Pathways to Mobility: Using a Multidimensional Approach to Examine Postgraduation Outcomes for Promoting College Student Success

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Abstract

Research examining students' socioeconomic outcomes after attaining a bachelor's degree tends to use single measures such as income or occupation (Thomas & Zhang, 2005; Torche, 2015). Yet, socioeconomic status is more complex than single measures. To capture that complexity, this study draws data from the National Center for Education Statistics Baccalaureate and Beyond Longitudinal Study (B&B:08/12) to examine a multidimensional measure of socioeconomic status one and four years after graduation with a bachelor's degree. The findings suggest that college graduates are not guaranteed benefits or low levels of time unemployed. The differences found across groups and time points highlight the importance of considering both monetary and non-monetary aspects of socioeconomic status related to higher education attendance and student success. This study contributes to exploring multidimensional measures to advance the understanding of students' postgraduation outcomes and the continued impact of higher education on students' outcomes beyond completion.

Keywords: postgraduation outcomes, student mobility, socioeconomic status, multidimensional measures

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Every year, students and their families make the decision to pay the ever-increasing cost of attending college under the assumption that higher education is either a pathway to upward socioeconomic mobility or at least a safety net against downward mobility (Pope & Fermin, 2003; Roth, 2019). The examination of the socioeconomic outcomes as a metric of success associated with attending higher education has been a focus of researchers since Hout's 1988 study showed that the association between socioeconomic origins and destinations almost disappeared for individuals with a bachelor's degree. Following that foundational study, scholars have consistently found that higher education is a mechanism for improving socioeconomic outcomes (e.g., Benson et al., 2015; Chetty et al., 2017a; Ma & Pender, 2023; Reber & Sinclair, 2020).

The ongoing focus on socioeconomic status as measures of postsecondary success contributes to the increasing pressure on U.S. higher education to prioritize earnings and demonstrate the return on investment of a bachelor's degree (Dancy et al., 2021; Kelchen, 2018). However, what we measure and how we measure it is a demonstration of our values as higher education institutions and the value of higher education itself. For example, intergenerational mobility research uses conceptualizations of socioeconomic status, including occupation, social class, income, and earnings (Torche, 2015). In education, postgraduate earnings are the primary means of evaluating the impact of higher education on postgraduation success. However, there is more focus on the mechanisms related to students' earnings, such as students' major choice (Carnevale et al., 2021; Eide et al., 2016; Thomas & Zhang, 2005), participation in campus experiences (Wolniak & Engberg, 2019), and alignment between occupation and major (Melguizo & Wolniak, 2012). When researchers and policymakers primarily focus on income or earnings as a measure of success, the implied message is that the value of higher education is solely monetary despite recent studies. Yet there have been recent reports documenting the non-monetary outcomes associated with higher education, such as employment, job satisfaction, well-being, participation in voting and volunteering activities, and more active citizenship (Lumina Foundation-Gallup Education, 2023; Ma & Pender, 2023).

As researchers, policymakers, and stakeholders continue to wrestle with the value of higher education, how we measure and conceptualize success is a vital part of that conversation. The current paper presents an exploration of a different method for measuring postgraduate outcomes that conceptualizes socioeconomic status as a multifaceted and nuanced phenomenon. The National Center for Education Statistics (NCES) Baccalaureate and Beyond Longitudinal Study (B&B:08/12) dataset contains an array of measures that capture different aspects of socioeconomic status, including annual salary, loan repayment, home ownership, employer benefits, number of jobs,

unemployment, and satisfaction with job security (NCES, 2012). These measures capture essential nuances such as security and non-monetary aspects of postgraduate outcomes that are rarely considered when examining the impact of higher education on postgraduate outcomes. Using latent class analysis (LCA), we consider how individuals' responses to these items place them into distinct groups one and four years after receiving their bachelor's degrees.

In conceptualizing socioeconomic success as more complex than income or occupation, we support the ongoing examination of postsecondary success in two critical ways. First, from an individual perspective, measuring socioeconomic success as more than just income acknowledges that while earnings remain vital to individuals' socioeconomic well-being, the changing nature of the U.S. economy resulting from the 2008 financial crisis and the more recent COVID-19 pandemic has led more recent graduates to prioritize other aspects of employment such as benefits, work-life balance, and flexibility (Sorensen et al., 2021). Measurements of postgraduation outcomes that conceptualize different aspects of success become more important as individuals consider more than salary when evaluating employment opportunities.

Second, from a societal perspective, when the focus is on the monetary benefits of education alone, we constrain higher education's purpose to vocational education with the sole mission of training graduates for the discrete skills within the workforce. This focus ignores vital aspects of postsecondary education such as civic engagement, problem solving, and critical thinking, which remain core tenets of liberal education (American Association of Colleges and Universities, 2023) that continue to be under attack by those who believe the purpose of higher education should primarily be economical (Dougherty & Lombardi, 2016). The ongoing push to prioritize the economic benefits of education has led institutions and policymakers to prioritize vocationally oriented disciplines, such as business and STEM, deprioritizing liberal arts disciplines, as well as helping fields such as education, counseling, and social work (Dutt-Ballerstadt, 2019). Because such disciplines lead to different economic outcomes than business and STEM, it becomes easy to discount these essential disciplines when we measure success purely in terms of income.

Background

To contextualize our study, the following sections provide an overview of common conceptualizations and measurement of postsecondary education outcomes and success. These sections are by no means comprehensive but seek to give an overview of different disciplinary approaches in this area of inquiry.

Theoretical Groundings

Many studies interrogating the outcomes associated with attending postsecondary education draw on the assumptions of human capital theory, proposing that an individual's

skills and knowledge are advanced by obtaining higher levels of education, which are then rewarded in the labor market by improved socioeconomic outcomes. Studies using human capital theory assume that education helps develop productive skills valued in the labor market, inferring causality between higher education and economic outcomes (Becker, 1964; Mincer, 1974). These enhanced skills and knowledge can include accomplishing tasks more effectively, learning new skills more efficiently, and developing desirable dispositions such as reliability or leadership (Tomaskovic-Devey et al., 2005), which are rewarded in the labor market. However, researchers have also suggested that returns associated with higher education are more complicated than merely acquiring desirable skills and experiences (Tomaskovic-Devey et al., 2005).

Human capital theory also treats education as a largely homogenous experience, frequently considering the level of education an individual receives and how that impacts singular measures of socioeconomic status (Torche, 2015). However, as the American Psychological Association (APA, n.d.) describes, socioeconomic status is more complex than a single measure.

> Socioeconomic status (SES) encompasses not just income but also educational attainment, financial security, and subjective perceptions of social class. Socioeconomic status can encompass quality of life attributes as well as the opportunities and privileges afforded to people in society (para. 1).

