

# Financial Capability, Financial Education, and Student Loan Debt: Expected and Unexpected Results

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*This study used the 2015 National Financial Capability Study to investigate the relationships among financial capability, financial education, and student loan debt outcomes. Specifically, this study examines four student loan outcomes: delinquency, stress, preparation, and satisfaction among borrowers who obtained loans for themselves. Three forms of financial capability (objective financial knowledge, subjective financial knowledge, and perceived financial capability) and two forms of financial education (formal school/workplace education and informal parental education) were used as potential predictors in the study. The Probit regression results showed that expectedly, several financial capability and financial education factors were positively associated with desirable financial outcomes such as loan calculation and loan satisfaction, and negatively associated with undesirable outcomes such as loan stress and loan delinquency. However, this study also showed several unexpected results. For example, objective financial knowledge was negatively associated with loan calculation and loan satisfaction, and subjective knowledge and formal financial education were positively associated with loan delinquency.*

*Keywords: delinquency, financial education, financial knowledge, financial literacy, stress, student loan*

Growing education costs and rapidly increasing student loan debt have become serious issues for families, governments, researchers, and financial practitioners. Outstanding student loan debt reached \$1.58 trillion in the third quarter of 2021 (Federal Reserve Bank of New York, 2021). The 2018 National Financial Capability Study (NFCS) report indicates that 26% of American adults were indebted with a student loan for themselves or a family member. The majority (72%) of those who had student loans took out the loans for themselves (Financial Industry Regulatory Authority [FINRA] Foundation, 2019). The outstanding education debt burden in the United States has proliferated during the past decade, and the average student loan debt is now close to \$57,520 among U.S. households (Helhoski & Lane, 2021). More borrowers with a high loan outbalance have fallen behind on their student loan repayments as opposed to making progress to reduce the debt (Looney & Yannelis, 2019).

Understanding student loan borrowers' repayment behaviors and borrowing satisfaction is a critical yet challenging issue. A study of student loan borrowers' mental health revealed that having student loans is negatively associated with psychological function (Walsemann et al., 2015). Specifically, among all borrowers, those who completed two years of college, although demonstrating a lower cumulative loan amount, reported more socio-economic disadvantages and poorer psychological function compared to those who completed four years of college. Another study found that, compared with an aggregated measure of total debt, student loan debt showed a stronger positive association with financial anxiety among college students; the study also showed that perceived repayment difficulty among student borrowers were associated with financial stress (Archuleta et al., 2013). The greater the amount of student debt young adults have, the poorer their mental health will be (Kim & Chatterjee, 2021).

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The present study examines the roles of financial capability and education and their associations with student loan preparation, delinquency, stress, and satisfaction, which have not been fully examined in the current literature, to our best knowledge. Specifically, we examine three aspects of financial capability, including subjective and objective financial knowledge and perceived financial capability, and two forms of financial education, namely formal financial education received from schools and workplaces and informal parental socialization for financial matters.

## **Theoretical Background and Literature Review**

### ***Theoretical Background***

Life-cycle hypothesis (Ando & Modigliani, 1963) and human capital theory (Becker, 1964) provide a theoretical background for the current study. According to the life-cycle hypothesis, individuals plan their consumption and savings behavior throughout their lifetimes, considering their future income (Ando & Modigliani, 1963). It is assumed that there are no credit constraints, and individuals can borrow against future earnings. A student can weigh the cost of borrowing student loans against the probability of completing the program and earning income in the future. Student loans differ from other types of consumers loans, such as credit card debts or auto loans, because other types of consumer loans provide immediate consumption and enjoyments, while student loans serve as an investment in human capital to help borrowers gain knowledge, skills, and capability to earn higher income in the future (Li, 2013). Individuals take on debt before completing their education and expect to be earning low income at that time while assuming that their future income will enable them to pay off loans at an early age.

Under the life-cycle hypothesis framework, it is reasonable to assume that students who are admitted into higher-educational programs would consider borrowing student loans to supplement consumption because of higher expected lifetime earnings, given their anticipated skill set, talents, and more competitive earning power in the job market once they obtain their degree. The decision and willingness to borrow student loans could be associated with factors such as financial resources and students' preparedness for college (Bound et al., 2010; Cho et al., 2015). Consequently, carrying a student loan can be associated with certain decisions in later life stages, such as occupation choices (Rothstein & Rouse, 2011), home buying (Cooper & Wang, 2014),

marriage and family formation (Bozick & Estacion, 2014), and financial satisfaction (Robb et al., 2019).

Human capital theory also provides theoretical support for this study to focus on financial capability and education factors. Whereas the costs must be paid in the present, the benefits of earning a higher education can only be enjoyed in the future; thus, individuals compare the costs of a higher education and its benefits according to human capital theory and choose whether or not to pursue higher education or training (Becker, 1964). Prior research pointed out that the economic benefit of education varies by level of training and by career field (Cohn & Geske, 1990); furthermore, it is rational to expect that loan repayment and default behavior can vary by individuals' highest educational attainment (Volkwein et al., 1998) and by their major field of study. Those who complete their educational program compared to those who do not are more likely to enjoy the expected earning enhancement, contribute to the nation's economic and cultural production, and be less likely to default on their loan obligations (Volkwein et al., 1998).

In terms of financial education, receiving formal financial education from schools and workforces or informally from parental socialization should contribute to the human capital, such as increased financial knowledge (e.g., Xiao & O'Neil, 2016), improved financial behaviors, such as better credit scores and fewer delinquencies (Brown et al., 2016; Urban et al., 2018), and a reduced amount of delinquent debt (Brown et al., 2016). Individuals exposed to personal finance education at schools are less likely to use alternative financial services (Harvey, 2019) and are more aware of income-driven repayment plans which have been shown to improve repayment progress and avoid default (Herbst, 2020; Mangrum, 2019). Similarly, receiving parental financial socialization can also contribute to increased financial literacy, which is positively related to financial behavior and well-being (e.g., Gudmunson & Danes, 2011; Shim et al., 2009).

