The Intersectionality of First-Generation Students and Its Relationship to Inequitable Student Outcomes

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About the Author

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Abstract

First-generation students are estimated to be a large portion of current and future postsecondary education enrollment in the United States. Additionally, existing research indicates that those students are more likely to be at risk of not being as successful in higher education. However, all this research is in spite of the fact that there is not a nationally agreed on definition of what is a *first-generation student*. This study uses two large national data sets of individual student course records and registration from the past two decades, gathered from 140 different U.S. institutions, to examine how institutions are gathering data on and defining first-generation students, the intersectionality of first-generation students with other student populations that have been traditionally underserved in U.S. postsecondary education, and the success of those intersectional students at their various institutions. Results indicate the high level of intersectionality of first-generation status with other student populations that have traditionally been underserved in U.S. postsecondary education, the contribution of first-generation status to the increased likelihood of a student being less successful in higher education, and the compelling need for a national standard for reporting the results of a large student population that is at greater risk. The need for creating a greater focus on the inequitable outcomes experienced by an extremely large percentage of postsecondary students is discussed.

Keywords: first-generation, student success, equitable outcomes

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INTRODUCTION

The U.S. Department of Education's National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) serves as an invaluable resource for the postsecondary educational sector within the United States. While there are certainly limitations to IPEDS that could, and have, been argued (Ashford, 2017), the fact that the NCES sets national definitions for data elements and requires collection of them for all postsecondary institutions that participate in the federal student financial aid program allows us to see trends within inequitable outcomes that identify populations of students who could be at greater risk of not completing higher education, and thus direct services toward them. For instance, because of IPEDS we know that the 6-year graduation rate for White students who first attended a public 4-year institution in 2015 is 66.6% compared to 46.1% for Black or African American (hereafter Black) students and 58.1% for Hispanic or Latino students (hereafter Hispanic) (NCES, 2022), and we know that the 6-year graduation rate for students who entered 4-year public institutions in 2013 is 52.1% for students who were not awarded a Pell Grant (hereafter Pell) in their first year, compared to 46.6% for those who did (NCES, 2022).

Because NCES has not required collection of students' first-generation status in similar fashion, however, we do not have access to the same national-level data on the enrollment, degrees earned, or completion rate trends of first-generation students, nor do we even have a national definition of what constitutes a *first-generation student*. This lack of a national standard definition generates a significant problem because first-generation students constitute a large portion of postsecondary education enrollment. Research from Redford and Mulvaney Hoyer (2017) of the 2002 high school sophomores who later went on to attend postsecondary education, indicates that 24% were students whose parents had no higher education experience and an additional 34% were students who had at least one parent with some higher education experience, but neither parent had earned a bachelor's degree. This finding aligns with data from the 2015–2016 national Postsecondary Student Aid Study (RTI International, 2019a), which indicates that, among undergraduates enrolled in postsecondary education in 2015–2016, 24% had parents who had no higher education experience, and 56% had neither parent who had earned a bachelor's degree; in addition, 59% of those students were the first sibling in their family to go to college. Given the lack of consistent national data capture for this population we do not have the same information available on national data trends that indicate the potential inequitable outcomes that occur for first-generation students in the same fashion that we have for other traditionally underserved postsecondary student populations such as underrepresented minority (Black, Hispanic, and Indigenous) students and Pell recipients. This lack of insight limits potential research on ways to assist a significant portion of higher education students who have been shown in the literature highlighted below, as well as in the results of this study, to be less likely to be retained, progress through, and graduate from postsecondary education. The purpose of this study is to demonstrate those inequitable outcomes that are occurring for a significantly large portion of postsecondary students, how first-generation status intersects with student populations that are at higher risk to be less successful in higher education, how that status contributes to an increased predicted risk, and how the lack of a national

standard for reporting contributes to the lack of focus for this student population. Higher education, and society at large, benefits from successful completion of degree goals for a larger number of postsecondary students; this research demonstrates how an increased focus on a very large portion of those students could help contribute to that goal.

Defining First-Generation Students in Postsecondary Education

The above data on postsecondary enrollment indicates the initial issue inherent in examining first-generation students in U.S. postsecondary education: the lack of a nationally recognized definition of what constitutes a first-generation student. Some research has chosen to define first-generation students as only those students where neither parent has any postsecondary education experience (Chen, 2005; Redford & Mulvaney Hoyer, 2017), while others have chosen to define first-generation students as those students whose parents have not completed a bachelor's degree (Engle & Tinto, 2008; Pike & Kuh, 2005; RTI International, 2019a, 2019b, 2019c; Thayer, 2000). While both definitions have value, and the literature around first-generation students has found differential experiences for both definitional types, the lack of consistency leads institutions to both collect and use internal data on first-generation students in different methods, and does not allow for a consistent effort to serve a significant portion of students enrolled in higher education. Additionally, while recent projections from Nathan Grawe (2021) indicate that the percentage of high school graduates where neither parent had earned a bachelor's degree will decline over the next decade, the projections still indicate that as of 2033 more than 60% of high school graduates will have had neither parent earn a bachelor's degree; this indicates the continuing substantial population of first-generation students who will enroll in postsecondary education in the future.

