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**Financial Education, Financial Knowledge and
Risky Credit Behavior of College Students**
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Abstract: The purpose of this study is to examine associations among financial education, financial knowledge, and risky credit behavior of college students. Using data from a sample of first-year college students, we found evidence that taking personal finance courses in high school and college is associated with financial knowledge as well as risky credit behavior. Specifically, both high school and college personal finance courses are associated positively with subjective financial knowledge. Subjective financial knowledge in turn reduces the chance of engaging in risky paying behavior. In addition, objective credit knowledge reduces the likelihood of engaging in both risky paying and borrowing behaviors.

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Financial Education, Financial Knowledge and Risky Credit Behavior of College Students

Jing Jian Xiao, Joyce Serido and Soyeon Shim

The financial upheaval of the current economic recession underscores the need for individuals of all ages to take responsibility for their financial well-being. Personal financial responsibility may be especially salient for young adults aged 18-25 as they transition from adolescence to adulthood (Arnett, 2000). During this transition period they need to acquire the financial knowledge, skills and behaviors to become financially independent. In addition to their financial success, research indicates that responsible financial behaviors are associated with other positive life outcomes among young adults (Shim, Barber, Card, Xiao, & Serido, 2009; Shim, Xiao, Barber, & Lyons, 2009; Xiao, Tang, & Shim, 2009).

To help these young adults develop financial competence, many high schools and universities have begun to offer financial education courses. Government and non-government organizations have also launched various financial education programs targeting youth (for a review of various financial education programs, see Fox & Bartholomae, 2008). The underlying assumption of this approach is that financial education programs contribute to students' financial knowledge which in turn promotes responsible financial behaviors. However, evidence on the effectiveness of these financial education programs is mixed (Fox & Bartholomae, 2008; Mandell, 2008). To better understand the relationship between financial education and financial behavior of young adults, this study uses data collected from a sample of first-year students at a university in the southwest to focus specifically on factors associated with risky credit behavior. Risky credit behavior is defined as consumer credit practices that have the potential to damage future financial well-being. Examples of risky credit behaviors include holding credit card debt, delaying the payment of credit card bills, making less than full payment on credit card bills, and

maxing out credit card limits (Lyons, 2008; Xiao, Tang, Serido, & Shim, 2009). We focus on credit behaviors for two reasons. First, young adults aged 18-25 are just beginning to manage credit and accrue debt in their own name. Whereas youth under 18 have developed cash management skills (John, 1999), managing credit is a new challenge. Second, although college students may manage credit better than non-college students in the same age group, compared with adults, they may engage in more risky credit behaviors (Barron & Staten, 2004). Recent studies indicate that a small but significant portion of college students are engaging in risky credit behaviors (e.g., Lyons, 2008; Sallie Mae, 2009; Xiao et al., 2009). In this study, we further extend the literature on financial education and financial behavior of young adults by simultaneously considering the effects of both high school and college courses as well as multiple dimensions of financial knowledge.

Financial Education, Financial Knowledge, and Financial Behavior

College students in general have limited financial knowledge. An early study examining five domains of financial knowledge in a sample of students at a Midwestern university concluded that while college students have general knowledge about money management topics, they lack specific knowledge (Danes & Hira, 1987). A financial literacy survey of college students on 14 college campuses found that only 53percent of the students answered the knowledge questions correctly (Chen & Volpe, 1998). In terms of topics, students are relatively more knowledgeable in general financial topics (mean score=64) and insurance (59) and less knowledgeable in saving and borrowing (54) and investments (40). In a recent national survey of financial literacy among college students, participants collectively achieved a mean score of only 62 percent correct answers (Jump\$start, 2008). Taken together, these studies suggest the need for additional financial education among college students. Indeed, a recent national survey reported

that 84 percent of undergraduates surveyed indicate the need for more education on financial management topics (Sallie Mae, 2009). In fact, 64 percent would have liked to receive information in high school and 40 percent as college freshmen. When asked the best way to deliver financial management information, surveyed students stated a preference for in-person education sessions over self-directed or passive methods (Sallie Mae, 2009).