### ***Student Loan Debt***

Student loans provide students an accessible way to finance their education; furthermore, the interest rate on federal student loans is fixed and lower than private loans (Consumer Financial Protection Bureau [CFPB], 2017). Private student loans are made by private organizations, including banks, credit unions, and state-based or state-affiliated

organizations and are generally more expensive (such as having higher interest rates) than federal student loans (CFPB, 2017).

The extant literature on student loans focuses on the consequences of carrying student loans, such as default and delay in wealth accumulation and homeownership. For example, previous literature indicated that certain types of loans are associated with homeownership (Cooper et al., 2014; Robb et al., 2020); student loan debt is also associated with lower wealth (excluding student loan debt) for households with at least some college experience (Cooper et al., 2014). Previous literature noted that both completers and non-completers' student loan repayment ability depends mostly on their employment after leaving postsecondary education (Wei & Horn, 2013). Borrowers who failed to complete the educational program were more likely to default on student loan payments (Gladieux & Perna, 2005).

Student loan defaults and stress related to student loans have been important topics of discussion among researchers. College students holding student loans are more likely to experience financial stress compared to those without student loan debt (Britt et al., 2015). Student loan repayment difficulties were associated with various factors such as individual students' demographic background and financial characteristics, the associated academic institution's features, and the type of loan to be repaid (Gross et al., 2009). The literature suggested that students seeking associate and post-bachelor's degrees showed worse student loan repayment behaviors (Brown et al., 2019), and non-White males with lower income or having other types of debt demonstrated higher likelihood to be late on student loan payments (Fan & Chatterjee, 2019).

Evidence from previous literature showed that gender and ethnicity were significant indicators of financial knowledge and financial behaviors (Lyons, 2004; Wang, 2009; Woodyard & Robb, 2012), which are associated with student loan debt behavior and attitude. Among college students, females were found to be less knowledgeable about personal finance topics compared with males, and the differences between genders persisted, even after accounting for many demographic characteristics (Borden et al., 2008; Chen & Volpe, 1998, 2002; Lusardi & Mitchell, 2007; Robb & James, 2009). This study contributes to the literature on student loan topics by examining how financial capability

and the experience of receiving financial education are associated with student loan behavior and attitudes. In particular, our goal is to link financial capability and education to student loan behaviors, including preparation propensity, repayment delinquency and stress, and borrowing satisfaction.

### ***Financial Capability***

Financial capability can be characterized in various ways, and sometimes used as a synonym of financial literacy (FINRA IEF, 2019). It refers to a combination of financial knowledge, resources, access, experience, and habits. Related literature also uses the terms "financial literacy" and "financial knowledge" interchangeably (van Rooij et al., 2012). Several studies have conceptualized financial literacy as synonymous with actual financial knowledge (FINRA, 2003; Lusardi & Mitchell, 2007, 2008, 2011). Huston (2010) developed a comprehensive definition of financial literacy and posited that financial knowledge is an integral dimension but is not equivalent to financial literacy. Studies have also emphasized the financial skills and capability aspects of financial literacy (Hung et al., 2009; Klapper et al., 2015). Therefore, our definition of financial capability includes the actual possession of financial knowledge and other dimensions, namely perceived financial knowledge and capability, the application of which originated from Huston's (2010) study (also see Xiao et al., 2020). Furthermore, financial capability falls under both the knowledge dimension and the application dimension. Being financially capable means possessing knowledge on critical financial matters to confidently take effective action that best fulfills an individual's financial goals.

Having adequate financial knowledge and an accurate assessment of financial knowledge can promote financial practices and the financial decision-making process (Chen & Volpe, 1998). Previous research has revealed a positive relationship between financial knowledge and financial behavior (Afsar et al., 2018; Hadar et al., 2013; Lusardi & Mitchell, 2011; Nguyen et al., 2017; Peng et al., 2007). Individuals deficient in financial knowledge, specifically low debt literacy, were more likely to engage in negative financial behaviors, such as high-cost transactions, incurring of higher fees, and high-cost borrowing (Lusardi & Tufano, 2015). Interestingly, the literature offers inconsistent evidence that the role of financial literacy and its association with student loan behavior and attitudes requires

better understanding. For instance, Robb and Sharpe (2009) revealed that financial knowledge was positively associated with carrying higher balances in credit card debt among college students. Moreover, Borden et al. (2008) found that financial knowledge was not significantly associated with either risky or healthy financial behaviors.

Both objective and subjective financial knowledge are important components of financial literacy and should be examined together to determine their influence on financial behaviors (Friestad & Wright, 1994; Nguyen et al., 2017). Robb and Woodyard (2011) indicated that the effects of both types of financial knowledge on financial behavior are differential. Objective financial knowledge is generally measured using a series of financial knowledge tests in order to generate an assessment of an individual's finance-related knowledge (Chung & Park, 2019; Kramer, 2016; Wang, 2009), whereas subjective financial knowledge is defined as an individual's belief about his or her own financial knowledge (Carlson et al., 2009) and can be measured by directly asking individuals to assess their own financial knowledge, obtained through a self-rating of respondents' financial knowledge (Nguyen et al., 2017; Porto & Xiao, 2016). Evidence suggested that having higher objective financial knowledge encouraged sound financial practices, such as demonstrating positive short- and long-term financial behaviors (Kim et al., 2019), and subjective financial knowledge was positively associated with informed borrowing behaviors (Fan & Chatterjee, 2017; Seay & Robb, 2013) and savings behaviors (Robb & Woodyard, 2011; van Rooij et al. 2012). Additionally, there is a positive association between financial knowledge and overall financial satisfaction (Joo & Grable, 2004; Xiao et al., 2014; Xiao & Porto, 2017), suggesting that financial knowledge could also influence student loan debt-related satisfaction. The negative and significant association between financial knowledge and student loan-related financial stress highlighted the importance of financial literacy on student loan repayment behavior and satisfaction (Fan & Chatterjee, 2019).