First-Generation Students Characteristics and Postsecondary Expectations

Redford and Mulvaney Hoyer (2017) found that students whose parents had no higher education experience were three times more likely to be Hispanic compared to students who have a least one parent who has earned a bachelor's degree (27% vs. 9%). They were also more likely to be Black (14% vs. 11%) and less likely to be White (49% vs. 70%). Additionally, the first-generation students were more than twice as likely to come from a home whose household income was below $50,000 (77% vs. 29%; Redford & Mulvaney Hoyer, 2017). This aligns with the finding that, among postsecondary enrollees in 2015–2016, those students where neither parent had earned a bachelor's degree were more likely to be Hispanic (25% vs. 14%), to be Black (18% vs. 12%), to be veterans (5% vs. 3%), to be age 30 or older (28% vs. 16%). In addition, they were less likely to be White (46% vs. 61%), and less likely to come from lower-income households (median parental income $41,000 vs. $90,000) than students where at least one parent had earned a bachelor's degree (RTI International, 2019a).

Additionally, students whose parents have no higher education experience are less likely to take the ACT test while in high school (66% vs. 83%), are less likely to have a high school GPA above 3.00 (33% vs. 56%), are more likely to delay their postsecondary enrollment (42% vs. 21%), and less likely to attend a highly selective institution (6% vs. 28%; Redford & Mulvaney, 2017). Also, a greater percentage of

students whose parents had not earned a bachelor's degree were enrolled in 2-year institutions (64% public 2-year undergraduates, 69% private nonprofit 2-year undergraduates) or for-profit institutions (72% 4-year for-profit undergraduates vs. 70% 2-year for profit undergraduates) in 2015–2016 (RTI International, 2019a).

First-Generation Students' Experience in Postsecondary Education

The National Association of Student Personnel Administrators' Center for First-Generation Student Success has found that undergraduate students who first enrolled in postsecondary education in 2011–2012, where neither parent had earned a bachelor's degree, were less likely to use health services (14% vs. 29%), academic advising (55% vs. 72%), or academic support services (30% vs. 37%), but were more likely to use financial aid resources (65% vs. 49%) than students who have at least one parent who has earned a bachelor's degree (RTI International, 2019b). Engle and Tinto (2008) discovered that students who have had neither of their parents earn a bachelor's degree were less likely to join campus clubs and organizations, more likely to live off campus, and more likely to take fewer classes. Additionally, this type of first-generation student had lower ratings of engagement on the National Student Survey of Engagement, were more likely to report being dissatisfied with their institution (Pike & Kuh, 2005), and were less likely to be enrolled full time (RTI International, 2019c). Finally, first-generation students where neither parent had any postsecondary educational experience were more likely to report financial strain as being a reason to drop out of college, as opposed to students who had at least one parent who had earned a bachelor's degree (Redford & Mulvaney Hoyer, 2017).

First-Generation Students' Postsecondary Education Success

Among students who entered postsecondary education in 2003–2004, first-generation students where neither parent had earned a bachelor's degree were less likely to have completed an advanced-level math course, had lower 1st-year retention rates, and were more likely to have left higher education altogether after their first year of enrollment (RTI International, 2019c). Additionally, Engle and Tinto (2008) found that first-generation students, where neither parent had completed a bachelor's degree, earned lower college GPAs; and Weston et al. (2019) indicated that first-generation students were less likely to earn passing grades in introductory "weed-out" science, technology, engineering, and mathematics (STEM) courses, that fail large numbers of students, particularly traditionally underserved students, before they can enter their major specific courses.

Given these initial indicators of student success it is not surprising that the literature has indicated that first-generation students are also less likely to earn a degree. The National Association of Student Personnel Administrators' Center for First-Generation Student Success (RTI International, 2019c) found that, among the students who entered higher education in 2003–2004, those where neither parent had earned a degree were more likely to have not attained any postsecondary credential 6 years after first enrolling than students who have at least one parent who had earned a bachelor's degree (56% vs. 40%). Additionally, Redford and Mulvaney Hoyer (2017) found that, among high school sophomores in 2002 who later enrolled in postsecondary education, only 53% of first-generation students (neither parent had postsecondary education experience) had attained

any type of postsecondary credential by 2012, as compared to 70% of students where at least one of their parents had earned a bachelor's degree.

Relevance of the Current Study

It is clear from the existing literature that there is no clear national definition of what a first-generation student is. Regardless of how first-generation students are defined, however, they are more likely to also be identified in a student population that has been historically underserved in U.S. postsecondary education, and they are less likely to be engaged and successful in their postsecondary education endeavors. Given those issues this study used a large national data file of postsecondary student records to answer three research questions relevant to this important postsecondary student population:

1| How do U.S. postsecondary institutions collect data on and define first-generation students?

2| What is the intersectionality between first-generation students and other traditionally underserved student populations in U.S. higher education?

3| What are the student outcomes for first-generation students overall, and what are they for those first-generation students who are also members of traditionally underserved student populations, compared to non-first-generation students?

METHODOLOGY

The study used two large national deidentified unit record data files to examine the research questions. One was a file of students' course grade results (course file) and the other was students' registration and degree records (retention file). Institutions submitted students' deidentified unit record data to a national nonprofit organization as part of their ongoing work on student success efforts. Two institutions that submitted course or registration data were not included in the study because they did not also provide data on first-generation status.

The course file consists of more than 62 million course grade records submitted by 146 separate institutions. The more than 62 million course records were submitted for 3,792,717 unique students for courses that occurred in academic terms ranging from Fall 2003 through Fall 2022. The data elements contained in the file consist of institution names; academic year; academic term; course subject; course number; research ID; if student was required to take developmental education courses; first-generation status; IPEDS race/ethnicity; gender; veteran status; Pell recipient status; course delivery method; course instructor designation; and course grade.

