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College Costs and Credit Cards: How Student Credit Card Use Influences College Degree Attainment

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Abstract

Since the turn of the twenty-first century, going to college has become increasingly financially difficult in the United States. Tuition prices continued to rise, state funding for higher education declined, and the mean family income declined or stagnated for all but the top 20 percent of families (Goldrick-Rab 2016). In a period where college has risen to be the preeminent way Americans can make a better life for themselves, it is becoming more difficult for Americans to pay for college. Financial aid does not cover as much of the price of college as it once did (Goldrick-Rab 2016), and college students are relying on financing methods like student loans more than ever before. Student loans, however, are not the only credit-based financial strategy college students use to pay for college (Manning 2000, 2005). With the explosion of consumer credit access from the 1980s to the 2000s, college students are using credit cards, many times to bridge gaps in their budgets as they try to pay for college. This paper utilizes data from the Education Longitudinal Study (2002–12) to examine the link between college student credit card use and bachelor's degree attainment and demonstrates that college students who carry a balance on their credit card from month to month have a lower likelihood of completing a bachelor's degree, net of other important factors. Research in the fields of financial counseling and planning, consumer studies, public policy, sociology, and health has explored college student credit card spending behaviors, associated health and educational outcomes, and the influence of family backgrounds on credit card use. This paper extends this existing body of research by considering how college student credit card use influences educational outcomes.

Keywords Credit cards · College students · Bachelor's degree · Higher education finance · Debt

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Introduction

Since WWII, the responsibility for paying for college has transitioned from the government to families. While government support for college funding increased through the passage of the Servicemen's Readjustment Act of 1944 (the GI Bill) and the Higher Education Act in 1965, it has lessened over time. For example, while Pell Grants were initially created to cover the cost of college for low-income students, virtually all current Pell Grant recipients take out loans to cover some portion of their college costs (Goldrick-Rab 2016). At the same time, college tuition has continued to rise, leaving an increasingly large burden of college payment on the shoulders of families (Montalto et al. 2019). As a result, scholars increasingly worry that this shift in who pays for college has introduced significant financial precarity into the college-going process (Goldrick-Rab and Broton 2015). Some students even sacrifice food in order to pay the costs associated with attending college (Broton and Goldrick-Rab 2015).

Loans, however, are not the only method students use to bridge monetary gaps in this area (Montalto et al. 2019). College students are also using credit cards to pay for educational expenses (Nellie Mae 2005; Norvilitis et al. 2006). Because credit cards carry higher average interest rates than educational loans and do not allow users to defer the credit card debt they accumulate, that college students are using such high-risk methods to fund their educational expenses may be an indicator of college students' financially precarious situations. Furthermore, carrying non-deferrable, high-interest debt may have negative consequences that could exacerbate these students' already insecure financial situations (Lyons 2004; Robb and Pinto 2010). For instance, if the immediate pressure of credit card debt dissuades students from persisting in college, they may drop out and be left with college debt but no degree. In contrast, however, access to credit may allow students from low income backgrounds to pay for important educational needs that they may have not had the resources to pay for otherwise. Access to credit might help students who might not have originally attended college due to their financial limitations to attend. Either way, the development of college student credit card access might have important implications for these students' educational outcomes (Letkiewicz et al. 2014; Robb et al. 2012).

Considering the potential role credit cards may play in the life of college students—primarily as a factor influencing educational outcomes—investigating patterns in college student credit card use and its associated outcomes is an important endeavor (Robb et al. 2012). In this paper, I investigate how college students' patterns of credit card use are related to their educational outcomes, particularly their progress to the bachelor's degree.

Broadly, conversations about the ways in which college students finance their degrees inform our understanding of social mobility and inequality because the bachelor's degree is an increasingly important tool for bettering life chances (Rosenbaum 2004). If the way students finance their degree influences their likelihood to attain a degree, we might have a better understanding of the ways in which inequality is perpetuated in society through the educational attainment process. Furthermore, if we better understand how students in financially precarious situations use credit to finance necessary purchases, we might better be able to serve these students and help them acquire the appropriate resources to finance their purchases, including college.

Research in numerous fields has explored college student credit card spending behaviors (Hancock et al. 2013), associated health and educational outcomes (Hogan et al. 2013; Nelson et al. 2008), and the influence of family backgrounds on credit card use (Norvilitis and MacLean 2010). This paper aims to extend this existing body of research by considering

how college student credit card use influences educational outcomes, particularly that of college graduation.

Gaining a deeper understanding of college student credit card use will ultimately shed light on the ways in which college students deal with economic insecurity while pursuing higher education and will inform our understanding of how methods of financing a college degree influence degree attainment. Because attaining a college degree is increasingly seen as an essential credential to land a good job (Rosenbaum 2004), disparities in degree attainment connect to disparities in income and wealth levels between social groups. While this paper focuses specifically on college student credit card use, this topic is embedded in and influenced by the broader structure of social inequality and insecurity in the United States. This paper is of interest to higher education scholars interested in how students navigate college and to social scientists interested in the ways in which outside social forces influence the educational attainment process.

College Students and Credit Card Use in the 2000s

Research has investigated the impact of increased credit access among college students by considering their credit card use (Hancock et al. 2013; Hayhoe et al. 2005; Manning 2000). College students are taking on debt to pay for their degree and using credit to finance their purchases. This societal shift is a concern for many. Some sources have called the rampant increase in student loan use and continual rise in cumulative student loan debt a "crisis," (Mitchell and Jackson-Randall 2012). Conversations about college student credit card use share similar concerns that credit card debt only adds to the increasing debt load on students in the young adult stage of the life course.

In addition to using credit cards to pay for educational expenses like textbooks and school supplies, students also use credit cards to fund recreational, leisure, and consumer pursuits while in college (Manning 2000). Considering recent research on students experiencing financially precarious situations in college (Broton and Goldrick-Rab 2016; Goldrick-Rab and Broton 2015), students may use credit cards to fund their purchase of food and other essential needs. Substantial research has investigated college student spending habits and credit card use (Dale and Bevill 2007; Lyons 2004, 2007; Palmer et al. 2001; Wang and Xiao 2009; Xiao et al. 2011), much of it advocating for limiting the influence of credit card companies on college campuses (Burnsed 2010).

Research points to several reasons that college students acquire credit card debt. Some scholars argue that students acquire credit card debt due to deficiencies in financial knowledge or literacy while others argue that students' personality traits or attitudes toward money are related to their likelihood of using credit cards and of using them in an irresponsible manner. One study that aimed to decipher between these two lines of thinking found that financial knowledge and attitudes toward money were both significantly related to student levels of credit card debt (Norvilitis et al. 2006). Several studies consider other factors like demographic differences as potentially influential in the number of credit cards and amount of credit card debt college students acquire, but many of them suffer from omitted variable bias by not including college students' financial situations in their analytical models (Hancock et al. 2013; Norvilitis et al. 2006). Furthermore, the lion's share of the current research takes for granted the assumption that credit card debt is necessarily negative, when credit cards were often used as a catalyst for economic security and mobility

in the 1970s and 1980s for people without access to financial resources during hard times (Hyman 2012).