As financial educators, we assume that personal finance and related courses in high school and college should improve the financial knowledge level of students, and students with improved financial knowledge should be more likely to perform desirable financial behaviors and less likely to perform risky financial behaviors. However, research evidence is mixed. The results of the multiyear Jump\$Start surveys administered to high school seniors in the U.S. regarding financial literacy show no association between high school finance course-taking and financial knowledge (Mandell, 2008). Another study showed mixed results regarding associations between financial knowledge and high school and college financial education (Peng, Bartholomae, Fox, & Cravener, 2007). These researchers used data from a university alumni survey and found that high school personal finance courses had no effect on investment knowledge whereas college personal finance courses did. Several studies on specific financial education programs show positive effects. For example, a study evaluating the 10-hour high school curriculum of the National Endowment for Financial Education (NEFE) showed that the course increased students' knowledge, self-efficacy, and saving rates (Danes, et al., 1999). Similarly, Bowen and Jones (2006) reported that a two-session education intervention increased knowledge and behavior intention.

It is possible that the effects of financial education may emerge over time, as suggested by a study conducted by Bernheim, Garrett, and Maki (2001). This study surveyed a sample of

consumers during their peak earning years (age 35-49) with results showing more responsible financial behaviors for adults who attended schools in states with a mandate for personal financial education compared to those who did not live in a mandate state. However, evidence for the effects of state mandated financial education is mixed. Tennyson and Nguyen (2001) found that high school students from states with specific course mandates did better in national financial surveys than did students who lived in states that did not require course mandates. However, in an earlier study, Mandell (1998) did not find the same effect. To test the potential effect of mandates, Mandell (2004) conducted a study in which he compared effects of required and non-required personal finance courses. He concluded that if a personal finance course is required and taught by competent teachers, it would improve financial literacy of students.

Several studies document associations between financial education and literacy on financial behavior. Borden, Lee, Serido, and Collins (2008) conducted an evaluation study using data collected from personal financial education seminars at the University of Arizona and found that financial seminars had a positive effect on students' financial attitudes and behavioral intentions. Chen and Volpe (1998) also found that higher financial knowledge was linked to positive financial decisions.

Studies that examine the relationship between financial education and risky credit behaviors of college students provide mixed results. Lyons (2008) reports that taking personal finance courses reduced the probabilities of four risky credit behaviors: holding credit card debt of \$1,000 or more, being delinquent on payments, having reached the limit on credit cards, and not paying balances in full. Hayhoe, Leach, and Allen (2005) report that taking finance courses is negatively associated with holding four or more credit cards, which is considered as a risky credit behavior. However, another study by Hayhoe, Leach, and Turner (1999) reported that

taking a personal finance course was positively associated with holding four or more credit cards.

Results of previous research can be summarized as follows: (1) Short term personal finance courses may impact student knowledge and behavioral intention; (2) Effects of full semester, formal personal finance courses may depend on the context of teaching such as whether courses are required; and (3) Financial education may have long term positive effects on financial behavior.

In this study, we examine factors associated with risky credit behavior from the perspectives of human development and behavior formation. When young adults are in the transition from adolescence to adulthood, they are developing behaviors that suit their development goals (Erickson, 1968). In the process of development, many socialization agents such as parents and schools provide assistance (Shim, et al., 2009). When a behavior is being developed and formed, many factors contribute to the process. For example, in a multi-stage behavior model, ten factors (or “processes,” in their terms) are identified as contributing to behavior change (Prochaska, et al., 1992). Among these ten factors, “social liberation” refers to social support mechanisms that help form or change behaviors. Regarding consumer finance, consumer education can be considered as one of these mechanisms to help consumers develop desirable financial behaviors (Xiao, et al., 2004).

As one of the socialization agents, schools provide support for students to develop desirable behaviors including financial behaviors. In high schools as of 2007, personal finance courses are offered as required courses in only seven states according to a survey conducted by the National Council on Economic Education (2007). In colleges and universities, only personal financial planning and related majors are required to take personal finance courses. Thus, most

students take personal finance courses in high schools and colleges as free electives. These personal finance courses provide information and opportunities for students to learn real world financial life skills. In addition, financial educators now develop action-oriented education programs and encourage students to engage in positive financial behaviors (Xiao, et al., 2004). We assume that personal finance teachers and professors are people who care about the well-being of their students and strive to provide effective financial education for them. These teachers and professors hope that financial education will contribute to an increase in financial knowledge, which in turn should foster desirable financial behaviors.