**H1:** Objective financial knowledge is negatively associated with (a) student loan delinquency and (b) student loan stress, and is positively associated with (c) student loan preparation and (d) student loan satisfaction.

**H2:** Subjective financial knowledge is negatively associated with (a) student loan delinquency and (b)

student loan stress, and is positively associated with (c) student loan preparation and (d) student loan satisfaction.

**H3:** Perceived financial capability is negatively associated with (a) student loan delinquency and (b) student loan stress, and is positively associated with (c) student loan preparation and (d) student loan satisfaction.

### *Financial Education*

The literature has established a strong relationship between financial education and financial attitudes and behavior. In the current study, we applied a broader definition of financial education to incorporate formal financial education (a) taught by schools and provided by workplaces and (b) financial socialization and teaching provided by parents that can be considered an informal financial education in a family setting. First, formal financial education implemented in schools or workplaces targeting certain subgroups of people had multiple benefits such as facilitating knowledge acquisition, improving confidence levels in knowledge and ability, and encouraging action-taking (Shim et al., 2009; Xiao & Porto, 2017). The literature showed that those who received formal financial education had a higher objective and perceived financial knowledge, desirable financial behavior, and perceived financial capability (OECD & OCDE, 2006; Xiao & O'Neil, 2016). Furthermore, personal finance education typically has a positive influence on financial knowledge (Bernheim et al., 2001; Brown et al., 2014; Brown et al., 2016; Danes et al., 1999). However, the results in the current literature were mixed about whether financial education courses provided by schools and employers can generate an influence on individuals' financial behavior (Lusardi & Mitchell, 2009; Mandell, 2009; Mandell & Klein, 2009; Fernandes et al., 2014; Urban et al., 2018).

Implementing personal education in high schools was found to increase financial knowledge and improve credit card use behavior among young adults (Stoddard & Urban, 2020; Urban et al., 2018), which helped them to assume less financial risk compared to those who have not taken such a course (Lyons, 2003). High school financial education graduation requirements decrease the private loan amount and reduce the likelihood of carrying a credit card balance among student loan borrowers (Stoddard & Urban, 2020). However, other studies implied that financial education had limited effects on financial outcomes (Robb & Sharpe, 2009;

Mandell & Klein, 2009; Cole et al., 2016). As with other education, the influence of financial education decreases over time (Fernandes et al., 2014; Brown et al., 2016) and might not be effective in complex financial matters (i.e., investment or retirement planning) (Alsemgeest, 2015) or for reducing high-cost borrowing behaviors (Bruhn et al., 2016). Those who received financial education provided by employers have demonstrated behavior positively associated with financial literacy (Bayer et al., 2009; Bernheim & Garrett, 2003; Kim, 2008; Kim et al., 2005), such as increased contributions to retirement accounts (Bayer et al., 2009), higher financial well-being (Garman et al., 1999), and greater likelihood to budget, manage asset allocation, and plan for retirement (Prawitz & Cohart, 2014). Overall, the effectiveness of financial education continues to be a variable of interest among researchers.

The current study also examines informal financial education, or parental financial socialization, in relation to student loan outcomes. Parental financial education during childhood is associated with a higher prevalence of healthy financial behaviors in emerging adulthood (LeBaron et al., 2020). The literature suggested that parental financial socialization has a profound influence on the financial capability, behavior, and well-being of adult children (e.g., Cole et al., 2014; Jorgensen et al., 2017; Kim & Chatterjee, 2013; Shim et al., 2009). Financial socialization is defined as acquiring knowledge about money, learning attitudes, money-related beliefs, and money management in various financial practices such as banking, budgeting, saving, insurance, credit borrowing and developing the skills necessary to manage one's financial resources (Kim & Chatterjee, 2013; Solheim et al., 2011). Previous studies indicated that communication with parents about money was significantly associated with financial knowledge and behavior of young adults, including saving and borrowing, investment, and insurance (Afsar et al., 2018; Jorgensen & Salva, 2010; Kim & Chatterjee, 2013; Kim et al., 2011; Lusardi et al., 2010). Furthermore, such influences remained important, even when the children were attending college away from home (Shim et al., 2009). In terms of parental informal financial socialization and borrowing behaviors, Pinto et al. (2005) found that the amount of credit information given by parents was negatively associated with the outstanding balance carried by college students on their credit cards, while peer influence, school education, and mass media all showed an insignificant relationship with credit card use. Fan and

Chatterjee (2019) found that parental financial socialization and receiving parental guidance on finances was negatively associated with student loan worries. A recent study affirmed the significance of financial education and indicated that a comprehensive blend of formal education and financial socialization from parents would increase the financial satisfaction of student loan borrowers (Kim et al., 2021).

**H4:** Formal financial education is negatively associated with (a) student loan delinquency and (b) student loan stress, and is positively associated with (c) student loan preparation and (d) student loan satisfaction.

**H5:** Financial socialization from parents is negatively associated with (a) student loan delinquency and (b) student loan stress, and is positively associated with (c) student loan preparation and (d) student loan satisfaction.

## Method

### *Data and Sample*

This study used the 2015 state-by-state National Financial Capability Study (NFCS) to examine the determinants of student loans, including calculating repayment in advance (or loan preparation), being late for repayment (or repayment delinquency), being concerned about repayment (or loan stress), and being satisfied with a borrowing experience (or loan satisfaction). This data set was funded by the FINRA Investor Education Foundation and conducted by Applied Research and Consulting, with an aim to collect information, including financial attitude, financial behavior, and capability of U.S. adults who were aged 18 and older at the time of the survey. Notably, even though a newer wave of NFCS (2018) is currently available, some of the main student loan-related survey questions were removed in the 2018 wave; therefore, in this study, we used the 2015 wave of NFCS.

The analytical sample of this study included 3,735 participants. First, in the overall NFCS sample, those who had student loans for themselves and excluded those who borrowed for their spouses or children included 5,514 respondents. We further restricted our sample to non-full-time students, because most student loan payments are not due before graduation or for full-time enrolled students. Additionally, we only focused on the employed and excluded non-employed respondents such as homemakers, retired, and unemployed

and disabled individuals. Lastly, the responses “Don’t know” and “Prefer not to say” were dropped regarding the key variables except for objective financial knowledge. For objective financial knowledge, “Don’t know” and “Prefer not to say” were coded as incorrect answers for each item.