Research in this area is in need of an empirical investigation of the ways in which college student credit card use fits into the broader picture of the educational attainment process. It is insufficient to only know precursors to college student credit card use. Without considering how this behavior connects to and influences a student's educational attainment, we have an incomplete picture of the role credit cards play in the status attainment process. If students use credit cards as a way to make it through college and to the bachelor's degree, acquiring credit card debt in college may not be as severe of a concern for scholars of educational inequality. However, if college students' credit card spending patterns influence bachelor's degree attainment—particularly if it influences it negatively—college student credit card use may be a mechanism through which social inequality in educational attainment is perpetuated. That is, if college students use credit cards to pay for educational expenses in the face of increasing financial responsibility for their education, and this financial strategy negatively influences their degree attainment chances, this may be evidence that increasing personal financial responsibility in higher education has disproportionately negative effects on those who have lower financial resources.

Attaining a College Degree: What Matters?

Extant research points to several factors that are related to a college student's likelihood of attaining a degree. Research in this area often shows contradictory findings, but several patterns emerge that show certain factors play significant roles in whether a student attains a college degree.

Between-institution differences have been shown to matter for rates of college student degree attainment. For example, students who start college at a two-year institution are less likely than students who start college at a four-year institution to attain a bachelor's degree. However, students who transfer from two-year to four-year schools are just as likely to attain a bachelor's degree as those who begin their education at a four-year school. (Mayhew et al. 2016). Similarly, institutional quality plays a role in the bachelor's degree attainment process. Students who attend more prestigious schools are more likely to attain a bachelor's degree than students who attend less prestigious schools, net of other factors (Alon and Tienda 2005). Other than these major institutional differences, between-institution factors do not seem to influence degree attainment rates as much as within-college factors.

Several within-institution or student-level factors play a role in the college degree attainment process. For example, students who work more hours during college are more likely to leave school during their first year and less likely to attain a bachelor's degree than students who work fewer hours during college (Bozick 2007; Roksa 2011). Furthermore, students who are enrolled part-time are less likely to attain a college degree than students who are enrolled full-time (Roksa and Keith 2008).

Some research investigates the relationship between students' participation in co-curricular activities known as "high-impact" practices and their subsequent levels of engagement (Kuh 2008, 2009). This area of research finds that students who participate in activities like research with a faculty member, study abroad, and mentoring—among other activities—are more engaged in their college experience, and the assumption, then, is that these students will be more likely to persist to complete a college degree. One study that focused

on whether student involvement in these activities actually relates to degree attainment, however, found no link between participation in any particular high-impact practice and degree attainment, but did find a positive relationship between the number of high-impact practices a student participates in and degree attainment (Andrews 2018).

Other student-level factors play a role in the degree attainment process. Mayhew et al. (2016, p. 416) note, "Of all within-college effects, academic achievement in college has the strongest and most consistent impact on retention, persistence, and graduation within various student populations." That is, high-achieving students are more likely to attain a college degree compared to lower-achieving students. Furthermore, students' demographic characteristics are related to their likelihood of attaining a college degree. For example, students from lower-socioeconomic backgrounds, non-White students, and males are less likely to complete a bachelor's degree than students from higher-socioeconomic backgrounds who are White and who are female (Bowen et al. 2009; Buchmann and DiPrete 2006).

Research has paid particular attention to the matter of financial factors playing a role in the college degree attainment process. Because students pay to attend college, a large amount of scholarly attention has been paid to the relationship between students' degree attainment and factors like tuition costs, student loans, and financial aid packages. I consider these findings in a distinct section because of its pertinence to this paper.

Financial Factors

While significant research has studied the connection between financial aid and college students' entry into postsecondary education (Alon 2005; Singell and Stater 2006), as well as the connection between financial aid and student persistence in college (Alon 2007; Goldrick-Rab et al. 2012; Haynes 2008), fewer studies have considered the relationship between financial aid and student's likelihood of completing college. Among those that have, there are mixed findings (Mayhew et al. 2016).

The link between financial aid and college completion varies depending on the type of aid considered. For example, several studies find that grants and scholarships are a particularly effective type of financial aid for increasing students' likelihood of completing a college degree, especially for students who typically have lower graduation rates (e.g. students from lower-socioeconomic backgrounds, students of color) (Alon 2007; Mayhew et al. 2016).

Research on the connection between student loans and college completion is mixed. Some studies show a positive effect of student loans on students' likelihood of graduating (Jackson and Reynolds 2013; Johnson 2013), while others show a negative effect (Kim 2007; Paulsen et al. 2002). Other studies show that college completion outcomes vary by the amount a student borrows in loans (Dwyer et al. 2013,2012; Hu and Kramer II 2015; Zhan 2014). Several of these studies show that students who take on loan debt up to $10,000 experience a positive effect toward graduation, but that loan amounts above $10,000 have diminishing returns for students' likelihood of graduating.

Goldrick-Rab et al. (2009) suggest that findings in this area are conflicted because of the complicated connection between students' background characteristics that make them differentially eligible for financial aid. Since many widely used datasets do not have good measures of both students' background characteristics and their financial aid packages in college, studies find varying effects of financial aid on educational outcomes. Furthermore, some studies suggest that what is most important is not the amount of financial aid offered to a student, but

rather the amount of tuition they are responsible for after their financial aid has been accounted for (Mayhew et al. 2016; Paulsen et al. 2002). That is, no matter the amount of financial aid or types of financial aid a student has access to, disparities in the gap between a student's financial aid package and tuition costs are what influence students' different educational outcomes.

The Current Study

This paper fills a knowledge gap in research related to college student credit card use and college student degree attainment. Research related to college student credit card use considers this behavior largely without considering the possible connection it may have with these students' educational outcomes. Furthermore, research related to college degree attainment largely ignores the role college student credit card use may have in this process. Scant attention has been paid to the connection between college student credit card use and subsequent degree attainment.

In a dated *Chicago Tribune* article, a college administrator remarks, "We lose more students to credit card debt than academic failure," (Rubin 1998). Dale and Bevill (2007, p. 121) write that college students' credit card debt "can lead to [students] dropping out of school," but do not empirically test this claim. To date, one study has specifically addressed the relationship between college students' credit card behavior and their subsequent degree attainment outcomes (Zhan 2014). Zhan finds no statistically significant relationship between students' level of credit card debt and college graduation when taking into account students' educational loans. However, Zhan does not take into account differences in youths' credit card behaviors, specifically that of carrying credit card debt from month to month.

This paper adds necessary information to this conversation by (1) linking academic conversations related to college student credit card use to those related to college degree attainment and (2) extending Zhan's (2014) investigation of this topic with additional empirical questions and an updated data source. This paper is aimed at understanding how students' responses to increased financial responsibility in college (e.g. taking on loans, credit card debt) relate to their educational outcomes. This paper considers questions including: To what extent does credit card ownership (e.g. owning a credit card at all, having several credit cards) relate to educational outcomes like bachelor's degree attainment? To what extent does carrying credit card debt from month to month relate to educational outcomes like bachelor's degree attainment?

Students who carry debt from month to month might experience persistent financial strain as opposed to those who use credit cards and pay off their balance every month. This strain might have an impact on students' educational outcomes because they might make enrollment and persistence decisions based on their financial situations. While I cannot test for this mechanism in the connection between college student credit card use and degree attainment, it provides one theoretical justification for why carrying a revolving credit balance might relate to college students' chances for attaining a bachelor's degree.

Methods

Data

I use data from the Education Longitudinal Study of 2002 (ELS: 2002) to answer this paper's empirical questions. The ELS dataset is a nationally representative dataset from

the National Center for Education Statistics (NCES). The ELS follows students who were in 10th grade in 2002 for 10 years (2012) as they transition into the workforce or go to college, and as they graduate, drop out, get married, work, and make other life transitions. The dataset analyzed during the current study is available in the NCES repository, found at https://nces.ed.gov/surveys/els2002/avail_data.asp. Due to their longitudinal nature, the ELS data are an ideal source for answering this paper's questions. The ELS data are especially useful for this paper's questions related to college students' educational outcomes.