The retention file consists of 1,881,559 unique student registration records submitted by 122 separate institutions. Only one of the retention file institutions did not submit course data to the course file. The more than 1.8 million students were all new entry students at their institutions with cohort entry terms ranging from Fall 2005 through Fall 2022. The data elements contained in the file consist of institution names; cohort academic year; cohort academic term; research ID; first-generation status; IPEDS race/ethnicity; gender; veteran status; Pell recipient status; and retention and graduation status for years 2, 3, 4, 5, and 6.

The institutions that submitted to the two files were over-represented by public institutions (71.7%) and 4-year institutions (71.8%), but cover a significantly large sample of the U.S. postsecondary educational sector over the past two decades.

Institutions were allowed to self-define *first-generation status* for students. Thus, to examine Research Question 1, online data reviews were scheduled with all institutional partners. More than 50 online sessions were conducted, covering approximately 50% of the institutional sample.

The student outcomes examined in the study consist of the non-pass rate in courses, defined as the percentage of grades awarded that were Ds, Fs, Waived grades, or Incomplete grades (DFWI) and the progression of students defined as the percentage of students who reenrolled in their second Fall semester (1st-year retention rate), third Fall semester (2nd-year retention rate), fourth Fall semester (3rd-year retention rate), and the percentage that graduated from their enrolled degree level or higher (primarily baccalaureate degrees at 4-year institutions, associate's degree at 2-year institutions) after their 4th year (4-year graduation rate), 5th year (5-year graduation rate), and 6th year (6-year graduation rate).

Chi-square statistics were used to examine the differences in the observed values. Given the large student sample sizes contained in the two data files, nearly all observed differences were statistically significant at the $p < 0.001$ level even when practical differences were negligible. All differences from the course data file met this criterion. When this was not the case for the observed variables in the retention file, however, it is noted in the results.

Finally, a set of logistic regression equations were run to examine the multiple correlational relationship between first-generation status and all the other historically underserved student populations. There is one regression equation for each student success outcome. Data are coded such that the DFWI model predicts the likelihood of earning a DFWI grade, and the progression models predict the likelihood of not being retained or graduating. Predictive variables consisted of first-generation status (1 = no), developmental education status (DFWI model only; 1 = no), veteran status (1 = no), Pell awarded status (1 = no), Hispanic (1 = yes), Black (1 = yes), White (1 = yes), and Male (1 = yes).

RESULTS

Research Question 1. How do U.S. postsecondary institutions collect data on and define first-generation students?

Among the institutions that participated in the data information sessions, a very small number (fewer than five) relied on the Free Application for Federal Student Aid (FAFSA) data on parental education level for defining first-generation status. The reasons stated for not using the FAFSA data on parental education level were as follows:

1 | The difficulty working with FAFSA data posed by the various interpretations of the current U.S. Department of Education guidelines on acceptable use of FAFSA data, and

2 | The fact that not all students complete the FAFSA. This finding obviously has implications for the disconnect between how institutions define first-generation status and how many of the national studies on first-generation students, which rely on the postsecondary longitudinal data sets generated by NCES, define first-generation status (Chen, 2005; Redford & Mulvaney Hoyer, 2017; RTI International 2019a, 2019b, 2019c).

Overwhelmingly, institutions instead collected parental education level at the time of application to determine first-generation status. A small set

of institutions simply asked whether either parent had completed a 4-year degree. Given the almost ubiquitous nature of the common application among the institutions in the sample, however, most of the institutions collected the reported education level for each parent either directly from the common application or from a similar style question. The most common stated reason for collecting the full parental education level is the flexibility of being able to define first-generation students in multiple fashions for different institutional purposes.

The two most common definitions provided by the institutions matched the national literature as either (1) neither parent has earned a bachelor's degree, or (2) neither parent has any postsecondary educational experience. Every institution that participated in one of the data information sessions indicated that they used the definition "neither parent has earned a bachelor's degree" for their data file submissions and for the two data sets used in the remainder of this study.

Research Question 2. What is the intersectionality of first-generation students and other traditionally underserved student populations in U.S. higher education?