Mueller and Parcel (1981) further emphasize the relational aspects of socioeconomic status and articulate that socioeconomic status:

> . . . describes social systems (usually society or community) in which individuals, families, or groups are ranked on certain hierarchies or dimensions according to their access to or control over some combination of valued commodities such as wealth, power, and social status (p. 14).

Despite the complexity of socioeconomic status highlighted above, single measures remain the primary means of analyzing the socioeconomic returns of higher education. In this paper, we seek to explore the complexity of higher education's impact on socioeconomic outcomes by examining it as a multidimensional construct.

Measurement of Socioeconomic Returns From Higher Education

Scholars across sociology, economics, and education disciplines have studied the impact of higher education on individuals' socioeconomic status from various fields and perspectives. Sociologists and economists have examined these concepts from the perspective of intergenerational mobility at the macro level (Chetty et al., 2017b; Torche, 2015), while the field of higher education research has focused more on the micro-level interactions between students and institutions (Benson et al., 2015; Thomas & Zhang, 2005), and career counseling has examined non-monetary aspects such as satisfaction and major alignment (Melguizo & Wolniak, 2012). These fields contributed to our

understanding of the impact of higher education attendance. However, few studies have considered the complexity of socioeconomic outcomes.

Sociological Approach

In examining mobility from a sociological perspective, researchers operationalize mobility by studying the association between parents and adult children's social class or occupational status, where a higher association indicates less mobility (Torche, 2015). Analysis of occupational status looks at occupations grouped into categories to form a hierarchy, where status is correlated with other social and economic variables (Hauser, 2010). Occupation is considered to provide better insight into long-term economic standing as occupation is less volatile than other measures, such as income, across a lifetime (Goldberger, 1989; Hauser & Warren, 1997; Torche, 2011). However, Mazumder and Acosta (2015) suggest occupational status may be less consistent today than in the past due to individuals switching occupations more frequently than in previous generations. Historically, education is viewed as the primary avenue for mobility in occupational research (Fox et al., 2016; Torche, 2015), making the level of educational attainment a common unit of analysis. Regression analysis is a standard method used in analyses where the child's occupational outcome is regressed on the parent's occupational status, with the regression coefficient capturing the persistence of socioeconomic status. In regression analysis, education is operationalized as a mediating variable in examining the persistence of socioeconomic status, and researchers typically control for age.

In contrast, social class research creates groups based on occupational assets, such as property or authority in the workplace, that impact parts of an individual's life, such as income, health, and wealth (Grusky & Weeden, 2008). Social class mobility is less hierarchical than occupational status. It is less focused on upward or downward movement and instead examines barriers to mobility connected to the ownership of different assets (Torche, 2015). Most social class research uses the classification devised by Erikson et al. (1979), which created classes based on different types of employment relations. These classes were defined by attributes including employer/employees, self-employment, skill level, authority in the workplace (supervisor/non-supervisor), and sector (urban/agricultural and manual/non-manual). Analysis of class mobility uses tables to cross-classify parents' and adult children's classes, examining movement between class origin and destination. Social class measures were more widely used in research in the 1970s to 1990s but persisted as a measure of mobility because they capture a more comprehensive range of economic conditions, making them a more holistic measure of status (Pfeffer & Hertel, 2015).

Economic Approach

Research by economists on intergenerational mobility captures socioeconomic status primarily through individual and family earnings or income. Researchers utilize the regression coefficient to analyze elasticity, attempting to approximate the average percent of change in adult children's earnings associated with a one percent change in their parents' earnings (Chetty et al., 2017b; Torche, 2015). The earnings of parents are

typically averaged over several years to reduce measurement bias (Mazumder, 2005). Adult children's incomes are primarily captured at the age of 40, which economists consider to be the age at which lifetime earnings peak, to account for fluctuations in earnings across an individual's lifetime (Baker & Solon, 2003; Haider & Solon, 2006; Torche, 2015).

Most researchers choose to examine either absolute or relative mobility. Absolute mobility examines the persistence of socioeconomic status within the context of economic and demographic factors and changes, while relative mobility examines persistence, excluding structural changes (Chetty et al., 2017b). In other words, absolute mobility considers whether children are better off than their parents within the context of evolving technology, occupational shifts, and demographic changes. In contrast, relative mobility looks at where parents and children are along the spectrum of socioeconomic status (i.e., top or bottom quintile) and asks if children have a higher status than their parents relative to other individuals (Reeves, 2017).

Education Approach

In the field of education, the impact on postgraduate earnings has been a significant focus (e.g., the College Board Reports, *Education Pays*), as have non-monetary outcomes of higher education, including personal lifestyles (e.g., cognitive and self-identity formation) and social development (e.g., political and civic engagement; Tomlinson, 2022). Education research uses a micro-level approach, examining the mechanisms through which institutions produce differential socioeconomic outcomes across graduates. For example, higher education researchers have found that graduates from more selective institutions, on average, can expect a higher return on their degree than peers at less selective institutions (Benson et al., 2015). This wage premium significantly increases over time rather than narrowing as students gain more workforce experience (Carnevale et al., 2021; Thomas & Zhang, 2005). However, looking beyond selectivity, researchers have found that the influence of institutional selectivity varies by students' major choice (Carnevale et al., 2021; Eide et al., 2016; Thomas & Zhang, 2005), participation in campus experiences (Wolniak & Engberg, 2019), or alignment between occupation and major (Melguizo & Wolniak, 2012). Additionally, graduates of highly selective institutions may gain an earnings premium through well-placed alums and social networks provided by the institution (Eide et al., 2016; Rivera, 2015).

An additional area of study that spans educational and career development research considers the impact of higher education on elements of socioeconomic well-being that are provided through employment, which encompasses non-monetary and psychological domains (Picatoste et al., 2021; Warhurst & Knox, 2022). In terms of non-financial outcomes, job satisfaction has attracted significant research attention, capturing multiple facets of employment, including satisfaction with pay, organizational support, and levels of employee involvement. Significantly, these components vary across racial and gender categories (Leider et al., 2016). Furthermore, new graduates, especially, may prioritize professional growth or flexibility above factors like employment stability, which was a more crucial component of job quality for earlier generations

(Blanco et al., 2020; Mann & Harter, 2016). In addition, there has been significant economic unrest over the past 20 years, such as the Great Recession, the student loan crisis, rising living expenses and stagnant wages, and the recent COVID-19 pandemic (Hoffower, 2022). These events have impacted how people perceive their socioeconomic well-being (Rothwell & Crabtree, 2021). Questions about non-monetary job components, like control over work schedules and job duration, have also been raised by the growth of the gig economy (Kalleberg & Dunn, 2016).

As many studies show, attending higher education can offer positive socioeconomic outcomes for graduates. However, the narrow conceptualization of socioeconomic outcomes through single measures inhibits our understanding of students' different socioeconomic outcomes after graduation. Utilizing multidimensional socioeconomic status measures is more common in public health, especially in research on developing countries where measures of income are hard to come by (Goodwin et al., 2018). Recently, Evans and colleagues (2022) called for a more comprehensive social class scale for higher education populations, arguing that single measures are insufficient to account for the complexity of social class. In response to this call, our study intends to contribute to the literature by proposing a multidimensional approach and advancing the understanding of higher education's continued impact on college student success beyond completion.