A few years have passed since the 2012 follow up with the ELS respondents and college student credit card use may have changed in that time. This paper still utilizes the ELS data because they are an example of nationally representative data that capture both college student credit card use and subsequent educational outcomes, something that few datasets do. Of the NCES datasets, the ELS is the most recent dataset that captures college students' trajectories through college and has completed all follow ups with respondents.

The ELS data include a nationally representative sample of students who were in 10th grade in 2002 (n = 16,197). Out of the 16,197 total respondents, I selected those respondents who graduated from high school in 2004, enrolled in postsecondary schooling within six months of graduating high school, and were still enrolled in college in 2006. Respondents in this analytical sample also needed to have information on credit card ownership and use, as well as degree attainment by 2012. After limiting analytical models to respondents without missing data on the variables included in the models, the primary analytical sample includes over 5,800 respondents, some who own a credit card in their name and many who do not. Later analytical models are restricted to those students who own a credit card in their name, which means the final analytical models include a smaller sample size of 2773 respondents.

White and Asian students are slightly overrepresented in the analytical sample, while Black and Hispanic students are slightly underrepresented. Female students, students from higher socioeconomic status backgrounds, and higher achieving students are also slightly overrepresented in the analytical sample. Despite these differences, the appropriate ELS panel weights were utilized in all logistic regression models such that sample estimates are weighted to reflect patterns in the total population of students who were high school sophomores in 2002 (National Center for Education Statistics 2014).

Variables

The ELS data have variables that report students' credit card ownership and patterns of use; these variables are central to the analyses of this paper. More specifically, these variables include whether a student owns a credit card in their name, how many credit cards a student has in their name, and whether they carry a balance on their credit card from month to month. These credit card variables are asked to all respondents, whether or not they own a credit card, so all of these variables offer respondents the option of marking that they do not own a credit card in their name. That is, these variables do not simply compare different credit card behaviors among students who own a credit card, but they compare credit card behaviors among students who own credit cards, in reference to students who do not own a credit card. Credit card variables serve as independent variables in the analyses while variables related to students' educational outcomes serve as dependent variables.

In order to measure students' educational outcomes, I use ELS variables that measure the respondent's level of education as of 2012. Respondents' level of education by 2012

is operationalized as a dichotomous variable that divides respondents into those who have attained a bachelor's degree and those who have not.

Important control variables from the ELS data include socioeconomic status, institution type, financial aid variables (e.g. student loan amounts, Pell Grant amounts), full-time or part-time enrollment status, family status that includes the respondent's marital status and whether the respondent has children, and high school GPA/academic achievement variables. The ELS data provide the framework for socioeconomic status variables. Father's level of education, mother's level of education, family income, father's occupation, and mother's occupation are equally weighted and standardized to form one socioeconomic variable with four ordered quartiles. After examining cell counts in each socioeconomic quartile, I operationalized the final socioeconomic status variable as a three-category variable that collapses the bottom two quartiles into one "Lower" category and translates the top two quartiles into "Middle" and "Upper." This operationalization is largely for making the analytical models as parsimonious as possible, but it is also appropriate because after restricting the sample to immediate enrollers who were still enrolled in college in 2006, many students from the lowest socioeconomic quartile were omitted from the analytical sample. Complete variable descriptions and descriptive statistics for all variables can be found under the Variable Descriptions list and Table 1 in the appendix.

Statistical Analyses

First, I offer descriptive analyses that report rates of credit card ownership and use across different groups in the sample. These descriptive analyses are meant to provide an overview of credit card behavior among college student groups in this sample, with a particular focus on credit card ownership patterns and who carries a balance on their credit card from month to month. In addition, these descriptive analyses include a basic bivariate look at the link between carrying a balance on a credit card and attaining a bachelor's degree by 2012. The primary purpose of these analyses is to establish a conceptual baseline for investigation in the subsequent inferential analyses. I use basic statistical techniques like cross-tabulations and chi-square tests for association to note significant patterns in the data within these analyses.

Second, I use logistic regression models to investigate which credit card behaviors are significantly related to bachelor's degree attainment, controlling for other important variables. Logistic regression is an appropriate technique for these analyses because the dependent variable in all models is a binary variable (Long and Freese 2014) that indicates whether a student attained a bachelor's degree by 2012 (0 = student did not attain a bachelor's degree by 2012, 1 = student attained a bachelor's degree by 2012). Binary logistic regression differs from linear regression by calculating the probability that the dependent variable outcome will be equal to 1 as opposed to calculating a numeric outcome along a continuous scale (Long and Freese 2014). In this paper, logistic regression models calculate the probability that respondents attained a bachelor's degree by 2012, given the values for the independent variables in the respective models.

For clarity, the following equation serves as the basis for all logistic regression models in this paper:

$$\Pr\left(Y = 1 | X_1, X_2, \ldots, X_k\right) = F\left(\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k\right)$$

Table 1 Descriptive Statistics for All Variables

Variables	Mean	S.D	Min	Max	N
Respondent has credit card in own name	0.47	0.50	0	1	6,752
How many credit cards respondent has in own name	0.82	1.19	0	7	6,752
Respondent carries balance on credit card from month to month	–	–	0	2	6,732
No credit card	0.53	–	–	–	*3,549*
Credit card, does not carry balance from month to month	0.34	–	–	–	*2,264*
Carries balance from month to month	0.14	–	–	–	*919*
Attained bachelor's degree by 2012	0.64	0.48	0	1	7,124
Socioeconomic status	–	–	0	2	6,800
Lower	0.31	–	–	–	*2,086*
Middle	0.26	–	–	–	*1,787*
Upper	0.43	–	–	–	*2,927*
Race	–	–	0	4	6,800
White	0.65	–	–	–	*4,390*
Asian	0.12	–	–	–	*795*
Black	0.10	–	–	–	*653*
Hispanic	0.10	–	–	–	*666*
Other	0.04	–	–	–	*296*
Female	0.56	0.50	0	1	6,816
Hours worked per week 2005–06	–	–	0	2	6,748
Did not work	0.32	–	–	–	*2,162*
1–20 h	0.39	–	–	–	*2,631*
More than 20 h	0.29	–	–	–	*1,955*
Respondent has biological child or is married or previously married in 2006	0.03	0.16	0	1	6,764
Started at a 4-year postsecondary institutions	0.76	0.43	0	1	7,118
Total Pell Grant amount	–	–	0	2	7,124
No Pell Grants	0.32	–	–	–	*2,260*
$1-$10,000	0.25	–	–	–	*1,768*
Greater than $10,000	0.43	–	–	–	*3,096*
Total loans	–	–	0	2	7,124
No loans	0.36	–	–	–	*2,558*
$1-$10,000	0.15	–	–	–	*1,045*
$10,000	0.49	–	–	–	*3,521*
High school GPA higher than 3.0	0.63	0.48	0	1	6,668
High school composite math/reading score	55.38	8.55	20.91	81.04	7,061

For categorical variables, the total N is provided in regular font, then the N for each category is provided in italics

This equation estimates the probability of Y being 1 given the values of the independent variables, denoted as X_1 through some hypothetical number of variables, X_k. The estimates are calculated with the cumulative standard logistic distribution function (F), using a constant (α), coefficients (β) for each independent variable, and values for each independent variable (X) (Long and Freese 2014).