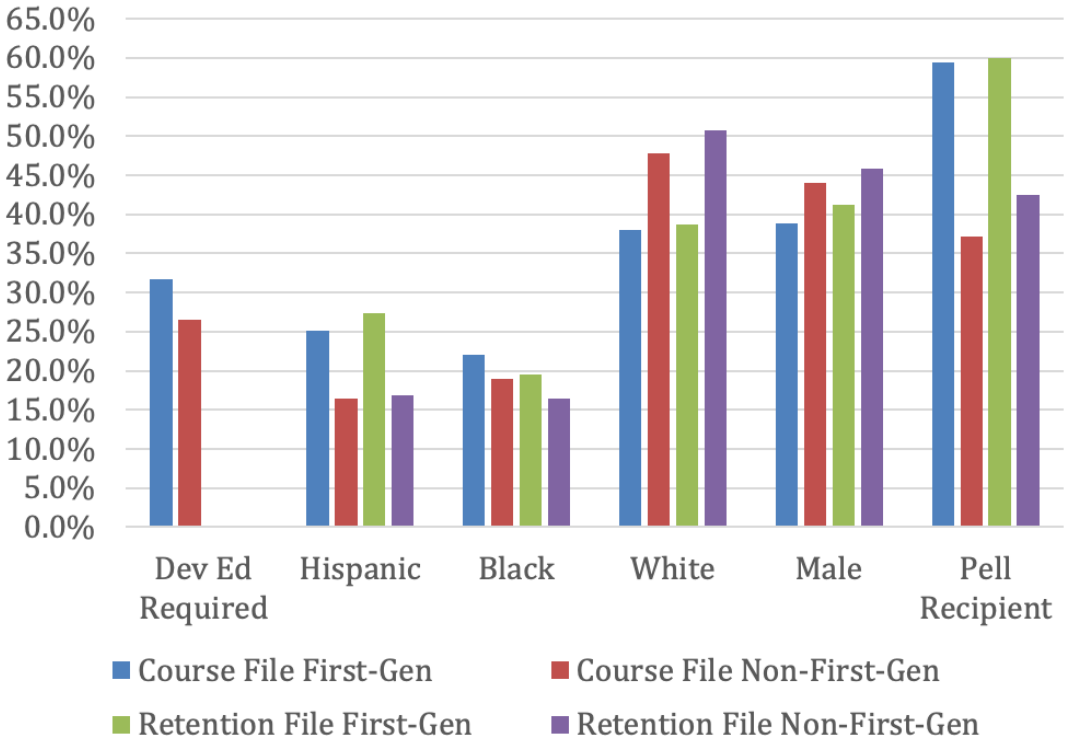
Table 1 indicates that first-generation students accounted for approximately a quarter of each of the files (27.0% Course file, 25.5% Retention file). There are a few areas where first-generation students were vastly overrepresented among student populations that have traditionally been underserved in U.S. postsecondary education. The first area is that first-generation students were much more likely to be Hispanic (25.1% vs. 16.4% Course file, 27.4% vs. 16.8% Retention file) as well as students who are required to take developmental education courses at their institution (31.7% vs. 26.5% Course file); first-generation students were dramatically more likely to be Pell recipients (59.4% vs. 37.2% Course file, 60.0% vs. 42.5% Retention file). First-generation students were also much less likely to be White (38.0% vs. 47.8% Course file, 38.7% vs. 50.7% Retention file). Among some additional traditionally underserved populations, first-generation students were slightly overrepresented among Black students (22.0% vs. 18.9% Course file, 19.5% vs. 16.4% Retention file) and veteran students, although there is little practical difference in the populations (3.4% vs. 2.5% Course file, 2.3% vs. 2.1% Retention file). However, there were no practical differences among Indigenous students (American Indian/Alaska Native 0.8% vs. 0.8% Course file, 0.8% vs. 0.7% Retention file, Native Hawaiian/Pacific Islander 0.5% vs. 0.4% Course file, 0.3% vs. 0.3% Retention file); in addition, first-generation students were less likely to be male (38.9% vs. 44.0% Course file, 41.2% vs. 45.8% Retention file). Figure 1 provides a visualization of the differences in key demographic groups between first-generation and non-first-generation students for each of the data files.

Table 1. Student Demographics for First-Generation and Non-First-Generation Students

Student Subpopulation	Course File		Retention File	
	First-Gen	**Non-First-Gen**	**First-Gen**	**Non-First-Gen**
Total	1,025,236 27.0%	2,767,481 73.0%	478,939 25.5%	1,402,660 74.5%
Developmental Education Required+	31.7%	26.5%	Unk	Unk
Nonresident Alien	2.0%	3.8%	2.0%	4.0%
Hispanic	25.1%	16.4%	27.4%	16.8%
American Indian/Alaska Native	0.8%	0.8%	0.8%	0.7%
Asian	4.8%	5.1%	5.0%	4.6%
Black	22.0%	18.9%	19.5%	16.4%
Native Hawaiian/Other Pacific Islander	0.5%	0.4%	0.3%	0.3%
Two or More Races	3.0%	3.3%	2.8%	2.9%
White	38.0%	47.8%	38.7%	50.7%
Unknown	3.8%	3.5%	2.8%	2.9%
Male	38.9%	44.0%	41.2%	45.8%
Veteran+	3.4%	2.5%	2.3%	2.1%
Pell Recipient+	59.4%	37.2%	60.0%	42.5%

Note: + Not every student reported data for developmental education (85% of cases reported), veteran status (90% of cases reported), and Pell recipient (76% of cases reported). First-Gen = first-generation student; Non-First-Gen = non-first-generation student.

Figure 1. Key Demographic Differences for First-Generation and Non-First-Generation Students



Note: Dev Ed Required = students for whom developmental education was required; First-Gen = first-generation student; Non-First-Gen = non-first-generation student

Research Question 3. What are the student outcomes for first-generation students overall and for first-generation students who are also members of traditionally underserved student populations compared to non-first-generation students?

Table 2 lists the DFWI rates by various student populations. As expected given the existing literature, first-generation students had higher DFWI rates than non-first-generation students. Additionally, the results aligned with national data trends on higher non-pass rates for other student populations that are often defined as being at risk (Weston et al., 2019). The largest gap is seen between Black students and White students (13.5 percentage points), followed closely by the gap between students for whom developmental education courses are required and those for whom they are not (13 percentage points). Hispanic students, male students, veteran students, and Pell recipients all have higher DFWI rates as well.

Table 2. Course DFWI Rates for Univariate Student Populations

Student Poplulation	DFWI Rate
Overall	18.7%
First-Generation	20.9%
Non-First-Generation	18.0%
Developmental Education Required	30.0%
No Developmental Education Requirement	17.0%
Hispanic	21.0%
Black	28.5%
White	15.0%
Male	20.4%
Female	17.4%
Veteran	20.8%
Nonveteran	19.0%
Pell Recipient	23.5%
Not a Pell Recipient	16.5%

Note: DFWI = Ds, Fs, Waived, or Incomplete Grades.