Of all the respondents, the majority (73.60%) worked full-time; 41.26% were aged 25–34, and 25.73% were aged 35–44. Around 57% were female, 63% were White, 45.81% were married, 47.58% reported holding a college degree, 22.38% reported holding a post-graduate degree, and 38.53% had an annual income between \$35,000 to \$75,000. Lastly, 49.32% had financially dependent children.

### **Dependent Variables**

Four dependent variables related to student loans were examined in this study: (a) being late for repayment (loan delinquency), (b) being concerned about repayment (loan stress), (c) calculating repayment in advance (loan preparation), and (d) being satisfied with borrowing experience (loan satisfaction). First, being late for repayment, or loan delinquency, was measured by the question: “*How many times have you been late with a student loan payment in the past 12 months?*” in which responses of “once” and “more than once” were coded as 1 and otherwise 0. Second, feeling concerned about repayment, or repayment stress, was measured using the question: “*Are you concerned that you might not be able to pay off your student loans?*” It was coded as a binary variable with 1 if the participant answered “yes” and 0 if he or she answered “no.” Additionally, respondents were asked, “*Before you got your most recent student loan, did you try to figure out how much your monthly payments would be?*” which was coded as a binary variable to determine calculating advance repayment, with 1 indicating the respondent tried to figure out monthly payments, and 0 otherwise. Lastly, being satisfied with the borrowing experience was measured as a binary variable, using the question: “*If you could go through the process of taking out loans to pay for your education all over again, would you take the same actions or make a change?*” It was coded as 1 if answered “take the same actions,” as a proxy for borrowing satisfaction, and coded 0 if answered “make a change,” indicating dissatisfaction. “Don’t know” and “Prefer not to say” responses were dropped from the analyses for these variables.

In the current study, about one-third (29.14%) of the participants reported being late on student loan repayment.

More than half (52.29%) confirmed that they had concerns about not being able to pay off their student loan debt. 40.93% of respondents reported having calculated repayment before applying for student loans. Only 33.68% would choose the same action if they were to go through the loan borrowing process again, indicating overall borrowing satisfaction.

### **Independent Variables**

**Financial Capability.** Objective financial knowledge, subjective financial knowledge, and perceived financial capability were the three aspects used to reflect financial capability. First, objective financial knowledge in this study was measured using six questions that objectively examined the respondents’ knowledge of fundamental financial concepts, such as numeracy, inflation, bond and stocks, compounding rate, mortgage, and diversification. Possible objective financial knowledge scores ranged from 0 (answered all wrong) to 6 (correctly answered all six questions). The respondents’ average objective financial knowledge was 3.08 on a 0–6 scale.

Second, subjective financial knowledge was measured using the question: “*On a scale from 1 to 7, where 1 means very low, and 7 means very high, how would you assess your overall financial knowledge?*” Responses ranged from 1 (very low) to 7 (very high). Lastly, perceived financial capability was measured using a single question: “*How strongly do you agree or disagree with the following statement? I am good at dealing with day-to-day financial matters, such as checking accounts, credit and debit cards, and tracking expenses.*” Responses ranged from 1 (strongly disagree) to 7 (strongly agree). The averages of subjective financial knowledge and perceived financial capability were 5.28 and 5.66, each on a 1–7 scale.

**Financial Education.** Formal financial education was constructed as a binary variable, with 1 indicating that the respondent participated in financial education offered by a school, college, or a workplace, and 0 otherwise. Informal financial influence from parents, or financial socialization, was also used as a binary variable, with 1 meaning “Yes” to the question “*Did your parents or guardians teach you how to manage your finances?*” and 0 if answered “No.” Among all sample participants, only 33.68% reported receiving formal financial education, and 47.42% said their parents or guardians taught them how to deal with finances.

### *Control Variables*

Completion of a student loan education program and whether the respondents had student loans through federal, private, or a combination of federal and private sources were included as control variables, each coded as binary variables. In this study, 64.74% reported having completed their educational program for which they borrowed the loan; 61.78% took out only federal student loans, 11.60% took out only private student loans, and 26.62% borrowed a combination of both federal and private student loans.

Moreover, sociodemographic characteristics including age, gender, race, marital status, educational attainment, income, working status, and having financially dependent children were also controlled in this study. “Don’t know” and “Prefer not to say” responses were dropped. The detailed descriptive statistics are presented in Table 1.

### *Statistical Analyses*

To examine the determining roles of financial capability and financial education, we use probit regression models for the

**TABLE 1. Descriptive Statistics (2015 NFCS)**

<b>Variables (continuous)</b>	<b>Obs</b>	<b>Mean</b>	<b>Std Dev</b>
Objective financial knowledge (0–6)	3,735	3.08	1.56
Subjective financial knowledge (1–7)	3,678	5.28	1.21
Perceived financial capability (1–7)	3,701	5.66	1.40
<b>Variables (dichotomous)</b>	<b>Obs</b>	<b>%</b>	
Loan delinquency	3,569	29.14	
Loan stress	3,563	52.29	
Loan preparation	3,582	40.93	
Loan satisfaction	3,260	33.68	
Formal financial education	3,337	30.33	
Informal parental socialization	3,619	47.42	
Types of loans	3,543		
Federal only		61.78	
Private only		11.60	
Both federal and private		26.62	
Completed education	3,673	64.74	
Employment status	3,735		
Full-time employed		73.60	
Part-time employed		17.05	
Self employed		9.34	
Age			
18–24	3,735	16.76	
25–34		41.26	
35–44		25.73	
45–54		11.35	
55–64		4.39	
65+		0.51	
White	3,735	62.84	
Female	3,735	56.95	
Married	3,735	45.81	
Education	3,735		

(Continued)