Methods

Data Sources and Sample
Data for this research study comes from the third cohort of the U.S. NCES Baccalaureate and Beyond Longitudinal Study (B&B:08/12). In creating the sample for this study, we limited institutions to four-year degree-granting institutions included in the B&B:08/12 study to focus our examination on those graduates who received a bachelor's degree. Additionally, to focus our analysis on first-time bachelor's degree recipients, the student sample was limited to those who had not previously received a bachelor's degree before their 2007/2008 graduation and those who completed both the 2009 and 2012 surveys. Individuals who were enrolled in school in 2012 were also removed from the final sample as their socioeconomic status could have been impacted by their return to school, resulting in *n* = 7,250.

Measures
To expand the conceptualization of socioeconomic status, we used multiple measures rather than a single measure, such as occupation, income, class status, or wealth (Table 1). In selecting the variables to include in our measures of socioeconomic status, we selected items that captured different dimensions of graduates' socioeconomic well-being and success. The first dimension focuses on financial success and is captured by graduates' salaries, home ownership, and the percentage of income that goes toward

student loan repayment. Homeownership has historically been considered a financial and socioeconomic achievement marker and an essential component of the "American Dream" (Hirschl & Rank, 2010, p. 125). The ability to own a home, especially shortly after graduation from college, demonstrates substantial socioeconomic security. Additionally, as the student loan crisis continues to hamper the socioeconomic success of college graduates (Kim & Chatterjee, 2019), loan repayment is a crucial element to consider.

The second dimension is job quality, which includes whether the job offers benefits and how satisfied individuals are with their job security. These elements move beyond the direct monetary benefits of employment. Employer benefits are essential to financial security in that they provide both short-term economic security by helping pay for medical care and long-term economic security through retirement savings (Loya et al., 2020). Additionally, being able to receive preventative medical care is important to graduates' overall well-being (Benach et al., 2014). Job security satisfaction also indicates a level of socioeconomic success, where graduates are employed not just for a paycheck but also do not worry about whether they will continue to have a job. Job security satisfaction is not only important for overall well-being (Bialowolski & Weziak-Bialowolska, 2021), but for subjective views of socioeconomic status (Ren et al., 2022).

The third dimension is socioeconomic stability, which includes the percentage of time unemployed since graduation and the number of jobs graduates hold. During the unstable economic climate that has been present since the housing crisis of 2009, college graduates have had to traverse a more difficult job market than previous graduates. Only considering if graduates are employed during discrete time periods (when surveys are conducted) may miss the socioeconomic instability present before obtaining employment. Many college graduates struggle to secure jobs following graduation, and while they may currently be employed, the impact of being unemployed previously and the duration of unemployment impact socioeconomic success (Western et al., 2012). Additionally, it is also not uncommon for individuals to hold multiple jobs to meet financial obligations such as paying rent or repaying student loans (Caza et al., 2022). Having to work multiple jobs again adds important nuance to socioeconomic success that is not captured by employment or salary alone. Instead, it indicates that more than one job is needed to meet an individual's financial needs (Caza et al., 2022).

Covariates
In addition to the socioeconomic variables, we considered two covariates within our model, students major at graduation and their family's gross annual income when they enrolled in college. Students' major (Appendix Table A.2) was included because of the differences in socioeconomic outcomes for different majors (Carnevale et al., 2021; Eide et al., 2016; Thomas & Zhang, 2005). Parents income (M = \$64,190, SD = \$19,770) was included to account for the persistence of socioeconomic privilege that often insulates students from higher socioeconomic backgrounds from more challenging socioeconomic outcomes (Torche, 2015).

Data Preparation

In order to conduct LCA, we first converted values from the B&B:08/12 dataset that were continuous (loan repayment, salary, and unemployment time) into categorical values to be compatible with LCA (Wang & Wang, 2020). For the loan repayment and income variables, the distribution of the responses was analyzed to establish quantile cutoffs that represented the median, 25th percentile, and 75 percentile, which we used to create groups of categorical variables. For the percentage of time unemployed variables, the distribution was likewise examined to determine how to best create categories from the data. For this variable, most respondents had 0–2 jobs, with a much lower number having 3 or more. We therefore decided to retain the existing categories of 0, 1, and 2 jobs and then combine those with 3 or more jobs into a single group. Finally, the percentage of time unemployed had a narrow distribution of responses, with the majority falling below 2% in both 2009 and 2012. Due to the limited distribution, we used cut points at the 33rd and 66th percentiles to create three categories. Students' majors were dummy coded for inclusion in the model.

Additionally, NCES uses a variety of codes to denote individuals who did not respond to items within the survey. For B&B:08/12 many respondents were coded as skipped for several of the variables. However, within NCES survey methods, skipped is different from missing. Instead, it denotes that respondents did not receive the question due to their response to a previous question. For example, in 2009, the loan repayment question was asked only for individuals who indicated that they had taken out a loan to pay for college. Meaning that those marked skipped never took out loans to pay for college. As these skipped responses still capture important elements of respondents' socioeconomic status, we chose to keep responses coded as legitimately skipped as part of the B&B:08/12 interview protocol (NCES, 2012). We instead renamed the response option to reflect the question that resulted in the survey item not being administered (i.e., skipped for loan repayment is now never loan). With these variables recoded into usable values, the remaining missing data for all variables was negligible (< 1%).

There were also some inconsistencies across the two waves of data in terms of how questions were asked and response options. For example, in 2009, respondents were asked, "Do you own a home, pay rent, or both own a home and pay rent?" and response options included: 1 = own a home or pay mortgage, 2 = pay rent, 3 = both own home and pay rent, 4 = neither own home nor pay rent. However, while respondents were asked the same question in 2012, NCES changed the variable options in the dataset to break out the possible responses into dichotomous options. The response option that most closely aligned with the 2009 question had the response options: 1 = paid mortgage, 0 = did not pay mortgage. To align the questions as best as possible, the 2009 and 2012 responses were recoded into own or do not own a home. Table A.1 in the appendix breaks down the recoding for home ownership, job security satisfaction, and benefits. Table 1 shows the final variable codes and both weighted and unweighted frequencies.