Our study focuses on potential impacts of financial education on risky credit behaviors among college students. Compared to previous studies, our study has several unique features: we focus on a sample of first-year college students, who are just entering the credit world. We examine potential effects of both high school and college financial courses on credit behaviors among this group of young adults. We also examine whether or not financial education has potential direct effects or indirect effects through financial knowledge on credit behaviors. We have measured both subjective and objective financial knowledge. The risky credit behaviors are measured in a unique way compared with previous research. Specifically, the following research questions frame our study:

1. Does personal financial education affect students' financial knowledge?
2. Does personal financial education affect student engagement in risky credit behaviors?

Method

Data

Data were collected at a university in the southwest, over an 8-week period during spring 2008, from first-year students enrolled full-time (i.e., 12 or more units). Details of the sampling procedures and methodology are reported elsewhere (Shim, et al, 2009), and thus are summarized only briefly here. After we received the Human Subject Committee's approval, we invited the entire freshman class (approximately 6,000 students) to participate in the study, using various recruitment methods (e.g., email, flyers, class announcements). All respondents were offered a nominal incentive for their participation. The survey questionnaire was posted online throughout the entire 8-week period of data collection, and an identical pencil-and-paper survey was administered in classrooms and freshman residential halls during the final weeks of data collection. A total of 2,098 students participated.

For the present study, only those students who reported owning at least one credit card (herein referred to as the credit sample) are included. This resulted in a total of 1,206 students (60 percent female; 40 percent male). The majority of the students (66 percent) were White, 14 percent were Hispanic, 10 percent were Asian and the remaining students were African American, Native American, and members of other races. Nearly two thirds (65 percent) of the students were in-state residents, one third were residents of other states, and 2.3 percent were international students. The majority of the students reported high levels of academic achievement (37 percent grade point average (GPA) of 3.5 or above; 29 percent GPA between 3.0-3.5). The average credit card debt held by this sample of students was modest (\$202), however the debt amounts varied widely, from zero balance to a maximum of \$7,000.

Measures

Personal finance course-taking. Two variables were used for personal finance courses taken in high school and in college. The high school course variable was coded 1 if a student reported taking one or more personal finance and related courses (consumer education, economics or business) in high school, otherwise it was coded 0. Similarly, a college course was coded 1 if a student reported taking a personal finance course in college, otherwise coded 0. The high school course and college course are moderately correlated ($r=.11, p<.0001$).

Financial knowledge. Since subjective knowledge and objective knowledge may exert differential effects on consumer behaviors (Ellen, 1994; Raju, Lonial & Mangold, 1995), we measured each of the constructs separately. Subjective financial knowledge refers to individuals' self-assessment of their own financial knowledge. Students rated their subjective knowledge on a five-point scale from 1 (very low) to 5 (very high) in response to one item: How would you rate your overall understanding of personal finance? Objective financial knowledge refers to accurate, factual knowledge regarding credit content and was measured by summing correct responses to eight credit-related, true-false quiz questions. These questions were originally developed by Hilgert, Hogarth, and Beverly (2003). Possible scores ranged from 0 (no answer correct) to 8 (all answers correct), with higher scores representing higher levels of objective credit knowledge. The mean score for objective financial knowledge (3.53/8) indicates that students answered less than half of the questions (44 percent) correctly on average. The average score of subjective financial knowledge (3.40/5) suggests that students believe that their financial knowledge is between "moderate" (3) and "high" (4). The correlation between subjective and objective knowledge is moderately related ($r=.12, p<.01$).

Risky credit behavior. Respondents were asked to indicate how often they had engaged in risky credit behaviors within the past six months using four risky behavior items based on previous research (Lyons, 2004, 2008) and one new item (borrowing from payday loans). Responses were based on a 5-point scale from 1 (never) to 5 (very often). After factor analyses, two factors emerged and were labeled *risky paying behavior* and *risky borrowing behavior*, respectively. Two items were used to measure risky paying behavior: paid bills on time each month; and paid off my credit card balance in full every month. The new variable was reverse coded in which a higher score indicates a more risky behavior before data analysis. To measure risky borrowing behavior, three items were used: borrowed money from credit cards; maxed out credit card limit; and used payday loan services. A measure of internal consistency of the items in the scale, Cronbach's alpha (Borg & Gall, 1989), were .71 and .61 respectively, for the paying scale and borrowing scale.