**TABLE 1. Descriptive Statistics (2015 NFCS) (Continued)**

Variables (continuous)	Obs	Mean	Std Dev
High school and lower		7.04	
Some college		23.00	
College degree		47.58	
Post graduate		22.38	
Income	3,735		
less than 35k		29.59	
35k–75k		38.53	
75k+		31.89	
Having dependent children	3,735	49.32	

*Note.*  $N = 3,735$ . Unweighted.

four binary dependent variables, including (a) being late for repayment, (b) concerned about repayment, (c) calculating repayment in advance, and (d) borrowing satisfaction. Probit models are nonlinear regressions, and the coefficients are fitted with maximum likelihood. We assume that the probit model takes the following form:

$$Pr(Y_i = 1|FC, FE, CV) = \Phi(FC'_i\beta_{FL} + FE'_i\beta_{FE} + CV'_i\beta_{CV}),$$

where  $Pr$  denotes probability, and  $\Phi$  is the cumulative distribution function of the standard normal distribution.  $FC$  and  $FE$  are the financial capability and education variables.  $CV$  includes control variables and intercept.  $\beta$ s are regression coefficients for these variables. This probit model is equivalent to the following latent variable model, estimated as:

$$Y_i^* = FC'_i\beta_{FL} + FE'_i\beta_{FE} + CV'_i\beta_{CV} + \varepsilon_i,$$

where  $Y_i = 1$  if  $Y_i^* > 0$  and  $Y_i = 0$  if  $Y_i^* \leq 0$ . The dependent variable  $Y_i^*$  is an unobserved continuous real-valued variable for respondent  $i$ . The observed outcome of the binary choice  $Y_i$  is equal to 1 if an affirmative response is provided and 0 otherwise. Before conducting probit regressions, variance inflation factors (VIF) were obtained, and no multicollinearity issue was identified. The VIF results are available upon request from the authors.

## Results

### Probit Regression Results

Tables 2–5 present the probit regression results for the four dependent variables, with coefficients, standard errors, and marginal effects reported. Marginal effects were calculated

at sample means. The regression results reported were unweighted. The weighted results showed slight differences in coefficients and p-values but remained consistency for the significance levels and the directions of the associations. The weighted results are available upon request from the authors.

**Loan Delinquency—Who Made Late Repayment?** Table 2 shows the probit regression results for repayment delinquency. The objective ( $\beta = -0.115, p < .000$ ) and subjective ( $\beta = 0.071, p = .003$ ) financial knowledge showed opposite relationships with the likelihood of having late student loan payments. Providing an additional correct answer to the objective knowledge questions was associated with 3.8% decrease in the probability of being late for loan repayment, whereas an additional point increase in the subjective financial knowledge scale was associated with a 2.4% increase in probability. Perceived financial capability was negatively related to late repayment behavior ( $\beta = -0.125, p < .000$ ), and the marginal effect showed that an additional point increase in the perceived financial capability was associated with a 4.2% decrease in the probability of engaging in late repayment. Interestingly, formal financial education received from schools or workplaces showed a positive association with being late for repayment ( $\beta = 0.115, p = .040$ ), and those who obtained financial education were 3.9% more likely to make a late student loan repayment.

Moreover, compared with those holding federal-only loans, those who had private loans and a combination of federal and private loans were more likely to be late on loan repayment. Self-employed borrowers were more likely than full-time working borrowers to be late on loan repayment. Older



**TABLE 2. Probit Regression Results for Student Loan Delinquency (2015 NFCS)**

Variable	Coef.	SE	<i>p</i>	Sig.	dy/dx
Objective financial knowledge	-0.115	0.018	0.000	***	-0.038
Subjective financial knowledge	0.071	0.024	0.003	**	0.024
Perceived financial capability	-0.125	0.020	0.000	***	-0.042
Formal financial education	0.115	0.056	0.040	*	0.039
Informal parental socialization	0.040	0.054	0.452		0.013
Types of loans (Ref: Fed only)					
Private only	0.176	0.079	0.027	*	0.061
Both federal and private	0.201	0.060	0.001	**	0.069
Completed education	-0.037	0.062	0.550		-0.012
Employment (Ref: Full-time employed)					
Part-time employed	-0.042	0.076	0.583		-0.014
Self employed	0.275	0.089	0.002	**	0.097
Age (Ref: 18–24)					
25–34	0.390	0.084	0.000	***	0.131
35–44	0.475	0.094	0.000	***	0.167
45–54	0.422	0.108	0.000	***	0.152
55–64	1.039	0.133	0.000	***	0.393
65+	0.721	0.348	0.038	*	0.273
White	-0.134	0.054	0.014	*	-0.045
Female	-0.127	0.053	0.017	*	-0.042
Married	0.097	0.062	0.120		0.032
Education (Ref: High school and lower)					
Some college	-0.342	0.111	0.002	**	-0.107
College degree	-0.471	0.107	0.000	***	-0.155
Post graduate	-0.686	0.119	0.000	***	-0.200
Income (Ref: less than 35k)					
35k–75k	-0.018	0.069	0.791		-0.006
75k+	-0.200	0.081	0.013	*	-0.065
Having dependent children	0.291	0.059	0.000	***	0.097
Constant	0.094	0.183	0.608		
Log Likelihood	-1632.052				
Likelihood ratio Chi-squared	316.920	<i>df</i> = 24	<i>p</i> < .000		
Pseudo R-squared	0.089				
Observations	2,964				

\* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001. Unweighted.

borrowers, compared with those aged 18–24 and those who had financially dependent children, were more likely to report being late on repayment. White women and those with education levels higher than high school were less likely to report late loan repayment.