Aligning with the course outcomes, we see the same equity gaps in progression rates for nearly all student populations (Table 3). First-generation students had lower rates at each progression level; the gap widens progressively after it starts at 2.2 percentage points lower in 1st-year retention rates then widens to eventually be 5.4 percentage points lower in 6-year graduation rates. The widest equity gap is again observed between Black students and White students. The gap is initially 11.7 percentage points in 1st-year retention rates, eventually growing to 21.3 percentage points for the 6-year graduation rate. Pell recipients and male students exhibited the same pattern of lower rates at each level of progression with a widening gap. Hispanic students exhibited a higher 1st-year retention rate (0.6 percentage points higher than White students), but the gap disappears by the 2nd-year retention rate; Hispanic students had lower progression rates than White students at each subsequent year. The most unique pattern is demonstrated by veteran students, who demonstrated lower retention rates each year with a widening gap. That might be because they graduated faster, however, since they demonstrated a higher 4-year graduation rate (6.3 percentage points) that narrows but holds for 5-year graduation rates (0.7 percentage points). For all practical purposes, however, the gap has disappeared by the 6-year graduation rate, when their rate is essentially the same as nonveteran students (0.2 percentage points lower).

Table 3. Progression Rates for Univariate Student Populations

Student Population	1st-Year	2nd-Year	3rd-Year	4-Year	5-Year	6-Year
	Ret Rate	Ret Rate	Ret Rate	Grad Rate	Grad Rate	Grad Rate
Overall	68.4%	50.3%	37.0%	29.0%	38.2%	41.5%
First-Generation	66.8%	48.5%	34.5%	27.1%	34.4%	37.4%
Non-First-Generation	69.0%	50.9%	37.8%	29.6%	39.4%	42.8%
Hispanic	70.8%	52.4%	36.6%	29.6%	37.2%	40.7%
Black	58.5%	40.6%	28.9%	16.9%	23.0%	25.7%
White	70.2%	52.4%	39.8%	32.3%	43.5%	47.0%
Male	67.1%	49.5%	36.6%	25.7%	35.5%	39.1%
Female	69.6%	51.0%	37.3%	31.7%	40.5%	43.5%
Veteran	64.4%	40.3%	23.9%	34.2%	37.7%	40.2%
Nonveteran	68.0%	49.7%	36.1%	27.9%	37.0%	40.4%
Pell Recipient	65.2%	46.5%	32.2%	22.3%	29.6%	32.7%
Not a Pell Recipient	69.6%	52.1%	40.0%	29.8%	41.5%	45.4%

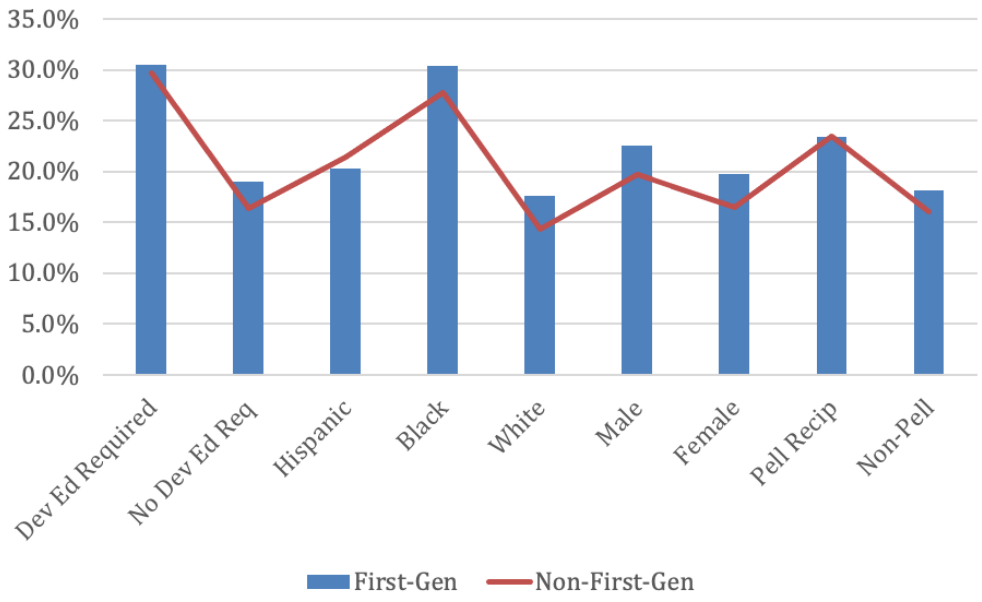
Table 4 lists the DFWI grades for the intersection ¬of first-generation students with various other traditionally underserved student populations in U.S. postsecondary education. As expected, given the existing literature and univariate results from this study, first-generation students demonstrated higher DFWI rates in most instances. In addition, the intersection of the first-generation and underserved students in most—but not all—instances, demonstrated the highest DFWI rates. The two highest instances of DFWI rates are found in first-generation developmental education students (30.5%) and first-generation Black students (30.4%). Additionally, non-first-generation nondevelopmental education, White, female, nonveteran, and non-Pell recipient students all demonstrated the lowest DFWI rates in each intersectional grouping. Among Hispanic students, however, non-first-generation students had higher DFWI rates, although both groups of Hispanic students had higher DFWI rates than either group of White students. Similarly, among Pell recipients there was no practical difference between first-generation and non-first-generation students' DFWI rates. Both groups had higher DFWI rates than non-Pell recipients, however. Figure 2 provides a visualization of the intersectionality of first-generation status and key student populations around course DFWI rates.