To account for variables found to be significantly related to college students' financial knowledge or behaviors, these analyses controlled for gender, academic achievement (GPA), and parental socio-economic status (SES). Gender was coded 1 (male) and 2 (female). The current college GPA was reported by the students. Parental SES was measured by three items: Father's education, mother's education, and parental income. The father's and mother's education levels were measured separately by five levels of schooling, from 1 (less than high school) to 5 (graduate school or professional degree). Parental income was measured by four levels: 1 (less than \$50,000), 2 (\$50,000-\$99,999), 3 (\$100,000-\$200,000), and 4 (more than \$200,000). Numerical values of the three variables were summed to form the parental SES variable. Cronbach's alpha for this composite variable was .73.

Data analyses

First, we used t-tests to examine potential differences in knowledge and behaviors between students who took financial education courses in either high school or college and those who did not. We then used multiple regression analyses to estimate the effect of financial education on financial knowledge. Separate models were estimated for subjective financial knowledge and objective credit knowledge respectively. For each knowledge model, we started with demographic variables as independent variables, and then added high school course, and then college course. The incremental contributions of these sets of variables are demonstrated by the significance of F changes. If the F change is statistically significant, it means the new set of variables contributes significantly to the explanation of the dependent variable. Finally, we used multiple regression analysis to examine the factors associated with risky behaviors, estimating separate models for risky paying behaviors and risky borrowing behaviors with significances of F changes to demonstrate incremental contributions of variables added to the models in each iteration.

Results

Group differences in Financial Knowledge and Risky Credit Behaviors

Table 1: Results of T-tests for Differences in Effects of Course-taking

Variable	Course-taking	n	Mean	p
<i>High school course</i>				
Subjective financial knowledge	No	300	3.01	.000
	Yes	905	3.27	
Objective credit knowledge	No	300	5.38	.241
	Yes	898	5.50	
Risky paying behavior	No	300	1.95	.082
	Yes	901	1.83	
Risky borrowing behavior	No	299	1.54	.402
	Yes	904	1.50	
<i>College course</i>				
Subjective financial knowledge	No	896	3.15	.000
	Yes	309	3.35	
Objective credit knowledge	No	892	5.52	.065
	Yes	306	5.33	
Risky paying behavior	No	892	1.86	.690
	Yes	309	1.84	
Risky borrowing behavior	No	895	1.47	.001
	Yes	308	1.62	

In the first set of analyses, we tested for differences in knowledge and risky behaviors for students who took financial education courses and those who did not (Table 1). It is worth noting that the majority (75 percent) of the students reported taking personal finance and related courses in high school. We found a significant difference, with students who took high school courses reporting higher levels of subjective financial knowledge compared to students who did not take high school courses. However, there were no differences in objective credit knowledge or in either of the two risky behaviors. The percentage of students who took a college personal finance course was much lower (25 percent). We found a similar significant group difference in subjective financial knowledge, with students who took college courses reporting higher levels

of subjective financial knowledge compared to students who did not take college courses. We also found a significant difference in risky borrowing behaviors, with students who took a college course reporting more risky borrowing behaviors compared to students who did not take a college course. This finding is opposite to what we would have expected.

Financial Education and Financial Knowledge

Table 2: Results of OLS Regressions on Subjective Knowledge

Variable	Coefficient estimate	Standardized Coefficient	p
<i>Model 1</i>			
Female (vs. Male)	-.294	-.174	.000
Parental SES	-.038	-.043	.138
GPA	.035	.029	.326
$R^2 = .031$			
<i>Model 2</i>			
Female (vs. Male)	-.281	-.166	.000
Parental SES	-.036	-.041	.155
GPA	.037	.030	.297
High school course	.236	.123	.000
$R^2 = .046$			
<i>Significance F change <.0001</i>			
<i>Model 3</i>			
Female (vs. Male)	-.269	-.159	.000
Parental SES	-.038	-.044	.127
GPA	.034	.028	.329
High school course	.221	.115	.000
College course	.144	.077	.009
$R^2 = .051$			
<i>Significance F change = .009</i>			

Note: Subjective knowledge is measured by a scale of 1 to 5, in which 5 means the most knowledgeable. Standard coefficients are calculated by dividing the standard deviation from the coefficient estimate so that contributions of all independent variables can be compared directly.