Another way of viewing this equation that shows a more explicit calculation of the cumulative standard logistic distribution function (F) is as follows:

$$\Pr\left(Y = 1 | X_1, X_2, \ldots, X_k\right) = \frac{1}{1 + \exp\left[-\left(\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k\right)\right]}$$

To be more specific about how this equation connects to the analytical models in this paper, the logistic regression models calculate the probability that a student will graduate with a bachelor's degree in 2012, given the student's values on a number of independent variables (e.g. whether they own a credit card, what socioeconomic status they have, how much student loan debt they have, etc.) For a more explicit understanding of what variables are included in each logistic regression model, see Tables 2 and 3.

One note about the logistic regression output in this paper: all tables present odds ratios as opposed to log odds for the coefficient estimates for each independent variable. I use odds ratios because I find them simpler to interpret in the context of logistic regression output. Odds ratios (for success) are calculated by dividing the probability of success by the probability of failure (Long and Freese 2014):

$$Odds_{success} = \frac{\Pr(success)}{\Pr(failure)}$$

Odds ratios restrict logistic regression coefficients to positive values, with values less than 1 meaning an increase in the independent variable will lead to a decrease in the odds of success in the dependent variable, and values greater than 1 meaning an increase in the independent variable will lead to an increase in the odds of success in the dependent variable. For example, if we are comparing students who do not own a credit card (0) and students who own a credit card (1) in terms of their odds of attaining a bachelor's degree and the logistic regression output says the odds ratio for this variable is 0.5, this would mean that students who own a credit card are half as likely to attain a bachelor's degree compared to students who do not own a credit card. Another way to say this is to say that students who do not own a credit card would be twice as likely to attain a bachelor's degree compared to students who own a credit card. To be clear, this is a hypothetical example to demonstrate interpreting odds ratios, see Tables 2 and 3 for actual logistic regression results.

Finally, as a way to account for the unequal distribution of students who carry a credit card balance from month to month, I use matching to compare students who are similar except for whether they carry credit card debt. Matching methods are meant to solve a common problem when utilizing observational data, namely that covariates may be differently distributed between treatment and control groups (Garrido et al. 2014). In this way, matching can mimic a randomized experiment by pairing respondents who are similar on covariates but different only on the treatment (Stuart 2010). I run matching models for the outcome variable of whether or not students attained a bachelor's degree by 2012. This model uses the credit card variable indicating whether students carry a balance on their credit card from month to month as the treatment variable. That is, this model investigates whether carrying a credit card balance from month to month influences educational outcomes when other relevant variables are equal. This model considers a smaller sample that includes only students who own a credit card.

In terms of the matching model used in this paper, I use Mahalanobis Distance Matching (MDM) as opposed to Propensity Score Matching (PSM). While PSM is a widely used matching method (Melguizo, Kienzl, and Alfonso 2011; Morgan et al. 2010; Rosenbaum

Table 2 Logistic Regression Models for Bachelor's Degree Attainment by 2012, Testing 3 Different Credit Card Predictor Variables (Odds Ratios Reported)

Variables	(1) Owns a Credit Card	(2) Number of Credit Cards	(3) Revolving Balance
Respondent owns a credit card	0.98		
	(0.08)		
Number of credit cards in own name		0.99	
		(0.03)	
Revolving credit balance status (reference category: Respondent owns a credit card but does not carry a revolving balance)			
Respondent does not own a credit card			0.92
			(0.08)
Owns credit card, carries balance from month to month			0.74*
			(0.09)
Socioeconomic status (reference category: Middle)			
Lower	0.84	0.84	0.84
	(0.09)	(0.09)	(0.09)
Upper	1.40***	1.40***	1.39**
	(0.14)	(0.14)	(0.14)
Hours worked weekly 2005–06 (reference category: 1–20 h)			
Did not work	1.06	1.06	1.06
	(0.11)	(0.11)	(0.11)
More than 20 h	0.58***	0.58***	0.58***
	(0.05)	(0.05)	(0.06)
Respondent has biological child, is married or previously married in 2006	0.44**	0.44**	0.46**
	(0.11)	(0.11)	(0.12)
Respondent started at a 4-year institution	2.07***	2.06***	2.07***
	(0.19)	(0.19)	(0.19)
Respondent enrolled part time in 2006	0.30***	0.30***	0.30***
	(0.05)	(0.05)	(0.05)

Table 2 (continued)

Variables	(1) Owns a Credit Card	(2) Number of Credit Cards	(3) Revolving Balance
Total Pell Grant amount (reference category: $1-$10,000)			
No Pell Grants	1.66***	1.66***	1.65***
	(0.18)	(0.18)	(0.18)
Greater than $10,000	1.66***	1.66***	1.66***
	(0.17)	(0.17)	(0.17)
Total student loans (reference category: $1-$10,000)			
No student loans	1.36*	1.36*	1.34*
	(0.17)	(0.17)	(0.17)
Greater than $10,000	2.75***	2.75***	2.79***
	(0.32)	(0.32)	(0.32)
High school GPA higher than 3.0	2.38***	2.38***	2.36***
	(0.20)	(0.20)	(0.20)
High school composite math/reading score	1.03***	1.03***	1.03***
	(0.01)	(0.01)	(0.01)
Constant	0.05***	0.05***	0.06***
	(0.02)	(0.02)	(0.02)
Observations	5,881	5,881	5,867

Standard errors in parentheses

***p < 0.001, **p < 0.01, *p < 0.5

Table 3 Logistic Regression Models for Bachelor's Degree Attainment by 2012, Comparing Results from the Full Sample (Including Students who do not Own a Credit Card) and Results from a Restricted Sample of Students who Own a Credit Card (Odds Ratios Reported)

Variables	(1) Attained Bachelor's Degree–Full Sample	(2) Attained Bachelor's Degree–Credit Card Holders
Revolving credit balance status (reference category: Respondent owns a credit card but does not carry a revolving balance)		
Respondent does not own a credit card	0.92	–
	(0.08)	–
Owns credit card, carries balance from month to month	0.74*	0.73*
	(0.09)	(0.09)
Socioeconomic status (reference category: Middle)		
Lower	0.84	0.84
	(0.09)	(0.12)
Upper	1.39**	1.49**
	(0.14)	(0.22)
Hours worked weekly 2005–06 (reference category: 1–20 h)		
Did not work	1.06	1.00
	(0.11)	(0.15)
More than 20 h	0.58***	0.54***
	(0.06)	(0.07)
Respondent has biological child, is married or previously married in 2006	0.46**	0.55
	(0.12)	(0.22)
Respondent started at a 4-year institution	2.07***	2.05***
	(0.19)	(0.28)
Respondent enrolled part time in 2006	0.30***	0.30***
	(0.05)	(0.07)

Table 3 (continued)

Variables	(1) Attained Bachelor's Degree–Full Sample	(2) Attained Bachelor's Degree–Credit Card Holders
Total Pell Grant amount (reference category: $1-$10,000)		
No Pell Grants	1.65***	1.76***
	(0.18)	(0.27)
Greater than $10,000	1.66***	1.59**
	(0.17)	(0.23)
Total student loans (reference category: $1-$10,000)		
No student loans	1.34*	1.35
	(0.17)	(0.25)
Greater than $10,000	2.79***	2.81***
	(0.32)	(0.47)
High school GPA higher than 3.0	2.36***	2.01***
	(0.20)	(0.25)
High school composite math/reading score	1.03***	1.03**
	(0.01)	(0.01)
Constant	0.06***	0.08***
	(0.02)	(0.04)
Observations	5,867	2,773

Standard errors in parentheses

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

and Rubin 1983, 1985; Titus 2007), some research critiques this method, showing that PSM actually increases imbalance in the dataset and bias in the estimates when it is intended to decrease these components (King and Nielson 2019). In order to account for the weakness of the PSM method, I utilize MDM instead, a matching method shown to reduce model imbalance much more than PSM does (King and Nielson 2019).