Table 4. Course DFWI Rates for Intersection of First-Generation and Other Student Populations

Student Subpopulation	First-Generation DFWI	Non-First-Generation DFWI
Developmental Education Required	30.5%	29.7%
No Developmental Education Required	19.0%	16.4%
Hispanic	20.3%	21.4%
Black	30.4%	27.8%
White	17.6%	14.3%
Male	22.6%	19.7%
Female	19.8%	16.5%
Veteran	21.5%	20.4%
Nonveteran	21.0%	18.3%
Pell Recipient	23.4%	23.5%
Not a Pell Recipient	18.2%	16.1%

Note: DFWI = Ds, Fs, Waived, or Incomplete Grades.

Figure 2. Intersectionality of First-Generation Status and Key Student Populations for Course DFWI Rates



Note: Dev Ed Required = students for whom developmental education was required; No Dev Ed Req = students for whom developmental education was not required; Pell Recip = students who are Pell Grant recipients; Non-Pell = students who are not Pell Grant recipients; First-Gen = first-generation student; Non-First-Gen = non-first-generation student; DFWI = Ds, Fs, Waived, or Incomplete grades.

Table 5 lists the progression rates for the intersection of first-generation students with various other traditionally underserved student populations in U.S. postsecondary education. Following the pattern exhibited throughout this study, first-generation students in each grouping generally demonstrated the lowest progression rate at each yearly point but not in all instances, and the nature of the intersection between first-generation students and other underserved populations becomes more complex.

Table 5. Progression Rates for Intersection of First-Generation and Other Student

Student Population	1st-Year Ret Rate		2nd-Year Ret Rate		3rd-Year Ret Rate	
	First-Gen	Non-First-Gen	First-Gen	Non-First-Gen	First-Gen	Non-First-Gen
Hispanic	72.0%	70.1%	54.1%	51.4%	38.6%	35.5%
Black	56.5%	59.3%	38.9%	41.3%	27.4%	29.5%
White	66.9%	71.0%	48.5%	53.4%	34.9%	41.1%
Male	64.7%	67.8%	47.0%	50.3%	33.4%	37.6%
Female	68.3%	70.1%	49.7%	51.5%	35.4%	38.1%
Veteran	61.9%	65.3%	39.0%**	40.9%**	22.8%*	24.4%*
Nonveteran	67.0%	68.3%	48.7%	50.0%	34.5%	36.6%
Pell Recipient	66.0%	64.7%	47.8%	45.6%	33.5%	31.5%
Not a Pell Recipient	66.1%	70.4%	48.2%	53.0%	35.5%	41.0%
	4-Year Grad Rate		2-Year Grad Rate		6-Year Grad Rate	
	First-Gen	Non-First-Gen	First-Gen	Non-First-Gen	First-Gen	Non-First-Gen
Hispanic	29.1%	29.9%	36.9%+	37.3%+	41.3%**	40.4%**
Black	16.9%+	17.0%+	21.9%	23.4%	24.1%	26.4%
White	30.8%	32.7%	39.5%	44.5%	42.5%	48.1%
Male	23.8%	26.2%	31.0%	36.8%	33.8%	40.7%
Female	29.6%	32.5%	37.0%	41.8%	40.0%	44.8%
Veteran	32.2%	35.0%	36.3%*	38.2%*	39.0%+	40.7%+
Nonveteran	26.8%	28.3%	34.2%	37.9%	37.3%	41.4%
Pell Recipient	23.1%	21.7%	29.8%+	29.5%+	32.8%+	32.7%+
Not a Pell Recipient	27.4%	30.3%	36.2%	42.5%	40.0%	46.5%

Note: + No statistical significance, * $p < 0.05$, ** $p < 0.01$, all others significant at $p < 0.001$; Ret Rate = retention rate; Grad Rate = graduation rate. First-Gen = first-generation student; Non-First-Gen = non-first-generation student.

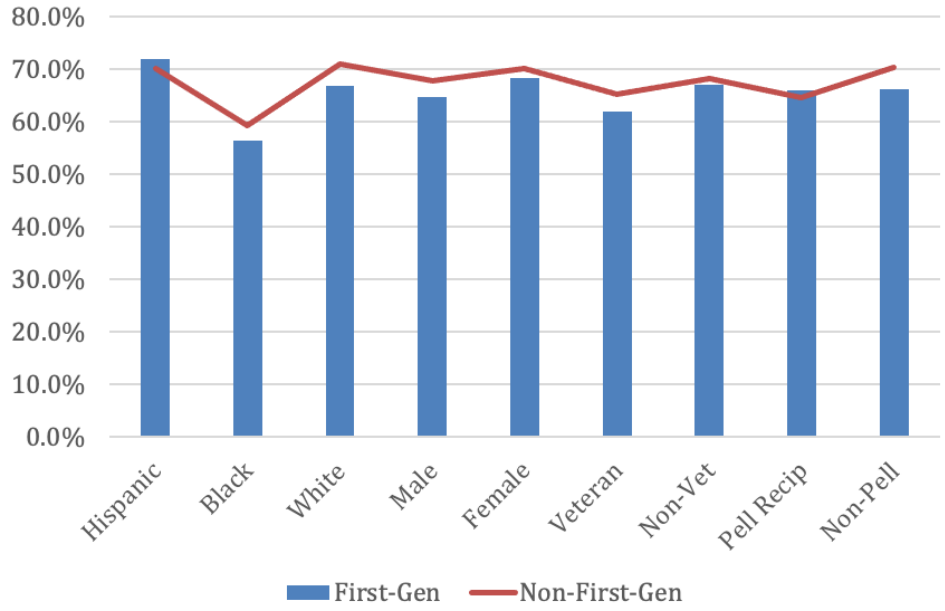
Among Black students and male students, first-generation students demonstrated the lowest progression rate at each year point compared to White and female students, respectively. The only exception is that there was no statistical difference in the 4-year graduation rates demonstrated by Black first-generation and Black non-first-generation students.