Table 3: Results of OLS Regressions on Objective Credit Knowledge

Variable	Coefficient estimate	Standardized Coefficient	p
<i>Model 1</i>			
Female (vs. Male)	.025	.008	.787
Parental SES	-.118	-.072	.015
GPA	.101	.045	.130
$R^2 = .084$			
<i>Model 2</i>			
Female (vs. Male)	.032	.010	.731
Parental SES	-.116	-.072	.016
GPA	.103	.045	.126
High school course	.128	.036	.227
$R^2 = .091$			
<i>Significance F change = .227</i>			
<i>Model 3</i>			
Female (vs. Male)	.022	.007	.821
Parental SES	-.116	-.071	.016
GPA	.104	.046	.121
High school course	.136	.038	.203
College course	-.095	-.028	.350
$R^2 = .095$			
<i>Significance F change = .350</i>			

Note: Objective knowledge is measured by a score ranged from 0 to 8, representing the number of correct answers for credit knowledge questions. Standard coefficients are calculated by dividing the standard deviation from the coefficient estimate so that contributions of all independent variables can be compared directly.

In the next set of analyses, we estimated a series of regression equations on the relation between financial education and financial knowledge. In the first equation, we regressed subjective knowledge on high school and college courses (Table 2). In the first step of the model, the control variables entered the equation. Only gender was significant, with males having higher levels of subjective knowledge. In step 2, high school course entered the equation and was significant. In step 3, college course entered the equation and also was a significant predictor of subjective knowledge. The results of the final model showed independent and significant associations on subjective financial knowledge for gender, high school course and college course. We repeated the three-step regression for objective knowledge (Table 3). In the first step of the model, we found that parental SES was significantly associated with decreased objective

credit knowledge, such that students from higher SES families had lower levels of objective credit knowledge. More importantly, the addition of the financial education variables in Steps 2 and 3 did not contribute to higher objective credit knowledge, the same result as in the simple t-tests.

Factors Contributing to Risky Financial Behaviors

Table 4: Results of OLS Regression on Risky Paying Behavior

Variable	Coefficient estimate	Standardized Coefficient	p
<i>Model 1</i>			
Female (vs. Male)	.050	.024	.442
Parental SES	-.088	-.083	.005
GPA	-.193	-.129	.000
$R^2 = .025$			
<i>Model 2</i>			
Female (vs. Male)	.043	.020	.490
Parental SES	-.090	-.084	.005
GPA	-.194	-.130	.000
High school course	-.128	-.054	.066
$R^2 = .028$			
<i>Significance F change = .066</i>			
<i>Model 3</i>			
Female (vs. Male)	.0406	.019	.514
Parental SES	-.089	-.083	.005
GPA	-.193	-.130	.000
High school course	-.126	-.053	.073
College course	-.025	-.011	.720
$R^2 = .028$			
<i>Significance F change = .720</i>			
<i>Model 4</i>			
Female (vs. Male)	-.033	-.016	.591
Parental SES	-.100	-.093	.001
GPA	-.184	-.124	.000
High school course	-.064	-.027	.355
College course	.015	.007	.822
Subjective financial knowledge	-.278	-.225	.000
$R^2 = .089$			
<i>Significance F change < .0001</i>			
<i>Model 5</i>			
Female (vs. Male)	-.026	-.013	.668
Parental SES	-.108	-.101	.000
GPA	-.177	-.119	.000
High school course	-.056	-.024	.413
College course	-.002	-.001	.979
Subjective financial knowledge	-.259	-.209	.000
Objective credit knowledge	-.077	-.116	.000
$R^2 = .076$			
<i>Significance F change < .0001</i>			

Note: Risky paying behavior is measured by an average score ranged from 1 to 5, in which 5 means most likely to engage in risky paying behavior. Standard coefficients are calculated by dividing the standard deviation from the coefficient estimate so that contributions of all independent variables can be compared directly.