Table 1. Socioeconomic Variables

Variable name (Code)	Unweighted		Weighted	
	n	%	n	%
2009 Loan repayment (SES091)				
0 = Skipped	1,160	16%	1,030.96	14%
1 = 9%+	3,100	43%	3,507.99	48%
2 = 2–9%	970	13%	818.03	11%
3 = 0–2%	950	13%	887.61	12%
4 = 0%	1,090	15%	1,009.42	14%
2012 Loan repayment (SES121)				
1 = 12%+	1,780	25%	1,557.56	21%
2 = 2–12%	1,630	22%	1,429.68	20%
3 = 0–4%	1,010	14%	966.04	13%
4 = 0%	2,830	39%	3,300.72	46%
2009 Own a home (SES092)				
1 = Don't own a home	6,150	85%	6,113.51	84%
2 = Own a home	1,110	15%	1,140.49	16%
2012 Own a home (SES122)				
1 = Don't own a home	4,970	69%	5,045.17	70%
2 = Own a home	2,280	31%	2,208.83	30%
2009 Annual salary (SES093)				
1 = $0–10,000	1,820	25%	1,638.94	23%
2 = $10,000–26,000	1,860	26%	1,841.87	25%
3 = $26,000–39,500	1,760	24%	1,866.51	26%
4 = $39,500–250,000	1,810	25%	1,906.69	26%
2012 Annual salary (SES123)				
1 = $0–22,880	1,810	25%	1,734.29	24%
2 = $22,880–37,000	2,750	38%	2,805.10	39%
3 = $37,000–53,040	910	13%	939.33	13%
4 = $53,040–470,000	1,780	24%	5,684.17	78%
2009 Employer benefits (SES094)				
0 = Skipped	1,370	19%	1,270.16	18%
1 = No benefits	1,580	22%	1,475.30	20%
2 = Benefits	4,300	59%	4,508.54	62%

Table 1. Socioeconomic Variables (*continued*)

Variable name (Code)	Unweighted		Weighted	
	n	%	n	%
2012 Employer benefits (SES124)				
0 = Skipped	640	9%	664.50	9%
1 = No benefits	930	13%	905.33	12%
2 = Benefits	5,690	78%	5,684.17	78%
2009 Percent of time unemployed (SES095)				
1 = 2%+	1,180	16%	1,257.61	17%
2 = 1–2%	2,060	28%	2,039.20	28%
3 = 0–1%	4,010	55%	3,957.19	55%
2012 Percent of time unemployed (SES125)				
1 = 2%+	1,740	24%	1,668.13	23%
2 = 1–2%	1,550	21%	1,344.48	19%
3 = 0–1%	3,960	55%	4,241.39	58%
2009 Job satisfaction (SES096)				
0 = Skipped	1,250	17%	1,138.47	16%
1 = Not satisfied	1,550	21%	1,612.01	22%
2 = Satisfied	4,450	61%	4,508.54	62%
2012 Job satisfaction (SES126)				
1 = Not satisfied	2,060	30%	2,089.07	30%
2 = Satisfied	4,810	70%	4,814.15	70%
2009 Number of jobs (SES097)				
0 = 0 job	1,250	17%	1,138.47	16%
1 = 1 jobs	5,010	69%	5,141.06	71%
2 = 2 jobs	840	12%	826.68	11%
3 = 3+ jobs	150	2%	147.79	2%
2012 Number of jobs (SES127)				
0 = 0 job	1,190	16%	1,093.36	15%
1 = 1 jobs	5,600	77%	5,728.35	79%
2 = 2 jobs	420	6%	389.96	5%
3 = 3+ jobs	40	1%	42.33	1%

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12).

Data Analysis

To examine socioeconomic status following graduation, we utilized LCA modeling to determine if graduates cluster into distinct groups based on socioeconomic indicators. LCA is an appropriate technique for this analysis because it can divide individuals into unobserved (latent) subgroups or classes based on the observed variables (Oberski et al., 2015). LCA is preferable to simple cluster analysis because the probability modeling that underlies LCA allows formal statistical analysis for determining the number of clusters (Magidson & Vermunt, 2002). This type of modeling lends itself well to examining socioeconomic outcomes since it allows for a multidimensional examination of socioeconomic success rather than unidimensional measures such as income or occupation. Full Information Maximum Likelihood (FIML) was used to address the limited remaining missing or incomplete data. Full information maximum likelihood estimation was used for all models, which allowed for missing data under the missing-at-random assumptions (MAR; Little & Rubin, 2002). NCES data weights were also applied to the analysis to adjust for any nonresponse bias that results from attrition across the different waves of data collection.

To determine the appropriate number of classes in both 2009 and 2012, we conducted LCA using Mplus 8.3 using a series of steps (Muthén & Asparouhov, 2011). The first step was to create unconditional probabilities for class membership for an individual's socioeconomic status in 2009 and 2012. The unconditional probability indicates the proportion of the population expected to belong to a latent class. We began with one class and then increased the number of classes until fit indices, including Akaike's information criterion (AIC), Bayesian information criterion (BIC), the sample-size-adjusted BIC (ABIC), Lo-Mendell-Rubin likelihood ratio (LMRLR), and adjusted Lo-Mendell-Rubin likelihood ratio (ALMR LR) did not improve the fit (Wang & Wang, 2020). Once we determined the appropriate number of classes for each year, we utilized the probabilities of belonging to each class for different socioeconomic variables responses to interpret the categories and provide a general description for each class. Finally, after the number of classes were selected, the covariates were added to the model to examine the relationship between college major and family income of the likelihood of students belonging to a specific class.

Limitations

The exploratory focus of the study presents several limitations that should be acknowledged. First, our ability to measure an individual's socioeconomic outcomes was also limited by data availability within the B&B:08/12 dataset. Some participants in the 2009 study did not complete the 2012 study, meaning we had to exclude them from the analysis. Additionally, while more robust than a single measure, socioeconomic status measures may only encompass some elements of individual success. Other non-monetary aspects of socioeconomic well-being, such as individuals' assessment of their subjective well-being, were not available within the dataset and, therefore, not considered in the analysis.

Results

The following section presents the results in three subsections. The first section provides the determination of the appropriate number of classes for each time period and an overview of the class identification. The second and third subsections provide explanations of the classes in 2009 and 2012, respectively, followed by interpretation of the impact of the covariates.

Latent Class Identification

For the 2009 LCA analysis, the 2-class model has the largest AIC BIC and ABIC values, indicating that this model fits the data worse than all the other models. In addition, while the 2-class model had perfect entropy, the p-values of the LMR LR and ALMR LR are all < .0001, indicating that additional latent classes could provide a better fit for the data. The 4-class model shows slightly better fits for the fit indices than the 3-class model. However, the p-values for both the LMR LR and ALMR LR are significant, indicating that the fit for the 3-class model is preferable to the 4-class model. Comparative fit indices are shown in Table 2.

Table 2. 2009 LCA Model Comparison

	AIC	BIC	ABIC	LMR LR p-value	ALMR LR p-value	BLRT p-value	BF
2-Class Model	82504.726	82745.726	82634.630	.000	.000	.000	1.000
3-Class Model	79302.043	79667.176	79498.754	.000	.000	.000	0.848
4-Class Model	79047.678	79536.819	79311.197	.253	.2576	.000	0.732

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12).