**Loan Stress—Who Were Concerned About Loan Repayment?** Table 3 presents the results for student loan stress or concern regarding being unable to pay off the loans. Those with higher objective financial knowledge ( $\beta = -0.122, p < .000$ ) and higher perceived financial capability

**TABLE 3. Probit Regression Results for Student Loan Stress (2015 NFCS)**

Variable	Coef.	SE	<i>p</i>	Sig.	dy/dx
Objective financial knowledge	-0.122	0.017	0.000	***	-0.049
Subjective financial knowledge	-0.012	0.023	0.610		-0.005
Perceived financial capability	-0.084	0.020	0.000	***	-0.034
Formal financial education	-0.030	0.053	0.574		-0.012
Informal parental socialization	0.081	0.050	0.107		0.032
Types of loans (Ref: Fed only)					
Private only	-0.281	0.077	0.000	***	-0.112
Both federal and private	0.219	0.057	0.000	***	0.086
Completed education	0.048	0.060	0.418		0.019
Employment (Ref: Full-time employed)					
Part-time employed	0.082	0.073	0.257		0.033
Self employed	0.159	0.086	0.065		0.063
Age (Ref: 18–24)					
25–34	-0.035	0.077	0.645		-0.014
35–44	0.023	0.087	0.796		0.009
45–54	0.121	0.100	0.227		0.048
55–64	0.296	0.130	0.023	*	0.115
65+	0.000	0.341	1.000		0.000
White	-0.216	0.052	0.000	***	-0.085
Female	0.054	0.050	0.282		0.022
Married	0.058	0.059	0.321		0.023
Education (Ref: High school and lower)					
Some college	-0.137	0.110	0.211		-0.055
College degree	-0.123	0.106	0.248		-0.049
Post graduate	-0.180	0.116	0.123		-0.072
Income (Ref: Less than 35k)					
35k–75k	-0.323	0.066	0.000	***	-0.128
75k+	-0.615	0.077	0.000	***	-0.242
Having dependent children	0.291	0.056	0.000	***	0.116
Constant	1.270	0.180	0.000	***	
Log Likelihood	-1875.688				
Likelihood ratio Chi-squared	343.180	<i>df</i> = 24	<i>p</i> < .000		
Pseudo R-squared	0.084				
Observations	2,960				

\**p* < .05; \*\*\**p* < .001. Unweighted.

( $\beta = -0.084$ ,  $p < .000$ ) were less likely to report such concern. Specifically, all other aspects constant, providing an additional correct answer to the objective knowledge questions was associated with a 4.9% decrease in the probability of feeling concerned about student loans, and an additional point increase in the perceived financial capability scale was associated with a 3.4% decrease in the probability.

Compared with federal loan borrowers, those who had private loans were less likely to report feeling concerned about student loan repayment, whereas those who had a combination of federal and private loans were more likely to have such default concerns. Those aged 55–64 were particularly more likely to be stressed over student loan repayment compared with 18–24 aged individuals. Being White and

**TABLE 4. Probit Regression Results for Student Loan Preparation (2015 NFCS)**

Variable	Coef.	SE	<i>p</i>	Sig.	dy/dx
Objective financial knowledge	-0.082	0.017	0.000	***	-0.032
Subjective financial knowledge	0.159	0.023	0.000	***	0.062
Perceived financial capability	-0.018	0.020	0.359		-0.007
Formal financial education	0.138	0.053	0.009	**	0.054
Informal parental socialization	0.366	0.050	0.000	***	0.143
Types of loans (Ref: Fed only)					
Private only	0.212	0.077	0.006	**	0.084
Both federal and private	0.069	0.057	0.222		0.027
Completed education	0.389	0.061	0.000	***	0.150
Employment (Ref: Full-time employed)					
Part-time employed	-0.004	0.072	0.956		-0.002
Self employed	0.127	0.087	0.146		0.050
Age (Ref: 18–24)					
25–34	-0.322	0.076	0.000	***	-0.125
35–44	-0.369	0.087	0.000	***	-0.141
45–54	-0.338	0.100	0.001	**	-0.128
55–64	-0.419	0.133	0.002	**	-0.155
65+	0.119	0.329	0.718		0.047
White	-0.164	0.052	0.001	**	-0.065
Female	-0.140	0.051	0.006	**	-0.055
Married	0.068	0.059	0.250		0.027
Education (Ref: High school and lower)					
Some college	-0.231	0.113	0.040	*	-0.089
College degree	-0.375	0.110	0.001	**	-0.146
Post graduate	-0.352	0.120	0.003	**	-0.135
Income (Ref: Less than 35k)					
35k–75k	0.005	0.066	0.940		0.002
75k+	-0.017	0.077	0.824		-0.007
Having dependent children	0.199	0.056	0.000	***	0.078
Constant	-0.550	0.178	0.002	**	
Log Likelihood	-1851.625				
Likelihood ratio Chi-squared	367.950	<i>df</i> = 24	<i>p</i> < .000		
Pseudo R-squared	0.090				
Observations	2,978				

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001. Unweighted.

having an annual income higher than \$35,000 indicated less likelihood of being stressed, but having financially dependent children was positively related to being stressed about student loans.

**Loan Preparation—Who Calculated Repayment in Advance?** Regression results for student loan preparation

are shown in Table 4. While objective financial knowledge was negatively associated with calculating repayment in advance ( $\beta = -0.082, p < .000$ ), subjective financial knowledge showed a positive relationship ( $\beta = 0.159, p < .000$ ). The marginal effects showed that, all other items constant, providing an additional correct answer to the objective knowledge questions was associated with a 3.2% decrease