Mahalanobis models calculate distance, or how similar two respondents are on the given covariates (Stuart 2010) using the following equation:

$$D_{ij} = (X_i - X_j)' \sum^{-1} (X_i - X_j)$$

This equation calculates the distance (*D*) between two respondents (*i, j*) on a set of covariates (*X*), where $\sum$ represents different variance covariance matrices based on what treatment effect the model calculates (Stuart 2010). Once these distances are calculated, respondents in the control and treatment groups are matched in similarity and compared in terms of the differences in treatment effects on the outcome of interest.

In the context of this paper, carrying a balance on a credit card from month to month is not distributed randomly among the student population, but matching can mimic random distribution of this treatment variable and an experimental design (Austin 2011) because it matches students who are similar based on a set of covariates, and makes counterfactual comparisons regarding educational outcomes between students who carry a balance and students who do not carry a balance on their credit card. For example, the MDM models in this paper measure the similarity of two students on a range of variables (e.g. their socio-economic status, whether they received Pell Grants, how many hours they work per week, etc.), one in the treatment group (carrying a revolving credit balance on their credit card) and one in the control group (owning a credit card, but not carrying a revolving credit balance), then compare how they differ in terms of their educational attainment in 2012. The set of covariates used for the matching process are the same set of covariates used in the logistic regression model #2 in Table 3.

Results

I report results in the order of the empirical analyses as developed and described above. In sum, the descriptive analyses show that credit card ownership is more common among students from the lower socioeconomic status group, students who started at a 4-year institution, and students who work more than 20 h per week. Carrying a balance on a credit card is more common among students from the lower socioeconomic status group, students who started at a less than 4-year institution, and students who work more than 20 h per week. When considering the descriptive connection between college student credit card use and bachelor's degree attainment, students who carry a balance on their credit card from month to month are least likely to attain a bachelor's degree by 2012.

This descriptive finding of the connection between a student carrying revolving credit and lower chances of attaining a bachelor's degree remains constant throughout the empirical models of this paper. Though I test for the connection between bachelor's degree attainment and three different credit card ownership and use variables, carrying a credit balance from month to month is the only credit card-related variable that reports a significant relationship with bachelor's degree attainment. This finding is true in both the logistic regression models and the MDM models.

Credit Card Ownership and Behavior, by Socioeconomic Status (n = 6,438)
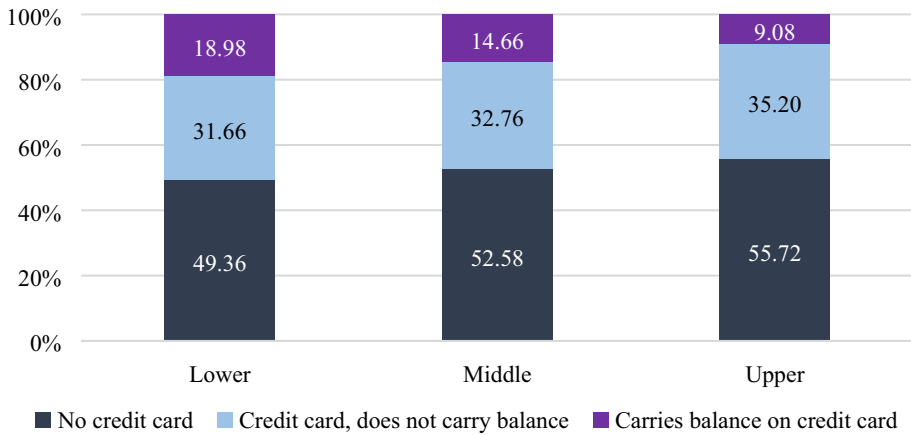
Fig. 1 Credit Card Ownership and Behavior, by Socioeconomic Status (n=6,438) (Color figure online)

Descriptive Analyses

Figures 1 through 3 show patterns in credit card ownership and behavior along important demographic differences. Namely, Fig. 1 examines differences between socioeconomic status groups, Fig. 2 examines differences between students' work status—specifically that of how many hours they work during the school year—and Fig. 3 examines differences by the type of institution a student starts their postsecondary education. Credit card ownership and behavior statistically significantly varies between all of the groups shown in Figs. 1 through 3.

Figure 1 shows notable socioeconomic differences, both in who owns a credit card and who carries a balance on their credit card from month to month. The majority of students from the upper socioeconomic category do not own a credit card in their name. This group of students is also less likely to carry a balance from month to month on their credit card if they do own one. In contrast, students from the lower socioeconomic category are more likely to both own a credit card in their name and carry a revolving balance if they own one.

Figure 2 shows the relationship between students' level of work hours in the 2005–2006 academic year and their credit card ownership and use. Students who work more hours are more likely to own a credit card and carry a balance on their credit card from month to month. Over sixty percent of students who did not work during this academic year did not own a credit card in 2006.

Figure 3 documents differences in students' credit card ownership and use between institution types, specifically whether or not they started their postsecondary education at a 4-year institution or a less than 4-year institution. Students who begin college at a less than 4-year institution are less likely to own a credit card than students who begin college at a 4-year institution. They are, however, more likely to carry a balance from month to month when they do own a credit card.

Credit Card Ownership and Behavior, by Hours Worked Weekly
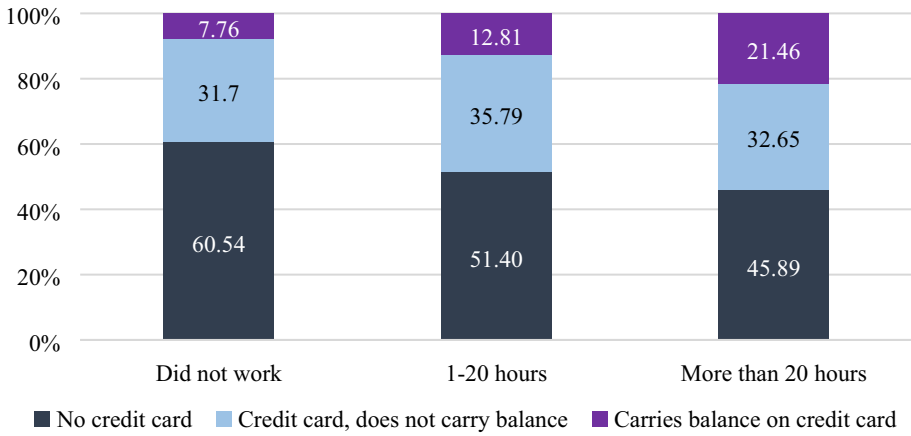during 2005-2006 School Year (n = 6,702)

Fig. 2 Credit Card Ownership and Behavior, by Hours Worked Weekly during 2005–2006 School Year (n = 6,702) (Color figure online)