Based on the fit indices, we selected the 3-class model to examine the classes' interpretability since the classes' interpretability in LCA is as important as fit (Wang & Wang, 2020). We examined the interpretability of the latent class membership using the estimated item probabilities and how each item differed across classes (see Table 3). From the probabilities, three distinct groups emerged based on the socioeconomic indicators: SES insecure (Class 1), SES secure (Class 2), and SES unemployed (Class 3).

Like the 2009 class identification, LCA was run for the socioeconomic responses provided by graduates in 2012 to determine the appropriate number of classes. Table 4 presents summaries of the LCA fit indices for two to four classes. Both the 3-class and 4-class models showed better fits for AIC, BIC, and ABIC than the 2-class model, with the 4-class model providing slightly better fits across all indices. All the p-values for both the LMR LR and ALMR LR for the 3-class model were not significant at $p <$ .001, and the 4-class model was not significant at $p < .01$. However, the entropy for the 4-class model was higher (0.694) than the 3-class model (0.633).

Table 3. 2009 Class Probabilities

	Latent class		
	1—SES Insecure (*n* = 2,190)	2—SES Secure (*n* = 3,930)	3—SES Unemployed (*n* = 1,140)
Unconditional probability			
	0.300	0.540	0.160
Conditional probability			
2009 Loan repayment (SES091)			
0 = skipped	0.388	0.387	1.000
1 = 9%+	0.213	0.087	0.000
2 = 2–9%	0.076	0.186	0.000
3 = 0–2%	0.037	0.240	0.000
4 = 0%	0.286	0.099	0.000
2009 Own a home (SES092)			
1 = Don't own a home	0.921	0.772	0.925
2 = Own a home	0.079	0.228	0.075
2009 Annual salary (SES093)			
1 = $0–10,000	0.221	0.000	1.000
2 = $10,000–26,000	0.647	0.098	0.000
3 = $26,000–39,500	0.107	0.422	0.000
4 = $39,500–250,000	0.025	0.481	0.000
2009 Employer benefits (SES094)			
0 = Skipped	0.041	0.010	1.000
1 = No benefits	0.564	0.051	0.000
2 = Benefits	0.395	0.939	0.000
2009 Percent of time unemployed (SES095)			
1 = 2%+	0.201	0.107	0.342
2 = 1–2%	0.288	0.273	0.294
3 = 0–1%	0.510	0.620	0.364
2009 Job security satisfaction (SES096)			
0 = Skipped	0.000	0.000	1.000
1 = Not satisfied	0.410	0.177	0.000
2 = Satisfied	0.590	0.823	0.000
2009 Number of jobs (SES097)			
1 = 1 job	0.000	0.000	1.000
2 = 2 jobs	0.726	0.908	0.000
3 = 3 jobs	0.226	0.082	0.000
4 = 4+ jobs	0.048	0.010	0.000

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12). SES = socioeconomic status.

Table 4. 2012 Model Comparisons

	AIC	BIC	ABIC	LMR LR *p*-value	ALMR LR *p*-value	Entropy	BF
2-Class Model	83873.715	84087.284	83988.773	.000	.000	0.754	0.000
3-Class Model	83157.275	83481.073	83331.717	.002	.002	0.633	0.000
4-Class Model	82732.911	83166.937	82966.737	.028	.029	0.694	0.000

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12).

Since the fit indices did not provide a clear picture of the appropriate number of classes, we examined both the 3-class and 4-class probabilities for interpretability. Like the 2009 LCA, the 3-class model for 2012 (see Table 5) provided a more interpretable grouping of individuals and was selected as the appropriate model. The 3-class model probabilities are provided in Table 5. Based on the socioeconomic indicators, three distinct groups emerged: SES insecure (Class 1), SES secure (Class 2), and SES stable (Class 3).

2009 Latent Classes

The first class, denoted by the blue diamonds in Figure 1, included the highest percentage of respondents (54%) and was categorized as SES secure (i.e., in Class 2). In this group, the probabilities indicated a low likelihood of having loan repayments that were over 9% of their incomes; the highest likelihood of owning a home (23%); a high likelihood of making over $26,000 a year; the highest probability of making over $39,500[1]; a high likelihood of responding they had a job with benefits; a high probability of responding they had been unemployed for less than one percent of the time since graduation; a high likelihood of responding they were satisfied with the security of their job; but also a high probability of responding they were working two jobs. These probabilities taken together indicate that while the graduates in this category may have some student debt and more than one job, they have achieved a relatively stable level of socioeconomic status. The lower levels of loan repayment are of specific interest, as this is a hotly contested issue across the country (Goldrick-Rab et al., 2016). The relationship between higher salaries and a lower percentage of income makes loan repayment more feasible. Additionally, the high likelihood of holding two jobs suggests that graduates may be taking on more work to manage expenses more easily, such as student loans (Velez et al., 2019).

Compared to the SES secure group, the SES insecure and SES unemployed groups had class probabilities indicating a less stable level of socioeconomic status. The SES

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1   Salaries are presented in 2009 dollars and not adjusted for inflation.

Table 5. 2012 Class Probabilities

	Latent class		
	1—SES Insecure (*n* = 1,320)	2—SES Secure (*n* = 3,320)	3—SES Stable (*n* = 2,620)
Unconditional probability			
	0.180	0.460	0.360
Conditional probability			
2012 Loan repayment (SES121)			
1 = 12%+	0.400	0.298	0.004
2 = 2–12%	0.051	0.251	0.209
3 = 0–4%	0.036	0.063	0.278
4 = 0%	0.513	0.388	0.509
2012 Own a home (SES122)			
1 = Don't own a home	0.855	0.745	0.542
2 = Own a home	0.145	0.255	0.458
2012 Annual salary (SES123)			
1 = $0–22,880	0.863	0.151	0.003
2 = $22,880–37,000	0.089	0.600	0.278
3 = $37,000–53,040	0.012	0.139	0.183
4 = $53,040–470,000	0.036	0.109	0.536
2012 Employer benefits (SES124)			
0 = Skipped	0.401	0.000	0.037
1 = No benefits	0.402	0.080	0.027
2 = Benefits	0.197	0.920	0.936
2012 Percent of time unemployed (SES125)			
1 = 2%+	0.349	0.289	0.087
2 = 1–2%	0.155	0.233	0.141
3 = 0–1%	0.496	0.478	0.772
2012 Job security satisfaction (SES126)			
1 = Not satisfied	0.610	0.269	0.216
2 = Satisfied	0.390	0.731	0.784
2012 Number of jobs (SES127)			
1 = 1 job	0.499	0.117	0.000
2 = 2 jobs	0.407	0.830	0.952
3 = 3 jobs	0.077	0.050	0.045
4 = 4+ jobs	0.017	0.003	0.003

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12). SES = socioeconomic status.