Pell recipients had lower progression rates each year, and non–Pell recipient non-first-generation students always demonstrated the highest progression rate. However, first-generation Pell recipients' 1st-, 2nd-, 3rd-year retention rates, and 4-year graduation rates, were higher than non-first-generation Pell recipients' rates, and there were no statistical differences between their 5- and 6-year graduation rates.

Among veteran students, the first-generation veteran students demonstrated the lowest progression rates at the 1st-, 2nd-, and 3rd-year retention rates. Veteran students had higher graduation rates regardless of first-generation status, however, except for non-first-generation nonveteran students, who had the highest 6-year graduation rate. Also, the 6-year graduation rate difference between first-generation and non-first-generation veterans was not statistically significant.

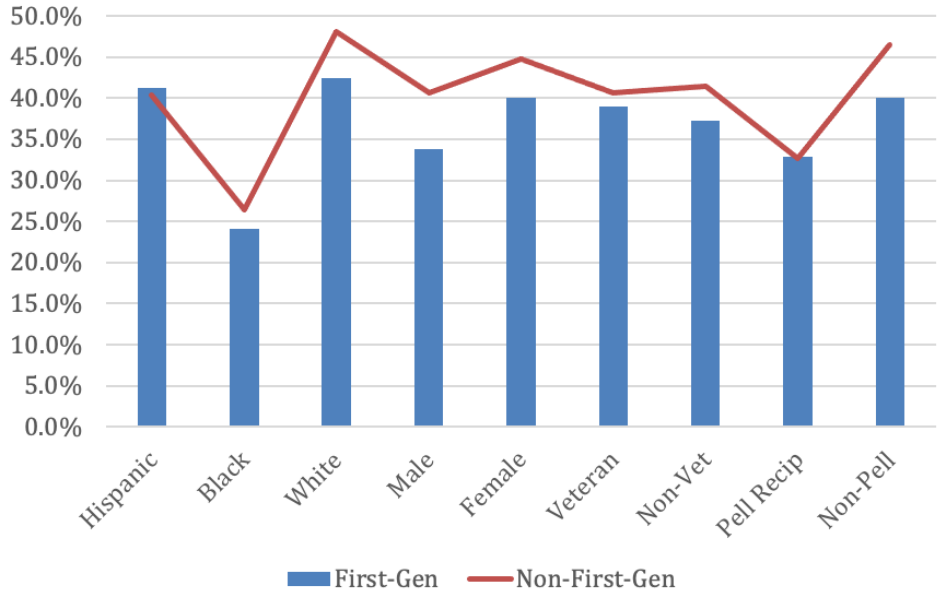
Finally, Hispanic students demonstrated the most complex pattern. First-generation Hispanic students usually had higher progression rates than non-first-generation Hispanic students, except in 4-year graduation rates, where they were lower, and in 5-year graduation rates, where the difference was not statistically significant. Additionally, first-generation Hispanic students had the highest 1st- and 2nd-year retention rates when compared to first- and non-first-generation White students. Finally, non-first-generation Hispanic students' retention rates (1st-, 2nd-, and 3rd-year) were higher than first-generation White students, but their graduation rates were all lower. Figures 3 and 4 provide a visualization of the intersection of first-generation status and various student populations around 1st-year retention and 6-year graduation rates.

Figure 3. Intersectionality of First-Generation Status and Key Student Populations for 1st-Year Retention



Note: Non-Vet = students who are not military veterans; Pell Recip = students who are Pell Grant recipients; Non-Pell = students who are not Pell Grant recipients; First-Gen = first-generation student; Non-First-Gen = non-first-generation student.

Figure 4. Intersectionality of First-Generation Status and Key Student Populations for 6-Year Graduation Rates



Note: Non-Vet = students who are not military veterans; Pell Recip = students who are Pell Grant recipients; Non-Pell = students who are not Pell Grant recipients; First-Gen = first-generation student; Non-First-Gen = non-first-generation student.

The results for the logistic regression equations for each student success outcome are listed in Table 6. All seven of the regressions are statistically significant and demonstrate acceptable goodness of fit. When considered together with all the other variables in the multicorrelational relationships, all parameters' relationships are in the expected direction based on the univariate relationships demonstrated in this study, with the exception that being White was associated with a greater likelihood of not being retained in your first or second year, and not graduating in your fourth year when considered in conjunction with all the other parameters in the equation. All the individual variables are statistically significant predictors in each equation.