Credit Card Ownership and Behavior, by Institution
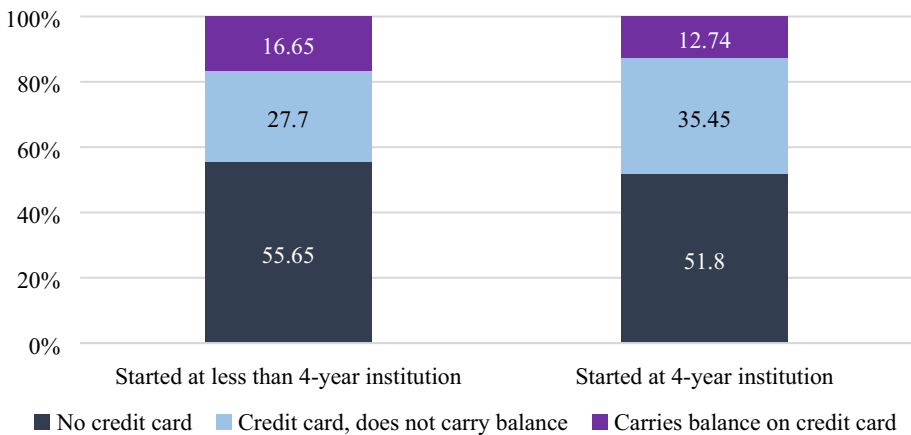(n = 6,730)

Fig. 3 Credit Card Ownership and Behavior, by Institution (n = 6,730) (Color figure online)

All of these figures have shown significant differences between demographic groups in credit card ownership and use. While these demographic differences are interesting, these patterns do not inherently tell us anything about the impact of these differences. Figure 4 shows differences in students' bachelor's degree attainment by 2012, by their credit card

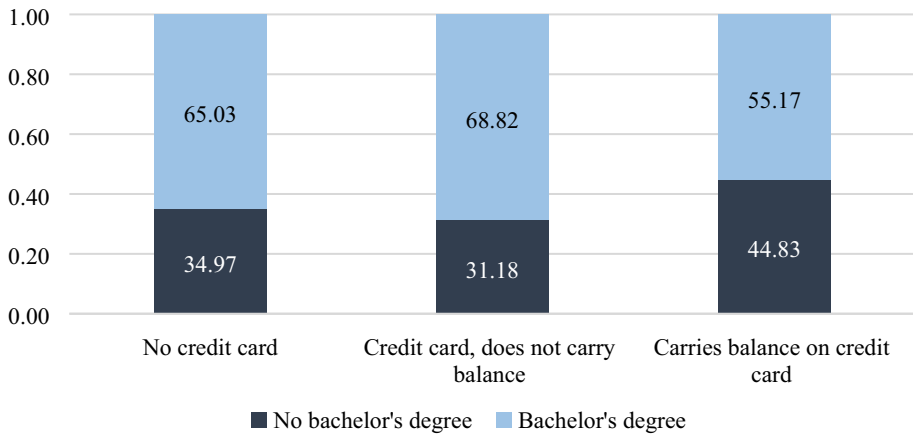Bachelor's Degree Attainment by 2012, by Credit Card Ownership and Behavior (n = 6,732)

Fig. 4 Bachelor's Degree Attainment by 2012, by Credit Card Ownership and Behavior (n=6,732) (Color figure online)

ownership and use variables. Students who carry a balance on their credit card are less likely to attain a bachelor's degree by 2012 compared to students who do not own a credit card and compared to students who own a credit card but do not carry a balance from month to month.

Building on these initial descriptive analyses, the following sections report results from statistical models that interrogate the role of credit card ownership and use within the context of students' educational outcomes.

Logistic Regression Models

Table 2 reports results from three logistic regression models considering the three credit card variables of interest to this paper. Model 1 investigates the link between credit card ownership and bachelor's degree attainment, focused primarily on the predictor variable of whether (1) or not (0) students own a credit card. Model 2 extends this analysis by considering a slightly different predictor variable of how many credit cards a student owns. While the first two logistic regression models focus on credit card ownership, Model 3 investigates how students use their credit cards by including a predictor variable comparing students who do not own a credit card (0), students who own a credit card but pay off their balance every month (1), and students who own a credit card and carry a revolving balance from month to month (2). The primary aim of splitting up the logistic regression models like this is to examine different patterns in educational attainment with attention to whether it is credit card ownership or how students use credit cards that matters most for educational outcomes.

As Table 2 shows, after controlling for a number of other variables, owning a credit card, and carrying several credit cards are not significantly related to students' bachelor's degree attainment.[1]

Students who carry a balance on their credit card from month to month, however, are significantly less likely to attain a bachelor's degree compared to students who own a credit card but do not carry a revolving balance. More specifically, controlling for a host of other factors, students who own a credit card and carry credit card debt from month to month are nearly three-fourths as likely to attain a bachelor's degree as students who own a credit card but do not carry a revolving balance. There is no statistically significant difference, however, in bachelor's degree attainment between students who own a credit card and pay off their balance every month and those who do not own a credit card.

Control variables report expected findings across the four models considered in Table 2. Students from the upper socioeconomic category are more likely to attain a bachelor's degree in 2012 than students from the middle socioeconomic category. These models find no significant difference in bachelor's degree attainment between the lower and middle socioeconomic categories. Working more than 20 h per week, having a biological child or being married or previously married, and being enrolled part time are related to lower chances of attaining a bachelor's degree in 2012. Starting at a 4-year institution and having higher high school academic performance indicators—GPA and standardized test scores—are related to higher chances of attaining a bachelor's degree in 2012.

Interestingly, financial control variables report findings that students with no Pell Grants or no student loans, as well as students with high amounts of Pell Grants or student loans, are both more likely to attain a bachelor's degree than students with moderate amounts of Pell Grants or student loans. These findings may reflect the relatively high financial resources of students without Pell Grants or student loans and the effectiveness of higher Pell Grant or student loan amounts providing financial support for students in financial need during college. In contrast, having a moderate amount of Pell Grants or student loans may indicate a financial need that is not entirely covered by these financial vehicles.

Considering these findings from the logistic regression models, the subsequent analyses exclusively utilize the variable indicating whether students carry a balance on their credit card from month to month to investigate how college student credit card spending behaviors are related to educational outcomes. That is, while research on college student credit card use comes in a variety of forms, this paper focuses specifically on the pattern of students carrying credit card debt from month to month in order to investigate whether the connection between this type of credit card use and students' educational outcomes holds significance in additional empirical models.

Table 3 reports two logistic regression models that focus on the association between carrying a credit card balance from month to month and educational outcomes. Model 1 is a copy of Model 3 in Table 2, placed in Table 3 in order to compare Model 1 findings with

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[1] As a note, prior iterations of these—and all of the following—analytical models included measures of students' race and gender. While there are important theoretical justifications for including these variables in these models because of the way credit card access developed historically (Hyman 2012), these groups consistently did not statistically vary in their bachelor's degree attainment rates. I imagine that these models might have reported significant differences along gender and race lines if they considered data from the 1980s and possibly 1990s when these groups were receiving increased access to credit cards and growing in the amount of credit card owners represented from their respective social groups. In order to present parsimonious models, these variables are excluded from the final analytical models.

Model 2. Model 1 includes all students while Model 2 restricts the analytical sample to students who own a credit card.

The primary purpose for Table 3 is to show the connection between students' credit card behavior and educational outcomes across different subsets of the sample. In prior iterations of Model 1, I explored statistical differences between students who carry a credit balance from month to month compared to students who do not own a credit card as a reference group. These analyses showed no significant difference between these two groups, but shifting the reference group to students who own a credit card but pay off their balances every month revealed a significant difference in bachelor's degree attainment in 2012 between students who carry a balance and students who own a credit card but do not carry a balance. Using this finding as motivation, Model 2 investigates these patterns with a restricted sample of students who own a credit card to further interrogate the difference in bachelor's degree attainment between students who own a credit card but have different patterns of use.