Figure 1. 2009 Response Patterns
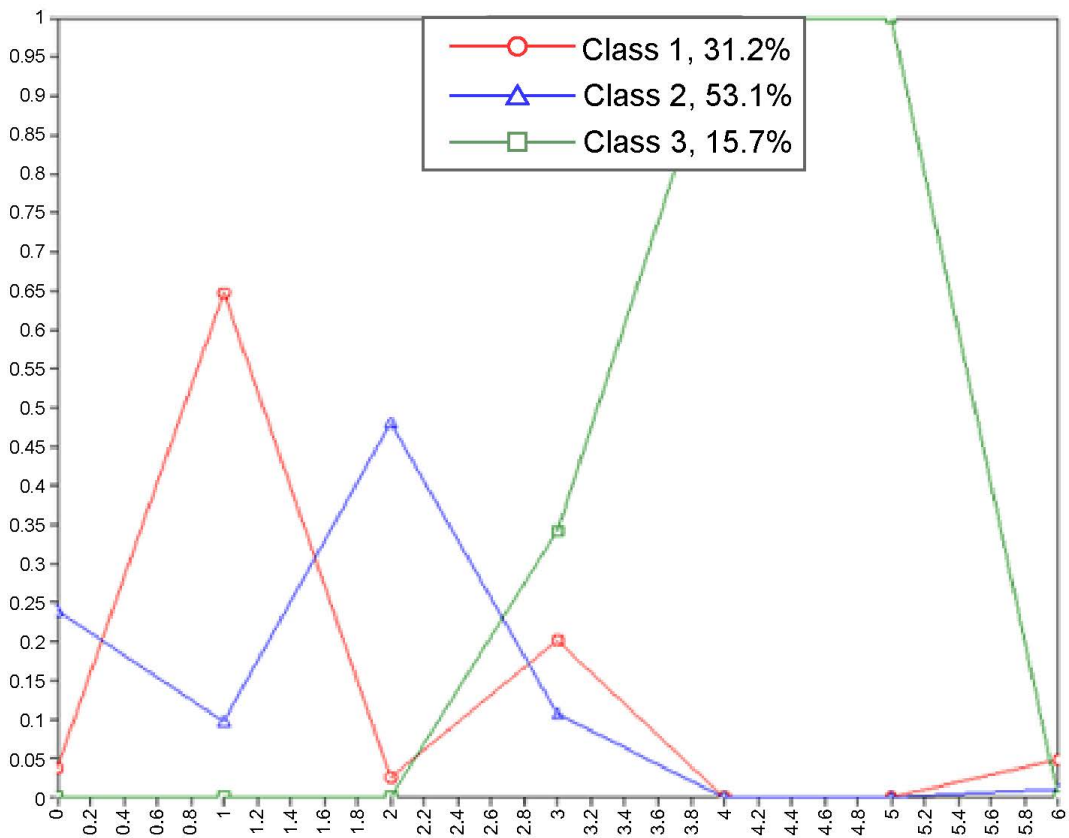
insecure group, denoted by the red circles in Figure 1, had the highest probability of responding that they had no student debt; a high likelihood of not owning a home; a high likelihood of only making between $10,000 and $26,000 a year; a high likelihood of having no benefits; a high likelihood of being unemployed for less than one percent of the time; were relatively evenly split between being satisfied with their job security and not satisfied; and a high likelihood of having more than two jobs. These probabilities indicate that these students may have achieved less socioeconomic stability than the SES secure group. One explanation for this may be that students without debt have more flexibility to take a job that pays less but aligns with their interests or a low-paid internship but may take on multiple positions to ensure enough income to cover expenses (American Student Assistance, 2015).

The SES unemployed group, denoted by the green diamonds in Figure 1, was distinct from the SES insecure group by their high likelihood of not being employed at all in 2009. Interestingly, they also displayed a high likelihood of never having taken out loans to pay for college. Additionally, the response likelihoods were evenly split across the responses for the percentage of time spent unemployed. These results indicate that while the graduates were currently unemployed, some had been employed at some point since graduation. These graduates may personify students that struggle to find

secure employment or find themselves underemployed following graduation. Under-employment has been an especially troubling trend for students who graduated around the time of the Great Recession—over 40% of recent college graduates report being employed in a role that does not require a college degree (Federal Reserve Bank of New York, 2024).

2012 Latent Classes

Four years after graduation, in 2012, graduates' socioeconomic status grouped into similar clusters with both a socioeconomically secure and insecure group readily iden-tifiable, with most graduates falling into the secure group. However, the unemployed group was no longer present, and a new group of SES stable was identified. Graduates in the secure group (see blue triangles in Figure 2) had response probabilities that were split across levels of student debt as a percent of income, with a moderate likelihood of responding that they had either substantial levels (2%–12%) or no debt; a high probability of not owning a home; a high probability of responding they were mak-ing $22,800 to $37,000 a year[2] and a low probability of responding that they were

Figure 2. 2012 Response Patterns

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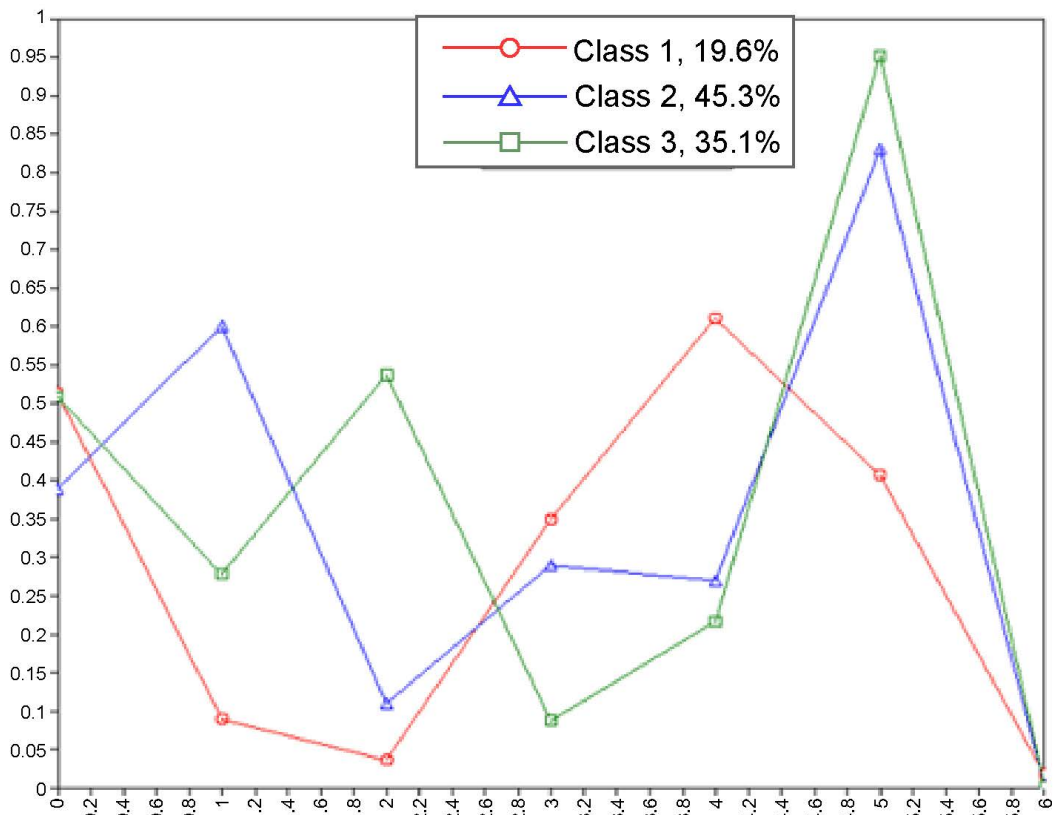
2   Salaries are presented in 2012 dollars and not adjusted for inflation.

