

Figure and Tables

Figure 2: Mean Follow Up Quiz Scores for Eau Claire Students
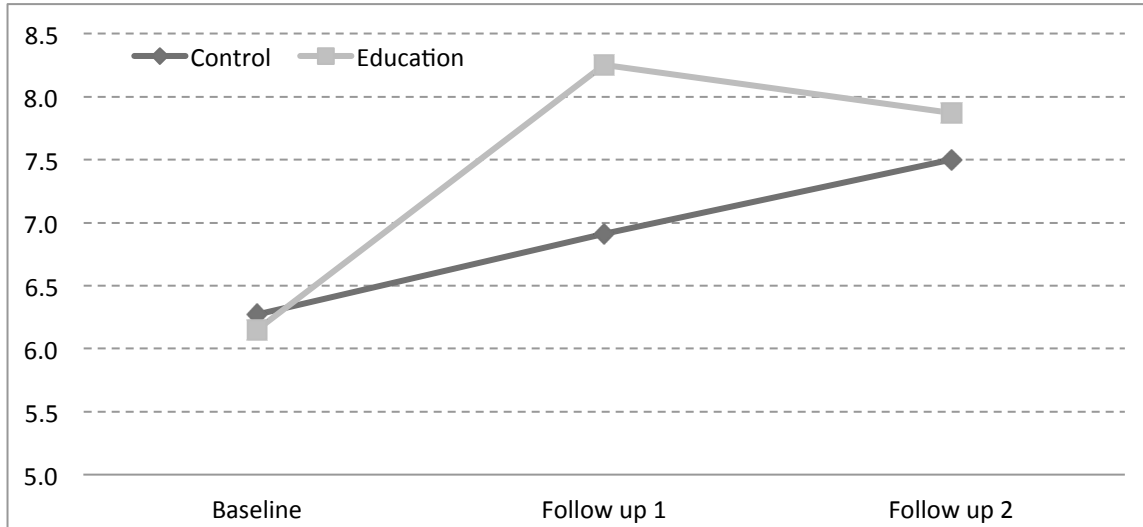
Data from in-class student assessment surveys completed in 2011-2013 school years in Eau Claire, WI. Quiz score is number of correct multiple-choice financial education questions out of 13 total (see Appendix C for questions). "Education" students received the 5-lesson financial education program between baseline and follow-up, while the "Control" students received the education between follow-up 1 and follow-up 2. Baseline and follow-up 1 assessments occurred approximately 8 weeks apart in the spring of 2012. Follow-up 2 occurred in the spring of 2013.

Figure 3: Mean Quiz Scores for Amarillo Students
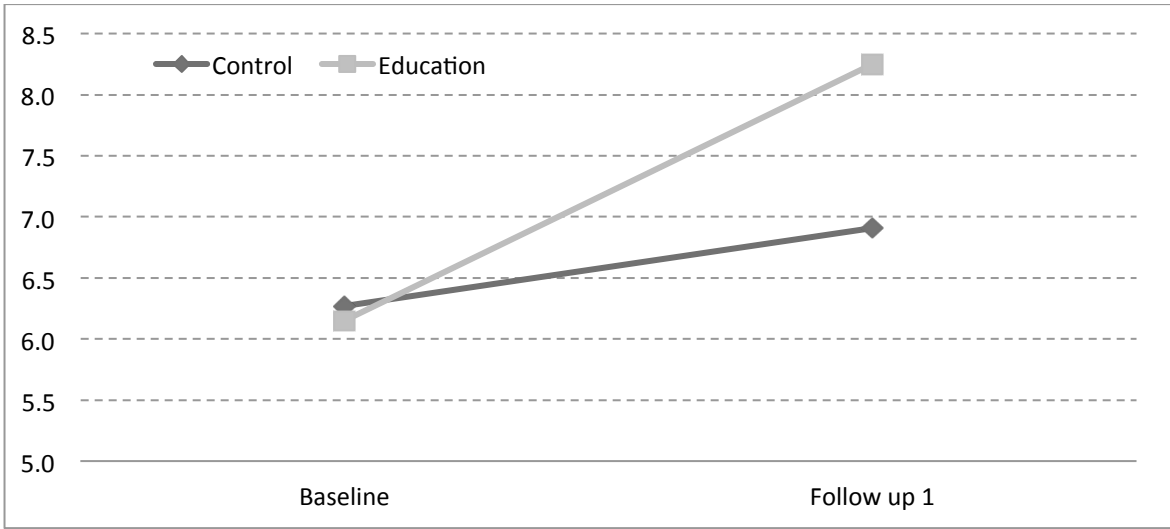
Data from in-class student assessment surveys completed in 2012-2013 school years Amarillo, TX. Quiz score is number of correct multiple-choice financial education questions out of 13 total (see Appendix C for questions). "Education" students received the 5-lesson financial education program between baseline and follow-up, while the "Control" students did not.