In the final set of analyses, we estimated a series of regression analyses to consider what factors contribute to risky credit behaviors. In the first model, we regressed risky paying behaviors on the set of variables, beginning with the control variables as in the previous analyses (Table 4). Both parental SES and student GPA were associated with a significant decrease in risky paying behaviors. The addition of high school course in Step 2 also was significantly associated with decreased risky paying behaviors. However, college course entered in Step 3 was not significant. The final model showed that both financial knowledge variables reduced the likelihood of engaging in risky paying behavior while the two education variables did not show significant effects.

Table 5: Results of OLS Regressions on Risky Borrowing Behavior

Variable	Coefficient estimate	Standardized Coefficient	p
<i>Model 1</i>			
Female (vs. Male)	-.123	-.085	.004
Parental SES	-.059	-.078	.008
GPA	-.110	-.106	.000
$R^2 = .026$			
<i>Model 2</i>			
Female (vs. Male)	-.127	-.087	.003
Parental SES	-.059	-.079	.007
GPA	-.111	-.107	.000
High school course	-.058	-.035	.234
$R^2 = .027$			
<i>Significance F change = .234</i>			
<i>Model 3</i>			
Female (vs. Male)	-.113	-.077	.009
Parental SES	-.062	-.083	.005
GPA	-.113	-.109	.000
High school course	-.075	-.045	.125
College course	.165	.101	.001
$R^2 = .037$			
<i>Significance F change = .001</i>			
<i>Model 4</i>			
Female (vs. Male)	-.121	-.083	.006
Parental SES	-.063	-.085	.004
GPA	-.112	-.108	.000
High school course	-.068	-.041	.165
College course	.169	.104	.000
Subjective financial knowledge	-.029	-.034	.256
$R^2 = .038$			
<i>Significance F change = .256</i>			
<i>Model 5</i>			
Female (vs. Male)	-.115	-.079	.008
Parental SES	-.070	-.094	.001
GPA	-.106	-.102	.000
High school course	-.061	-.037	.208
College course	.153	.094	.001
Subjective financial knowledge	-.012	-.014	.647
Objective credit knowledge	-.068	-.148	.000
$R^2 = .060$			
<i>Significance F change < .0001</i>			

Note: Risky borrowing behavior is measured by an average score ranged from 1 to 5, in which 5 means most likely to engage in risky borrowing behavior. Standard coefficients are calculated by dividing the standard deviation from the coefficient estimate so that contributions of all independent variables can be compared directly.

The model regressing risky borrowing behavior on the set of variables is presented in Table 5. In this model, all three control variables were associated with significant decreases in risky borrowing behaviors, that is, females, students from higher SES families and those with higher academic achievement used fewer risky borrowing behaviors. The addition of college course (Step 3) and objective credit knowledge (Step 5) were significant. The final model indicated that objective credit knowledge reduced the likelihood of performing risky borrowing behavior, while surprisingly again, college education increased the likelihood of performing this behavior.

Discussions

This study examined the associations between financial education, financial knowledge, and risky credit behavior among a sample of first-year college students. Findings suggest that both high school and college personal finance courses may contribute to subjective financial knowledge of students, and subjective financial knowledge in turn may contribute to a lower likelihood of engaging in one of the risky credit behaviors, risky paying behavior. However, personal finance courses do not show a direct impact on objective credit knowledge. In addition, college personal finance course-taking is associated with a higher likelihood of engaging in risky borrowing behavior. Objective credit knowledge reduces both risky paying and borrowing behaviors. Other factors that help decrease probabilities of performing risky credit behaviors are GPA, parental SES, and gender. Students with higher GPA and those having higher SES parents are less likely to engage in risky paying and borrowing behaviors. Female students are less likely than males to engage in risky borrowing behavior.

Consistent with previous studies, we found that high school personal finance courses do not increase objective financial knowledge (Mandell, 2008). Other findings provide new insights.

For example, this study indicates that both high school and college courses increase subjective knowledge and subjective knowledge in turn reduces likelihood of performing risky paying behavior. The findings of this study suggest that subjective and objective knowledge may be two different factors that influence student behaviors. Subjective knowledge among first year students may reflect self-confidence based on either previous experiences, prior financial education courses or both. It is also possible that students who take personal finance courses follow a personal interest in finance. These findings are consistent with previous studies on subjective and objective knowledge (Ellen 1994; Raju, Lonial, and Mangold 1995). Those studies find that subjective knowledge has a more significant effect on the attitudinal or behavioral outcome variables than objective knowledge, and subjective knowledge and objective knowledge produce different effects on the outcome variables.