making less than $22,800; a high likelihood of having a job with benefits; the highest probability of responding they had been unemployed less than one percent of the time since graduation; a high likelihood they were satisfied with their job security; and a high likelihood of having two jobs. While this group did have lower salaries and a range of student debt levels, they presented non-monetary markers of socioeconomic status, including benefits, satisfaction with job security, and less unemployed time. As the largest percentage of respondents, the emergence of the satisfied group suggests that students may have prioritized positions with job security over higher levels of income.

Compared to the SES secure groups, the SES stable group (denoted by the green squares in Figure 2) had probabilities indicating a higher socioeconomic status level across most measures. The SES secure group had the highest probability of paying less than 4% of their income in student loans and the highest likelihood of paying nothing. Additionally, they had the highest probability of responding that they owned their own home, made over $53,000 a year, had a job that provided benefits, were satisfied with their job security, and were unemployed less than one percent of the time since graduation. However, they also still had a high probability of working two jobs. A potential explanation for this finding is that for the secure group, this second job could be used by graduates to bolster economic security or allow them the resources to purchase a home. Overall, these probabilities suggest the graduates had reached a relatively stable socioeconomic status, to the point where almost half were able to purchase their own home.

At the other end of the spectrum, the SES insecure group, denoted by the red circles in Figure 2, was much less likely to achieve higher levels on the socioeconomic measure included in this analysis. Like the satisfied group, the insecure group was polarized across the level of student debt, with a moderate probability of responding that they had high (12%+) and no student debt. Graduates in this group also had a high likelihood of responding that they did not own a home, were making less than $22,800 a year, and a low likelihood of responding that they were in a job that provided benefits. They had a moderate likelihood of responding that they had been unemployed less than one percent of the time, were not satisfied with their job, and had only one job. These probabilities suggest that these students may be in a more challenging socioeconomic position than their SES satisfied or SES secure peers and less satisfied with their status.

Relationship With Covariates 2009

There were also significant differences in the likelihood of graduates belonging to different classes based on major and family income. In 2009, graduates who majored in computer science and engineering, compared to business, were more likely to be in the SES secure group versus the insecure group. In contrast, graduates who majored in biology, general studies, social sciences, humanities, education, and other majors were more likely to be in the insecure group versus the secure group compared to business graduates. Additionally, computer science, engineering, and biology graduates were more likely to be in the unemployed group versus the insecure group than business

graduates. Education graduates were less likely to be in the unemployed group than the insecure group, compared to business graduates. Socioeconomic status did not influence group membership in 2009 (see Table 6).

Table 6. Ratio for the 3-Class Model in 2009 With Parents' Income and Major With the SES Insecure as the Comparison Group

Class	Odds Ratio	SE	p
SES Secure			
Parent SES	0.999	0.006	
Computer Science	2.512	0.579	***
Engineering	2.100	0.340	***
Biology	0.306	0.036	***
General Studies	0.359	0.079	***
Social Science	0.254	0.032	***
Humanities	0.152	0.022	***
Health	1.007	0.169	
Education	0.564	0.083	***
Other	0.384	0.048	***
SES Unemployed			
Parent SES	1.004	0.006	
Computer Science	1.870	0.565	*
Engineering	1.813	0.384	**
Biology	1.843	0.269	***
General Studies	0.973	0.254	
Social Science	1.006	0.156	
Humanities	0.852	0.137	
Health	1.290	0.290	
Education	0.499	0.103	***
Other	0.810	0.129	

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12). Business majors are the reference group for major comparison. SES = socioeconomic status.

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

Similar relationships also emerge for the 2012 model. Graduates who majored in computer science and engineering were more likely to be in the stable versus the insecure group than business school graduates. In contrast, graduates who majored in biology,

general studies, social sciences, humanities, education, and other majors were more likely to be in the insecure versus the stable group compared to business graduates. Graduates who majored in engineering, biology, social sciences, and humanities were also less likely to be in the secure group versus the insecure group. In 2012, family income increased the likelihood of belonging to the stable group versus the insecure group (see Table 7).

Table 7. Ratio for the 3-Class Model in 2012 With Parents' Income and Major With the SES Insecure as the Comparison Group

Class	Odds Ratio	SE	p
Secure			
Parent SES	1.013	0.007	
Computer Science	0.847	0.227	
Engineering	0.449	0.141	*
Biology	0.671	0.092	**
General Studies	0.684	0.162	
Social Science	0.741	0.108	*
Humanities	0.486	0.073	***
Health	1.446	0.309	
Education	1.349	0.225	
Other	1.030	0.145	
Stable			
Parent SES	1.042	0.008	***
Computer Science	2.876	0.657	***
Engineering	4.550	0.849	***
Biology	0.383	0.067	***
General Studies	0.152	0.06	***
Social Science	0.170	0.039	***
Humanities	0.050	0.019	***
Health	1.201	0.259	
Education	0.020	0.026	**
Other	0.223	0.045	***

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12). Business majors are the reference group for major comparison. SES = socioeconomic status.

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

Discussion and Implications

This study explored using multiple dimensions of socioeconomic status at two points in time to examine postsecondary outcomes. Our findings help advance our understanding of the socioeconomic outcomes related to attending higher education, expanding on previous research on postgraduation outcomes, which has primarily looked at earnings as a measure of socioeconomic status (Hu & Wolniak, 2013; Wolniak & Engberg, 2019) and intergenerational mobility research which historically utilized only one socioeconomic status measure (Torche, 2015). In contrast, our study conceptualizes socioeconomic status as a multidimensional measure of socioeconomic success that helps provide a broader picture of students' outcomes beyond graduation. Our results provide insight into important aspects of socioeconomic success that encompass not only financial success but elements of job quality and stability. The results of our study have important implications for higher education administrators, policymakers, researchers, students, and families in supporting long-term student success beyond graduation.