Model 2 reports similar findings as Model 1 and carrying a credit balance from month to month remains a statistically significant indicator of lower bachelor's degree attainment by 2012. Model 2 reports slightly different findings across control variables. The coefficients for students from the upper socioeconomic category, for students with no Pell Grants, and for students with student loans greater than $10,000 all increased but remained significant. The coefficients for students who work more than 20 h per week, for students who started at a 4-year institution, for students with Pell Grants totaling more than $10,000, and for students with a high school GPA higher than 3.0 all decreased but remained significant. In Model 2, students who have a biological child, have been married or have been previously married in 2006 are no longer represented as having significantly different bachelor's degree attainment rates compared to those without children and who have never been married. Similarly, students who have no student loans no longer report significant differences in bachelor's degree attainment by 2012 compared to students with a moderate amount of student loans.

These models offer a comparison of credit card behavior among students who own a credit card in their name and provides the opportunity to investigate this difference in educational outcomes among credit card holders in a matching-based model. The restricted Model 2 in Table 3 sets up the next empirical investigation of this paper. Further comparing differences in credit card use among students who own a credit card might give us unique insights into the significance of carrying a revolving credit balance for students' educational outcomes. The following section translates the models in Table 3 from logistic regression analyses to Mahalanobis Distance Matching models in order to investigate the connection between carrying a revolving credit card balance and educational outcomes further.

Mahalanobis Distance Matching Models

In order to investigate the connection between students' credit card behaviors and their subsequent educational outcomes, I use the quasi-experimental method of MDM to extend the analyses and findings of this paper. Respondents were matched according to the covariates in the logistic regression models and differed in whether they report that they carry a credit card balance from month to month (treatment group) or do not (control group). All students in these MDM models are credit card owners.

Table 4 Mahalanobis Distance Matching Model Using Epanechnikov Kernel Matching for Bachelor's Degree Attainment by 2012, Only Students who Own a Credit Card (Average Treatment Effect for the Treated (ATT) is reported)

Outcome variables	Treated	Controls	Difference	Standard error
Attained bachelor's degree by 2012	.645	.724	− .079***	.030

***p < 0.001, **p < 0.01, *p < 0.05

Table 4 reports findings from an MDM (multivariate-distance kernel matching) model considering the outcome of bachelor's degree attainment by 2012. Kernel matching reduces bias in MDM models by weighting control matches through an inverse association with the matches' respective distances from their treatment counterparts. That is, kernel matching weights matches that are closer together more heavily so that it emphasizes the comparisons that best reflect similar cases on all covariates except for whether students carry a balance on their credit card from month to month. Because of this advantage, I report kernel matching estimates exclusively as opposed to other MDM model types.

The treatment effect of carrying a balance on a credit card is significant and negative when considering bachelor's degree attainment by 2012. As Table 4 shows, the probability of attaining a bachelor's degree by 2012 among students who carry a credit card balance from month to month is 0.645, compared to a 0.724 probability of these students attaining a bachelor's degree had they not carried a credit card balance in college. The treatment effect of carrying a credit card balance from month to month, then, is a decrease in a student's probability of attaining a bachelor's degree by 7.9 percentage points.

Limitations

Perhaps the primary limitation to this study is the way the sample is limited to a select group of college students: students who enrolled in college within six months of graduating from high school and who were still enrolled in college in 2006. Prior work documents the connection between delayed entry into college and degree attainment (Andrews 2018; Bozick and DeLuca 2005; Goldrick-Rab and Han 2011; Roksa and Velez 2012), showing that students who delay entry into college are less likely to attain a bachelor's degree than students who enroll immediately after graduating from high school. By omitting students who delay entry into college, this paper focuses on a group of students who fall into a more "traditional" college attendance pathway. Students' college trajectories are increasingly varied and often interrupted (Goldrick-Rab 2006), and this paper may not speak to this development in college going patterns like it might if delayers were included in the analytical sample.

By restricting the analytical sample to students who enrolled in college within six months of graduating from high school and who were still enrolled in college in 2006, this paper's findings can only speak to the relatively advantaged students who fit this criteria. Nearly 28 percent of students who started college in the fall term of 2014 failed to persist to the fall term of 2015 (National Student Clearinghouse Research Center 2016). A substantial portion of students do not make it to their second year of college, and requiring this paper's analytical sample to still be enrolled in college in 2006 does not capture the educational outcomes of the many students who do not make it that far in college.

Despite these shortcomings, this paper provides important knowledge on the connection between college students' credit card ownership and use and subsequent educational outcomes. In fact, restricting the analytical sample in this fashion allows the empirical models to speak with more authority on the connection between credit card use and educational outcomes. Because the ELS survey asks students about their credit card use in 2006, including students who were not enrolled in college in 2006 in the analytical sample does not appropriately reflect college student credit card use patterns. Furthermore, limiting the sample to students who enrolled in college within six months of graduating from high school helps to standardize the time the analytical models gives students to attain a bachelor's degree, which levels the playing field for possible educational outcomes by giving all students eight years to attain a bachelor's degree. These analytical decisions may limit this paper's ability to speak to the broad range of college students attending college with varying enrollment trajectories, but it allows the empirical models to speak specifically to the connection between college student credit card use—while in college—and educational outcomes like bachelor's degree attainment.

Discussion

The analyses conducted in this paper reveal several important findings. Namely, *that* college students use credit cards is not as problematic as *how* college students use credit cards. Carrying a credit balance from month to month appears to be a particularly problematic way to use credit cards. Also, even after controlling for and matching on financial aid variables like Pell Grant and student loan amounts, college student credit card use still has an impact on students' educational outcomes. Significant attention has been paid to the influence of grants and student loans on the college-going and college-completing process (Goldrick-Rab 2016; Mayhew et al., 2016), but this paper suggests that additional financial factors like students' credit card use should be considered in this area of research as well.

The results show consistent statistical differences in educational outcomes between students who own a credit card and carry a revolving credit balance and the two other student groups investigated in this paper: students who own a credit card and do not carry a credit balance from month to month and students who do not own a credit card. Students who carry a revolving credit balance on their credit card are consistently less likely to attain a bachelor's degree by 2012 compared to students who own a credit card but pay off their monthly credit balances.

This finding is potentially a cause for concern if, as shown in the descriptive analyses in Figs. 1 through 4, disadvantaged groups are more likely to carry a credit balance from month to month. If carrying a balance on a credit card is disproportionately common among underrepresented and marginalized student groups, this may be another obstacle to college graduation that could drive inequality in educational outcomes. Credit cards have become a widespread method for bridging gaps in family budgets in the face of stagnating wages and labor market opportunity, especially for those who have fewer financial resources (Hyman 2012; Manning 2000). This paper shows that, at least among college students who enroll in college soon after graduating high school, carrying a revolving credit balance is detrimental to achieving important educational outcomes, even after controlling for financial variables like amount of Pell Grants and student loans a student has by 2012.

While I do not test questions related to why students carry a revolving credit card balance, history and research have shown that credit card companies encourage and reward

credit card holders who carry a balance from month to month because they are the most profitable customers, especially if they are from lower financially-resourced backgrounds because of the higher interest rates attached to their accounts (Hyman 2012). As college students find themselves navigating the financial landscape of higher education as tuition increases are common and state funding for postsecondary education is stagnating, credit card companies have stepped in to offer easy access to needed money. This paper, however, shows that we should be concerned if students are using this credit access to fund their education, thinking that it will help them build better lives by helping them get through college, and yet reaping negative consequences from their credit card use.