The relationship between financial education and objective knowledge seems puzzling. According to the findings, objective knowledge reduces the likelihood of performing both risky credit behaviors. However, neither high school nor college courses show direct effects on objective knowledge. Clearly, objective knowledge regarding credit behaviors is gained from other sources (e.g., parents) than formal courses. In addition, the association between college course-taking and increased likelihood of engaging in risky borrowing behavior may suggest that additional exposure to formal financial education may be a Pandora's box, removing inhibitions about using credit cards and thus promoting more risky financial behaviors (Borden et al., 2008). It is possible that the content of the financial courses may be too broad in their coverage of financial topics. This suggests that courses for this age group may need to focus more on practical knowledge of credit management. Another possibility is self-selection bias. It is often the case that personal finance courses are offered as free electives in many high schools and

universities. However, whether this bias promotes course-taking among students who have a lower level of credit knowledge, or those who have an interest in personal finance, is not known. This is an interesting future research question. The final possibility is that it may be that self-confidence (subjective knowledge) comes with content knowledge but it takes practice, applying what one has learned in class, to see more tangible effects of education (objective knowledge); therefore, financial education needs to include practical application of ideas to be effective.

Limitations

This study intends to investigate the relationship between financial education and risky credit behavior of college students. Because the data set is cross-sectional, the findings only suggest potential impacts and cannot be interpreted as evidences for causal relationships. Another limitation of this study is a lack of specificity on the types of financial education courses student took (length of class, quality of instruction, mandated or not, their performance in class, and motivation for taking). Findings need to be interpreted cautiously when these limitations are kept in mind.

Implications for Financial Educators

While the findings are suggestive rather than conclusive, they provide helpful information for financial educators to improve their financial education for high school and college students. One insight that follows from this study is associations among the constructs: financial education courses do not show associations with objective credit knowledge. However, objective knowledge does show strong association with lower likelihood of performing risky credit behaviors. Therefore, further examination into the content and instructional strategies used in courses for this age group is warranted. When financial educators design and implement

personal finance courses, they may want to allocate more teaching time on credit management and demonstrate tangible cause and effect relationships to encourage desirable credit behaviors. Because high school seniors and college first-year students are at the threshold for taking on the challenge of consumer credit, financial educators need to provide practical and action-oriented education to this age group.

Implications for Future Research

This study provided some evidence to support the effectiveness of financial education on financial knowledge and behavior and raises some interesting questions for future research. For example, future research topics may include the effect of education designed to help students make connections between what they are learning in class, the financial behaviors they practice, and the impact on their financial and overall well-being. In addition, examining differences between subjective and objective knowledge and their differentiated effects on financial behavior formation among young adults may provide important insights for programs and interventions designed for this age group. We also need to consider how school requirements (e.g., elective versus required courses) affect both course-taking and course impact on behavioral differences, extending Mandell's (2004) results on college level courses. In addition, future research may also consider how program effectiveness varies when taught by peers in informal workshop settings compared to formal financial courses in terms of reducing risky credit behaviors, as suggested by Borden et al. (2008). Finally, we call for designing more consistent measures in evaluating financial education courses so that findings across studies can be better interpreted.

Appendix

1. The question on subjective knowledge:

How would you rate your overall understanding of personal-finance and money-management concepts and practices?

Very low	Low	Moderate	High	Very high
1	2	3	4	5

2. Questions on objective knowledge (Hilgert et al., 2003):

Indicate whether each of the following statements is True or False.

	T	F
1. If you expect to carry a balance on your credit card, the APR is the most important thing to look at when comparing credit card offers.	1	0
2. Your credit report includes employment data, your payment history, and any inquiries made by creditors, and any public record information.	1	0
3. If you have any negative information on your credit report, a credit repair agency can help you remove that information.	1	0
4. Making payments late on your bills can make taking out a loan more difficult.	1	0
5. With compound interest, you earn interest on your interest as well as on your principal.	1	0
6. Your credit rating is not affected by how much you charge on your credit cards.	1	0
7. The finance charge on your credit card statement is what you pay in order to use credit.	1	0
8. Using extra money in a bank savings account to pay off a high-interest-rate credit card debt is a good idea.	1	0

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