**TABLE 5. Probit Regression Results for Student Loan Satisfaction (2015 NFCS)**

Variable	Coef.	SE	<i>p</i>	Sig.	dy/dx
Objective financial knowledge	-0.066	0.018	0.000	***	-0.024
Subjective financial knowledge	0.104	0.025	0.000	***	0.038
Perceived financial capability	0.007	0.021	0.733		0.003
Formal financial education	-0.072	0.056	0.202		-0.026
Informal parental socialization	0.341	0.054	0.000	***	0.123
Types of loans (Ref: Fed only)					
Private only	-0.175	0.080	0.029	*	-0.061
Both federal and private	-0.390	0.062	0.000	***	-0.135
Completed education	0.272	0.065	0.000	***	0.096
Employment (Ref: Full-time employed)					
Part-time employed	0.059	0.078	0.451		0.022
Self employed	0.055	0.093	0.551		0.020
Age (Ref: 18–24)					
25–34	-0.245	0.081	0.003	**	-0.088
35–44	-0.263	0.093	0.004	**	-0.092
45–54	-0.356	0.110	0.001	**	-0.120
55–64	-0.576	0.154	0.000	***	-0.179
65+	-0.163	0.333	0.624		-0.057
White	0.076	0.055	0.171		0.027
Female	-0.131	0.054	0.015	*	-0.048
Married	-0.047	0.063	0.455		-0.017
Education (Ref: High school and lower)					
Some college	-0.346	0.117	0.003	**	-0.119
College degree	-0.484	0.112	0.000	***	-0.173
Post graduate	-0.405	0.123	0.001	**	-0.139
Income (Ref: Less than 35k)					
35k–75k	0.269	0.073	0.000	***	0.098
75k+	0.504	0.083	0.000	***	0.187
Having dependent children	0.152	0.060	0.011	*	0.055
Constant	-0.708	0.193	0.000	***	
<hr/>					
Log Likelihood	-1608.321				
Likelihood ratio Chi-squared	305.190	<i>df</i> = 24	<i>p</i> < .000		
Pseudo R-squared	0.087				
Observations	2,736				

\* *p* < .05; \*\* *p* < .01; \*\*\* *p* < .001. Unweighted.

in the probability of calculating student loan repayment in advance. In contrast, an additional point on the subjective knowledge scale was associated with a 6.2% increase in probability. Additionally, both formal ( $\beta = 0.138, p = 0.009$ ) and informal parental socialization ( $\beta = 0.366, p < .000$ ) showed positive associations with the calculating repayment before the application for student loans. Specifically,

those who received financial education from schools or workplaces were 5.4% more likely and those who were financially socialized with their parents were 14.3% more likely to calculate loan repayment in advance.

Table 4 also reports the results for control variables. Compared with those holding federal-only loans, those who

had private loans were more likely to calculate monthly payments before borrowing. Those who completed a degree using an education loan were more likely to report calculating monthly payments during the pre-loan stage. Older borrowers, those who were aged 25–64 (compared with those aged 18–24), women, those who were White, and those who had higher educational attainment (compared with having high school or lower) were negatively associated with calculating repayment amount in advance, while having financially dependent children showed a positive association.

***Loan Satisfaction—Who Were Satisfied with the Borrowing Experience?*** Results for student loan borrowing satisfaction are shown in Table 5. Objective financial knowledge showed a negative association with the likelihood of taking the same action if respondents were to re-borrow the loan ( $\beta = -0.066, p < .000$ ), while subjective knowledge showed a positive relationship with the likelihood of reporting overall borrowing satisfaction ( $\beta = 0.104, p < .000$ ). The marginal effect results showed that providing an additional correct answer to the objective knowledge questions was associated with a 2.4% decrease in the probability of being satisfied with the borrowing experience, and an additional point increase in the subjective financial knowledge scale was associated with 3.8% increase in that probability. Informal financial education received from parents showed a positive relationship ( $\beta = 0.314, p < .000$ ), and those who received parental financial socialization were 12.3% more likely to be satisfied with their student loan borrowing experience.

Compared with federal-loan-only borrowers, those who borrowed private student loans or a combination of federal and private loans were less likely to be satisfied with their borrowing experience. Completion of the degree was a positive indicator of borrowing satisfaction. Women, those who were aged 25–64, and those who had education levels higher than high school were less likely to be satisfied with their borrowing experiences. Contrarily, those with an income higher than \$35,000 and those with financially dependent children were more likely to be satisfied with their student loan borrowing experience.

### **Discussions, Limitations, and Implications**

This study examined the roles of financial capability and financial education in relation to student loan preparation, delinquency, stress, and satisfaction. We measured three aspects of financial capability, including objective and

subjective financial knowledge and perceived money-management skills. Regarding financial education, both formal education from school and informal financial socialization from parental teaching were examined. The findings of this study showed that objective financial knowledge is negatively associated with making late repayments and loan stress, thus supporting H1(a) and (b), but it is also negatively associated with calculating repayment in advance and borrowing satisfaction, thereby not supporting H1(c) and (d). The negative relationship between financial knowledge and being late for student loan repayments and feeling stressed about student loans is consistent with the literature on financial stress and risky financial behavior (e.g., Fan & Chatterjee, 2019; Lusardi & Tufano, 2015).

One possible explanation of the negative relationship between objective knowledge and loan preparation is that people with higher financial knowledge can be prone to assess their needs for student loans in a more comprehensive way than the oversimplified calculation of whether they are likely to afford the monthly payments several years down the road, especially since lenders offer various repayment plans based on each borrower's circumstances. It could be more interesting to examine more sophisticated student loan preparation practices other than only monthly repayment calculation. Future studies could explore this research path if the data on borrowers' behavior with more advanced loan preparation practices is available. Finally, unexpectedly, our findings suggest a negative relationship between objective financial knowledge and student loan borrowing satisfaction. This could be because the satisfaction measure is a retrospective assessment for the borrowing experience, and more financially literate individuals could be more likely to regret and be stressed about student loans. This could also indicate that it is necessary to examine subdomains of financial satisfaction using various measures such as borrowing experience satisfaction with credit cards, car loans, and income.

Subjective financial knowledge was found to be positively associated with being late for student loan repayment, calculating student loan repayment in advance, and student loan borrowing satisfaction, thus only supporting H2(c) and (d). The findings confirmed that subjective financial knowledge is a strong indicator of borrowing behaviors (Allgood & Walstad, 2011; Fan & Chatterjee, 2017; Robb & Woodyard, 2011). In line with previous studies (e.g., Nguyen et al.,

2017; Kramer, 2016; Robb & Woodyard, 2011; Xiao, Ahn, et al., 2014; Xiao, Chen, et al., 2014), we also identified inconsistency in the roles of objective and subjective financial knowledge. Moreover, more research is needed to further investigate the positive relationship between subjective knowledge and the likelihood of making late loan payments, which could be associated with inaccuracies in the self-assessment of financial knowledge.