Table 1: Summary Statistics: Eau Claire Wisconsin Students

Panel A: Baseline	Control mean	sd	Education mean	sd
Quiz score	6.27	2.34	6.15	2.59
Student Banked	0.66	0.47	0.70	0.46
Student Savings Level (6pt)	4.52	1.48	4.74	1.37
Spend Immediately (5pt)	2.61	1.13	2.62	1.13
Savings Attitude	1.76	0.90	1.79	0.92
Banking Attitude	1.90	1.09	1.90	1.10
Observations	343		397	

Panel B: Follow-up #1	Control mean	sd	Education mean	sd
Quiz score	6.91	2.46	8.25*	2.52
Student Banked	0.70	0.46	0.76	0.43
Student Savings Level (6pt)	4.53	1.56	4.67	1.45
Spend Immediately (5pt)	2.45	1.12	2.40	1.06
Savings Attitude	1.97	0.52	2.03	0.45
Banking Attitude	2.15	0.77	2.32*	0.63
Observations	321		384	

Panel C: Follow-up #2	Control mean	sd	Education mean	sd
Quiz score	7.50	2.16	7.87	2.17
Student Banked	0.72	0.45	0.77	0.42
Student Savings Level (6pt)	4.57	1.62	4.57	1.51
Spend Immediately (5pt)	2.55	1.22	2.41	1.11
Savings Attitude	1.98	0.53	2.08	0.43
Banking Attitude	2.00	0.78	2.30	0.70
Observations	121		156	

Data from in-class student assessment surveys completed in 2011-2013 school years in Eau Claire, WI. Quiz score is number of correct multiple choice questions out of 13 total (see Appendix C for questions). Student banked is an indicator where 1=student self-reporting having a bank account. Savings Level is self-reported conditional on reporting a bank account ("If you have a savings account, about how much money do you think is currently in the account?1=$1 to $25, 2=$26 to $50, 3=$51 to $100, 4=$101 to $200, 5=$201 to $500, 6=More than $500; 7=Don't know, which is set to missing). Spend Immediately is a 5-point scale "How often do you find it hard to avoid spending money immediately, like within 1 or 2 days?" 1=Never 2=Almost never 3=Sometimes 4=Most of the time 5=Always). Savings Attitude is a composite scale of 4 survey items: (a) "Are you saving for the future" 1=yes, 2=no; (b) "How often do you find it easy to save money?"; (c) "Some kids feel that saving money is only for adults. How often to you feel that way?", and (d) "Is it good to save money?" Items a, b and c use the 1=Never 2=Almost never 3=Sometimes 4=Most of the time 5=Always scales. Item d uses 1=Not at all 2=A little bit 3=Somewhat 4=Very 5=Extremely). Scales are reverse scored as to make positive responses in the composite. The Banking Attitude is a scale of financial institution or "banking" attitudes with 3 survey items: (a) "Do you think banks and credit unions provide services that are useful to you?" (1=Not at all, 2=Slightly, 3=Somewhat, 4=Very much, 5=Absolutely) (b) "Some kids feel that bank accounts are only for adults. How often to you feel that way?" (1=Never 2=Almost never 3=Sometimes 4=Most of the time 5=Always), and (c) "Do you think banks and credit unions are a safe place for people to keep their money?" (1=Not at all, 2=Slightly, 3=Somewhat, 4=Very much, 5=Absolutely). * = statistically significant difference from control group at 5% level using 2-tailed test.

Table 2: OLS Regression Estimates of the Effect of Financial Education on Financial Knowledge for Eau Claire Students

	Quiz score (1)	Quiz score (2)	Quiz score (3)	Quiz score (4)
Financial Education	1.401***	1.408***	1.453***	1.467***
	(0.233)	(0.228)	(0.222)	(0.250)
Baseline quiz score	0.467***	0.436***	0.409***	0.365***
	(0.0396)	(0.0381)	(0.0429)	(0.0531)
Student Controls	No	Yes	Yes	Yes
School Controls	No	No	Yes	Yes
Parent Controls	No	No	No	Yes
Observations	700	700	647	479
R^2	0.27	0.28	0.31	0.33

Standard errors in parentheses (clustered at classroom level).
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data from in-class student assessment surveys completed in 2011-2012 school years in Eau Claire, WI. Quiz score is number of correct multiple-choice financial education questions out of 13 total (see Appendix C for questions). Financial education is a dummy for the student receiving financial education between the baseline and follow-up survey. Student controls include an index measuring how well the student performs in school, an index measuring how much the student believes financial issues are only the responsibility of their parents, and the gender of the student. School controls include whether it has a bank branch present on campus, the percentage of students in the school designated as economically disadvantaged, the percentage of students who are designated members of minority racial groups, and the percent of students in families with limited English language skills. Parent controls include an indicator of whether either parent has a bachelors degree or higher, the respondent parent's self-reported credit rating, the household's estimated savings level, and an indicator of whether the parent is banked.