Students and Families

Higher education is often presented as a linear pathway to successful socioeconomic outcomes, leading students and families to invest significant tuition dollars (as well as room and board) in pursuit of that outcome (Pope & Fermin, 2003; Roth, 2019). Many students also select majors based on the perceived economic returns of those majors (Carnevale et al., 2021; Eide et al., 2016; Thomas & Zhang, 2005), leading to increased enrollment and emphasis on disciplines such as STEM and business (Dutt-Ballerstadt, 2019). Our results indicate that students who majored in engineering and computer science were more likely to be in the SES secure group in 2009 and the stable group in 2012, indicating that these majors may provide a certain level of not just monetary benefits but also security and socioeconomic well-being. However, students may choose to pursue majors and occupations such as education or humanities because of a sense of purpose or fulfillment associated with such careers (Melguizo & Wolniak, 2012), despite knowing that they may earn less than if they were to go into STEM or business.

An additional nuance to the findings around computer science and engineering is that while graduates were more likely to be in the secure group in 2009, they were also more likely to be in the unemployed group compared to the insecure group. These results suggest a dichotomy for graduates of these majors. Those who were able to find employment achieved relative socioeconomic security; however, they were almost equally likely to be unemployed. Some of this could be attributed to the fact that these students graduated at the height of the great recession—a time when many graduates struggled to find employment (NCES, 2012)—or they could indicate that some graduates generally struggle to find employment within these fields immediately after graduation (NCES, 2012). However, five years after graduation in 2012, graduates

from computer science and engineering were more likely to be in the stable group, which presented both high likelihoods of economic security and satisfaction with their job security. A possible explanation for these results could be that five years after graduation, only graduates who are secure within their careers in STEM remain in them since attrition is an issue within STEM careers (Jelks & Crain, 2020).

Administrators and Policymakers

For higher education administrators, our results reinforce existing literature indicating that graduating from higher education is not a guaranteed ticket to socioeconomic success and that graduates may take diverse trajectories following graduation (Arum & Roska, 2014; Vedder et al., 2013). While some students do obtain relative economic stability following graduation, others may struggle. Within these groups, the individual variables provide a more nuanced picture of graduates' lives. Higher education administrators often tout the benefits of higher education regarding increased access to benefits, less time unemployed, and health outcomes (Clayton & Torpey-Saboe, 2021; Ma et al., 2019; Ma & Pender, 2023). However, our results indicate this is only the case for some students.

Additionally, there were some critical differences based on graduates major. Engineering and computer science students were more likely than business students to have higher levels of socioeconomic outcomes both one and four years after graduation, indicating that these majors may provide more security both in the short- and long-term. More concerning is that many of the other majors resulted in students being more insecure regarding socioeconomic status. These results should not be taken as an indication that students should not major in humanities or social sciences but instead should direct administrators to majors where students may need more support in terms of launching their careers. While business and STEM fields tend to have more structured internship pathways that lead to full-time employment following graduation (Moss-Pech, 2021), students in other majors may find it more challenging to acquire valuable internships. We encourage administrators to continue to invest in resources to support career resources for these majors, as well as work with employers in fields associated with these majors to create more robust internships. Of additional note is that these graduates obtained their bachelor's degree at the height of the Great Recession, during which many individuals struggled to acquire jobs (NCES, 2012).

As policymakers continue to push for increased accountability for higher education institutions in terms of student outcomes (Kelchen, 2018), using measurements, such as what we have presented in this study, that encompass more than just income becomes more important. When policymakers present income as the primary measure of postsecondary success, they omit the myriad of other benefits associated with attending higher education. A primary focus on income disadvantages disciplines that while vital to society (e.g., education, social services) do not pay as well as other disciplines. While our results indicate that certain majors such as education, social sciences, and humanities are less likely to lead to socioeconomic security than business majors, there

was only one measure that assessed how graduates evaluated their jobs (job security satisfaction). Considering other aspects of graduates' feelings about their jobs in future analyses could further elucidate the non-monetary value associated with these majors, as well as the value to society of such career paths that are not necessarily the highest paying.

Future Research

While the goal of this paper was not to provide the measure of socioeconomic status that all researchers should use, we hope that by presenting the capabilities and potential of LCA in measuring socioeconomic success that other researchers will also be interested in using such methods to build more nuanced conceptualizations. The benefits of this approach may be further bolstered by comparisons to more common econometric models to compare the outcomes. We believe such methods can expand our understanding of not just socioeconomic success but a tool for examining both individual and institutional impacts on this outcome. We hope that other researchers will take these tools and continue to build on and expand upon our conceptualization as they examine postsecondary success.

Conclusion

Our study explores a multidimensional approach to examine college students' post-graduation outcomes. As the higher education landscape is changing, we hope that our study can inspire scholarships for revisiting the measurements of higher education outcomes and advancing the understanding of higher education's long-term impact on student mobility. A more nuanced understanding of students' outcomes can help leaders improve student support services, promote student success, and further strengthen public confidence in the value of higher education for a promising future.

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Appendix

Table A.1. Variable Operationalization

Variable Operationalization	2009 original question and response options	2009 recoded response (new response value)	2012 original question and response options	2012 recoded response (new response value)
Home ownership	Do you own a home or pay rent? 1 = own home or pay mortgage 2 = pay rent 3 = both own home and pay rent 0 = neither own home nor pay rent	1 = own home (2) 2 = don't own home (1) 3 = own home (2) 4 = don't own home (1)	Do you own a home or pay rent? 1 = paid mortgage 0 = did not pay mortgage	1 = own home (2) 0 = don't own home (1)
Job security satisfaction	Are you satisfied with each of the following in your current job . . . Job security? 1 = satisfied with job overall 0 = not satisfied with job overall -3 = skipped (unemployed)	1 = satisfied (2) 2 = not satisfied (1) -3 = unemployed (0)	Satisfaction with primary job: Job security, in 2012 1 = very dissatisfied 2 = dissatisfied 3 = neither 4 = satisfied 5 = very satisfied	1 = not satisfied (1) 2 = not satisfied (1) 3 = not satisfied (1) 4 = satisfied (2) 5 = satisfied (2)
Job benefits	Which of the following benefits does your current employer offer you? Medical insurance and/or other health insurance, such as dental or optical 1 = offered medical/health insurance 0 = did not offer medical/health benefits -3 = skipped (unemployed)	1 = benefits (2) 0 = no benefits (1) -3 = unemployed (0)	Did your employer offer you any other benefits such as health insurance, retirement plans, paid vacation or holidays, etc.? 1 = yes, employer offered benefits 0 = no, employer did not offer benefits -3 = skipped (unemployed)	1 = benefits (2) 0 = no benefits (1) -3 = unemployed (0)

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12).

Table A.2. Distribution of Majors

Major	%
Business	13%
Computer Science	4%
Engineering	9%
Biology	20%
General Studies	2%
Social Science	13%
Humanities	10%
Health	5%
Education	9%
Other	15%

Note. Data are from the U.S. Department of Education, National Center for Education Statistics, 2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12).