Students who get into debt from college but do not attain a college degree are left between a rock and a hard place because they have debt without any ability to translate that investment into additional labor market value. Similarly with credit card debt, students who use credit cards to fund their college degree, whether directly or indirectly, might temporarily have greater access to education that they might not otherwise be able to afford, but have higher chances of not being able to complete a college degree. In this case, these students are left with high-interest, non-deferrable debt that influences their ability to acquire financial resources in order to fund future important purchases and straps their current financial options with the burden of ever-growing debt.

The MDM models show that the influence of carrying a credit card balance from month to month decreases a student's likelihood of completing important educational outcomes by nearly eight percentage points. Controlling for other variables that have been shown to influence bachelor's degree attainment, how college students utilize credit cards seems to be an important factor for higher education practitioners to consider when support college students toward graduation.

Conclusion

This paper adds additional empirical knowledge to social science and education research areas interested in the overlap between college students' financial situations and educational outcomes. As families become increasingly responsible for paying for college, research in this area is pivotal to helping scholars and practitioners understand how the changing landscape of higher education funding is influencing student outcomes. Furthermore, the more we understand about student outcomes during this critical stage of the life course, the more we can understand about the ways in which higher education plays a role in the system of social stratification in the United States.

For example, if carrying a credit card balance from month to month decreases a student's chance of graduating with a bachelor's degree, and if that student is then responsible for paying off high-interest credit card debt in addition to student loans, all without a degree to increase their earning power in the labor market, these students may be worse off in terms of living a financially secure adult life because of college. And if students from disadvantaged backgrounds resort to using credit cards and carrying credit balances that hinder their ability to complete a college degree at a higher rate, the increasing personal financial responsibility of paying for college may be a driver of economic inequality in society by strapping these students with additional obstacles to financial security. While this paper cannot speak to why students choose to carry a balance on their credit card from month to month—whether or not it is because students have limited financial options and

credit cards provide easily accessible money—it provides robust evidence that students' financial situations impact their educational outcomes.

Numerous factors influence college students' educational outcomes. This paper shows that college student credit card use—particularly that of carrying a credit balance from month to month—is one of these factors. This paper's analyses document college student credit card use in 2006, prior to the Credit Card Accountability, Responsibility and Disclosure Act of 2009, which shifted credit card access for those under 21, making it more difficult to acquire a credit card. Preliminary research on one campus has suggested that college students are owning fewer credit cards and carrying less debt after the Credit CARD Act of 2009 (Norvilitis 2014), but further research should be conducted to understand these patterns with a more nationally representative dataset. Understanding the broader picture of how the Credit CARD Act of 2009 has shaped college students' experiences with credit cards (that would subsequently impact educational outcomes according to the findings of this paper) would help us understand how financial policy and regulation ultimately influences societal outcomes for students who are aspiring to be upwardly mobile in their adult lives.

If under-21 college students are still obtaining and using credit cards at high rates because their parents are willing to co-sign for the credit cards, questions arise about how universities and researchers might educate co-signers and their students on the potential benefits and drawbacks of credit card use in college. Finally, while students who carry credit balances from month to month have bleaker educational outcomes, future research might investigate how these outcomes translate to financial behaviors and outcomes later in the life course, and how they fit into the broader picture of social inequality in the United States.

In addition, for studies that consider social factors in association with risky credit card use among college students, the primary focus has been on social psychological factors, not socioeconomic or financial support factors (Zhu 2019). Given increasing costs associated with higher education, lower socioeconomic status students may resort to paying for some part of their college education with credit cards because they do not have as many family resources to pull from and credit cards, while riskier, are potentially a more easily accessible form of credit. Future research should investigate whether or not carrying credit card debt is a signal of students being in financially precarious situations, particularly since much of the research on college student credit card use up to this point has focused on student credit card use as connected to personal attributes like students' financial literacy levels (Robb and Sharpe 2009; Zhu 2019). If future research finds that risky credit card behavior is an outcome of students being in financially precarious situations, this may go a long way to shifting the conversation to consider sociological reasons for inequality in college student experiences as opposed to relying on explanations that focus on college student characteristics and decision-making.

In terms of implications for practice, college campuses offer a myriad of support services for college students to enhance student persistence and completion rates. Services that consider how students' financial situations impact their college experiences are needed on college campuses to make the link between the full life experiences of college students on and off campus. Prior researchers have highlighted the importance of providing financial courses or workshops to improve college students' financial literacy, attitudes, and behaviors (Borden et al. 2008; Hancock et al. 2013; Montalto et al. 2019). Given the findings of this paper, administrators and practitioners creating and revising such financial support programs for students should incorporate content related to carrying credit card debt from month to month and show the ways in which this financial practice can be detrimental to

students' trajectories through college. In addition, professionals creating financial support content should teach and promote financial strategies that prevent this kind of credit card behavior, and show how these strategies fit into the broader context of *why* college students might carry this kind of debt (whether it is primarily due to lack of financial resources or lack of financial knowledge). Overall, more candid and open conversations with students regarding their finances, debt levels, and credit card use are needed during college students' tenures in higher education to provide the holistic support students need to succeed in college.

Appendix

Variable Descriptions

The ELS data have questions about college student credit card use that include:

1. "How many credit cards do you have in your own name that are billed to you? (If none, enter zero.)"
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more credit cards

  *Note: The ELS top-codes this variable (7 or more credit cards) in the public use data. Respondents originally entered how many credit cards they have in their own name prior to the ELS condensing higher numbers into a single "7 or more" category. Refer to Variable #3 in this list to see how this variable was recoded in most of the analyses presented in this paper.

2. "Do you usually pay off your credit card balance each month, or carry the balance over from month to month?" This question was asked to any respondent in the second follow up (2006) who had at least one credit card.
- Pay off balance
- Carry balance
3. A recoded variable from the above measure expanding the variable to include a reference category that includes students who do not own a credit card.
- No credit card
- Credit card, does not carry balance
- Carries balance on credit card

  In order to measure students' educational outcomes, I use these ELS variables:

1. Respondent's highest level of education as of the third follow up (2012)
- Some PS attendance, no PS credential

- Undergraduate certificate
- Associate's degree
- Bachelor's degree
- Post-Baccalaureate certificate
- Master's degree/Post-Master's certificate
- Doctoral degree
2. A recoded variable from the above measure simplifying degree attainment to whether or not the respondent attained a bachelor's degree:
- No bachelor's degree by 2012
- Bachelor's degree by 2012

Important control variables from the ELS data include:

1. Socioeconomic status
- Lower
- Middle
- Upper
2. Race
- White
- Asian
- Black
- Hispanic
- Other
3. Gender
- Male
- Female
4. Hours worked weekly 2005–06
- Did not work
- 1–20 h
- More than 20 h
5. Institution type
- Respondent first attended a less than 4-year postsecondary institution
- Respondent first attended a 4-year postsecondary institution
6. Total student loans in 2012
- No student loans
- $1-$10,000
- Greater than $10,000
7. Total Pell Grants in 2012
- No Pell Grants
- $1-$10,000
- Greater than $10,000
8. Respondent has biological child or is currently or has been previously married in 2006
- No
- Yes
9. High school GPA
- 3.00 or lower
- 3.01–4.00
10. High school composite math/reading score (20.91–81.04)

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