Table 3: OLS Regression Estimates of the Effect of Financial Education on Banked Status and Financial Attitudes for Eau Claire Students

	Student Banked	Student Savings Level (6pt)	Spend Immediately (5pt)	Savings Attitude	Banking Attitude
Financial Education	0.041	-0.17	-0.068	0.030	0.13[**]
	(0.030)	(0.12)	(0.077)	(0.037)	(0.057)
Student Controls	Yes	Yes	Yes	Yes	Yes
School Controls	Yes	Yes	Yes	Yes	Yes
Parent Controls	Yes	Yes	Yes	Yes	Yes
Observations	460	243	457	460	458
R^2	0.56	0.69	0.35	0.29	0.38

Standard errors in parentheses (clustered at classroom level)
[*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

Data from in-class student assessment surveys completed in 2011-2012 school years in Eau Claire, WI. See Table 1 for dependent variable definitions. Financial education is a dummy for the student receiving financial education between the baseline and follow-up survey. Student controls include the baseline value of the outcome variable, an index measuring how well the student performs in school, an index measuring how much the student believes financial issues are only the responsibility of their parents, and the gender of the student. School controls include whether it has a bank branch present on campus, the percentage of students in the school designated as economically disadvantaged, the percentage of students who are designated members of minority racial groups, and the percent of students in families with limited English language skills. Parent controls include an indicator of whether either parent has a bachelors degree or higher, the respondent parent's self-reported credit rating, the household's estimated savings level, and an indicator of whether the parent is banked.

Table 4: Effect of Financial Education on Financial Attitudes and Behaviors Using a 3-period Panel: Eau Claire

	Quiz score	Student Banked	Student Savings Level (6pt)	Spend Immediately (5pt)	Savings Attitude	Banking Attitude
Post-Education	1.51***	0.057***	0.14***	-0.11**	0.081***	0.12***
	(0.13)	(0.019)	(0.047)	(0.054)	(0.029)	(0.038)
Constant	6.42***	0.69***	4.60***	2.61***	1.93***	2.06***
	(0.056)	(0.0070)	(0.023)	(0.027)	(0.0099)	(0.014)
Observations	1673	1673	1038	1667	1673	1670
R^2	0.31	0.02	0.02	0.02	0.02	0.05
Students	746	746	530	745	746	746

Standard errors in parentheses (clustered at classroom level)
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data from in-class student assessment surveys completed in 2011-2012 school years in Eau Claire, WI. See Table 1 for dependent variable definitions. Post-Education is a dummy for the student having received financial education by the time of the survey. This is zero for all students at baseline, one for the "Treatment" students only at follow-up 1, and one for all students at follow-up 2. Each model includes student fixed effects and a 3-period linear time trend.

Table 5: Summary Statistics for Amarillo Students

Panel A: Baseline	Control mean	sd	Education mean	sd
Quiz score	5.51	2.17	5.49	2.10
Student Banked	0.36	0.48	0.37	0.48
Student Savings Level(6pt)	3.55	2.04	3.14	2.01
Spend Immediately(5pt)	2.88	1.15	2.95	1.22
Savings Attitude	1.77	0.59	1.75	0.66
Banking Attitude	1.99	0.82	1.79	0.93
Observations	308		448	

Panel B: Follow Up	Control mean	sd	Education mean	sd
Quiz score	5.61	2.31	7.80*	2.66
Student Banked	0.43	0.50	0.46	0.50
Student Savings Level(6pt)	3.34	1.96	3.14	1.87
Spend Immediately(5pt)	2.79	1.16	2.76	1.27
Savings Attitude	1.87	0.62	1.90	0.58
Banking Attitude	1.95	0.91	2.13*	0.90
Observations	285		418	

Data from in-class student assessment surveys completed in the 2012-2013 school year in Amarillo, TX. See Table 1 for dependent variable definitions.). * = statistically significant difference from control group at 5% level using 2-tailed test.

Table 6: OLS Regression Estimates of the Effect of Financial Education on Financial Knowledge, Banking Status and Financial Attitudes for Amarillo Students

	Quiz score	Student Banked	Student Savings Level (6pt)	Spend Immediately (5pt)	Savings Attitude	Banking Attitude
Financial Education	2.27***	0.023	0.13	-0.062	0.052	0.27***
	(0.21)	(0.032)	(0.15)	(0.088)	(0.048)	(0.076)
Student Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	703	702	181	689	701	695
R^2	0.41	0.43	0.69	0.22	0.25	0.23

Standard errors in parentheses (clustered at classroom level)
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data from in-class student assessment surveys completed in the 2012-2013 school year in Amarillo, TX. See Table 1 for dependent variable definitions. Financial education is a dummy for the student receiving financial education between the baseline and follow-up survey. Student controls include the baseline value of the outcome variable, an index measuring how well the student performs in school, an index measuring how much the student believes financial issues are only the responsibility of their parents, and the gender of the student.

Table 7. Median Account Balance by Student Self Reported Savings Level

Self Reported Student Savings Level	Median Savings Account Balance
$1 to $25	$19
$26 to $50	$71
$51 to $100	$67
$101 to $200	$144
$201 to $500	$254
More than $500	$605

Note: n=53 students with school-based accounts