The results showed that perceived financial capability was negatively associated with being late for student loan repayment and concerned about repayment, thereby supporting H3 (a) and (b). This finding suggested that individuals' confidence in money management may help their ability to engage in better financial practices, which was also found in previous studies (Tang & Baker, 2016; Xiao & Porto, 2017). However, inconsistent with the findings from Shim et al. (2019), which implied that individuals with low financial self-efficacy could face higher psychological stress, we found that, specifically regarding student loan stress, perceived financial capability showed a negative relationship with stress induced by such debt.

The study shows that those with higher objective knowledge and perceived financial capability were less likely to make a late student loan payment and feel stressed about their student loans. On the other hand, those with better subjective financial knowledge and informal financial education from parents were more likely to calculate student loan monthly payments in advance and feel satisfied with their borrowing experiences. Given the variations in the influences of objective and subjective knowledge, perceived financial capability, and formal and informal financial education on student loan outcomes, different emphases can be placed on student loan interventions and education programs to customize the focus on these influential factors.

Surprisingly, we found that formal education received at school or in the workplace were positively associated with being late for student loan repayments, which could be corroborated with previous studies claiming that financial education might have limited and delayed effects on financial outcomes (Brown et al., 2016; Fernandes et al., 2014). We found that both formal education from schools and in the workplace and informal financial socialization from parents were positively associated with calculating monthly repayments in advance, thus supporting H4(c) and H5(c), which

is consistent with previous studies (e.g., Kim & Chatterjee, 2013; Shim et al., 2010; Urban et al., 2018). Furthermore, parental financial socialization was also positively associated with loan satisfaction, thus supporting H5(d), as supported by previous studies (e.g., Fan & Chatterjee, 2019; Kim & Chatterjee, 2013). These findings suggest that well-implemented financial education mandates along with better financial socialization engagements with parents could be an effective mechanism (Fan & Chatterjee, 2019; Fan & Zhang, 2021; Urban et al., 2018).

The results of the current study did not necessarily suggest that financial education programs are ineffective in promoting positive student loan repayment behavior, but they did raise questions regarding how student loan borrowers obtain and utilize financial information from formal educations, what content should be taught through the financial education program, and the duration of the education session to maximize the effectiveness in enhancing financial behaviors. Also, as suggested in Urban et al. (2018), well-funded teacher preparation could be key to successfully implementing financial education programs. Moreover, the timing of financial education also matters. Memory fades, and cognitive abilities, which could worsen with age, could diminish the effect of financial education. It is possible that those who have recently received financial education, formally or informally, can demonstrate better student loan outcomes. It is worth further examination on the timing of financial education and financial outcomes for future studies.

The study also indicates that, compared with those who only borrowed federal loans, those who borrowed from multiple student loan sources (both federal and private) or only from private loans were more likely to exhibit loan-delinquency behavior, which is consistent with Robb et al. (2019). Borrowers using multiple loans or using private loans only were also less likely to feel satisfied with their overall borrowing experience. According to Minsky (2018), the repayment terms for federal student loans are more flexible than private student loan terms and typically have lower interest rates compared with private student loans. A grace period is granted to students who graduated, left school, or dropped below half-time enrollment, depending on the federal student loans type. Federal student loans also offer options to postpone students' loan payments if borrowers are having trouble making payments. Notably, private loan

borrowers were more likely to calculate monthly repayments before borrowing. Interest rates of private loans are set by the lender regarding a student loan borrower's credit score and cosigners on the terms or conditions. This could explain why private-loan-only borrowers compared with fixed-interest-rate federal student loan borrowers were more likely to calculate monthly payments before applying.

This study is limited by the cross-sectional dataset that was used, so the results did not imply any causality. Longitudinal datasets and appropriate methods are needed in the future to examine long-term student loan preparation, repayment behavior, stress, and satisfaction to examine possible causal relationships. For example, long-term surveys from before borrowing through the repayment period could provide better insights into whether borrowing experience could possibly be related to an increase in financial and student loan literacy. Some limitations of this study include the lack of detailed information in the data. For example, we could not account for student loan deferment and/or forbearance options available for borrowers who might have a short-term financial hardship and therefore paused their repayments. Future studies can explore these options if data is available. Another limitation related to data limitation is that the timing of receiving financial education is not available. Given the possibility that the effectiveness of the education information might diminish over time, the limitation of the information could bias the results. Additionally, more advanced measures of student loan preparation practices are also needed to further this area of study. Furthermore, since we focused only on working American non-student borrowers for their own education, the current results could have limitations to be generalized to other student loan borrowers and student loan borrowers in other countries. These limitations could potentially bias the results. In spite of its limitations, the study certainly adds to our understanding of the significant financial capability and education factors associating with student loan outcomes.

Student loan debts have increased significantly over the years. The related evidence presented in this study is intended to help policymakers attempt to understand factors associated with student loan behaviors and loan satisfaction to develop policies to reduce loan delinquency and promote responsible student loan repayment behaviors. The findings encourage improvements in the current financial education curricula and programs implemented by high schools, colleges, and

workplaces. More research is needed to closely examine financial education programs in order to maximize the effectiveness in enhancing student loan financial behaviors and satisfaction. Based on the significance of parental financial socialization found in this study, parents should recognize their critical roles in shaping student loan behaviors and the attitudes of borrowers. More research is needed to examine how to improve parental involvement and socialization during their informal financial education process with their children at early ages, so that, when entering adulthood, adult children can make informed student loan decisions and demonstrate responsible borrowing behaviors.

For financial counselors and planners, understanding the different roles played by financial capability and the financial education experiences of their clients can provide valuable insight to provide better services based on client characteristics. Financial practitioners can also emphasize the significant role of perceived money management skills and improve financial confidence while providing counseling or planning services, because our findings showed that borrowers with higher confidence in their own financial skills and capabilities were less likely to experience student loan delinquency and stress.

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