Table 6. Logistic Regression Results for Student Success Variables

	DFWI (DFWI = 1) Chi sq = 1087986 Hosmer Lemeshow = 21931		**1st-Year Retention** (not retained = 1) Chi sq = 15454 Hosmer Lemeshow = 669		**2nd-Year Retention** (not retained = 1) Chi sq = 12156 Hosmer Lemeshow = 889	
Variable	B	Sig	B	Sig	B	Sig
First Generation (FG = 0)	–.044	< .001	–.060	< .001	–.027	< .001
Dev Ed (Dev Ed = 0)	–.599	< .001				
Veteran (Vet = 0)	–.061	< .001	–.328	< .001	–.511	< .001
Pell Award (Pell = 0)	–.200	< .001	–.106	< .001	–.129	< .001
Hispanic (Hisp = 1)	.153	< .001	–.072	< .001	–.138	< .001
Black (Black = 1)	.514	< .001	.555	< .001	.435	< .001
White (White = 1)	–.078	< .001	.106	< .001	.010	< .001
Male (Male = 1)	.251	< .001	.135	< .001	.083	< .001
	3rd-Year Retention (not retained = 1) Chi sq = 10048 Hosmer Lemeshow = 1034		**4-Year Graduation** (not graduated = 1) Chi sq = 16549 Hosmer Lemeshow = 286		**5-Year Graduation** (not graduated = 1) Chi sq = 19216 Hosmer Lemeshow = 593	
Variable	B	Sig	B	Sig	B	Sig
First Generation (FG = 0)	–.022	< .001	–.010	< .001	–.072	< .001
Veteran (Vet = 0)	–.662	< .001	.164	< .001	–.111	< .001
Pell Award (Pell = 0)	–.213	< .001	–.238	< .001	–.323	< .001
Hispanic (Hisp = 1)	–.124	< .001	.016	< .001	–.036	< .001
Black (Black = 1)	.338	< .001	.863	< .001	.781	< .001
White (White = 1)	–.110	< .001	.103	< .001	–.112	< .001
Male (Male = 1)	.058	< .001	.317	< .001	.249	< .001

	6-Year Graduation (not graduated = 1) Chi sq = 15694 Hosmer Lemeshow = 707	
Variable	B	Sig
First Generation (FG = 0)	–.066	< .001
Veteran (Vet = 0)	–.182	< .001
Pell Award (Pell = 0)	–.343	< .001
Hispanic (Hisp = 1)	–.085	< .001
Black (Black = 1)	.760	< .001
White (White = 1)	–.145	< .001
Male (Male = 1)	.207	< .001

Note: Dev Ed = students for whom developmental education was required

Examination of the regression coefficients indicate that being a Black student demonstrates the strongest relationship in the multicorrelational equation with each dependent variable consistently, with the exception that needing developmental education demonstrates the strongest relationship with DFWI grades. Pell-recipient status also consistently demonstrates a strong negative relationship with the dependent variables in each multicorrelational relationship. When considered with all the other variables within the regression equations, first-generation status typically accounts for one of the weakest relationships with the various dependent variables. First-generation status is a statistically significant predictor in each of the equations, however, even when considered with the other historically underserved populations, such that being a first-generation student is associated with a greater likelihood of earning a DFWI grade, and not being retained or graduating at each progression point when considered with the other identifiers of historically underserved students in U.S. postsecondary education.

LIMITATIONS

Several limitations exist within the present study that allow for the opportunity of expansion of the research. Institutions in the present study were allowed to define first-generation status at the institutional level; while all institutions interviewed indicated they used the same definition, not every institution was interviewed in the research, leading the results to suffer from the exact lack of a national standard that is identified in the present findings. Future research would benefit from the ability to examine student outcomes at each institution by both nationally recognized definitions. Additionally, the present study chose to focus on student progression irrelevant of institutional type. While this benefits the generalizability of the results across the postsecondary education landscape, it does not acknowledge the differential student experience that occurs across different sectors of U.S. higher education, in particular the distinction between 2- and 4-year institutions. The examination of institutional type as a covariate would greatly

expand the research; perhaps there are sectors of the postsecondary environment that demonstrate they are serving first-generation students better than others, leading to potential models of exemplar practice to replicate. Finally, the study was limited by the number of student characteristic variables available across most institutions. Future research would benefit from the further inclusion of more-nuanced variables of student academic preparation, greater indicators of student socioeconomic status, and data on students' academic discipline.

DISCUSSION

This study adds to the literature highlighting the inequitable outcomes for first-generation students in U.S. higher education, demonstrates the large level of intersectionality between first-generation status and other traditionally underserved student populations and how that intersectionality relates to student outcomes, and demonstrates the ongoing need to establish a national standard definition, or definitions, of first-generation status. The lack of a national standard leads to inconsistent reporting of student outcomes, which in turn contributes to a lack of highlighting a large student population that demonstrates higher risk of attrition in U.S. higher education. This lack of consistent insight into the population can ultimately impact the level of effort directed at this large, underserved student population. Without a consistent national standard for defining and tracking first-generation students it can lead to a lower level of focus on the inequitable outcomes of first-generation students as compared to those seen in other consistently reported student populations such as those delineated by race and ethnicity or Pell status.

In support of the need for a consistent standard, nearly all the institutions interviewed in the research collected data that would allow them to use multiple definitions of first-generation status to align with different purposes at the institution. While every institution interviewed submitted first-generation status using the definition "neither parent had earned a bachelor's degree," the definition commonly found in the literature (Engle & Tinto, 2008; Pike & Kuh, 2005; RTI International, 2019a, 2019b, 2019c; Thayer, 2000), it is worth noting that nearly all institutions in the study indicated that they also use the other existing definition from the literature: "neither parent had any postsecondary experience" (Chen, 2005; Redford & Mulvaney Hoyer, 2017). Given the preponderance of institutions that collect data in a fashion that allows them to report on either definition it seems reasonable that student data could be reported nationally for both definitions, allowing for a more nuanced examination of student behavior for both groups. Without a standard, however, it is likely that institutions will continue to use multiple definitions for different purposes making the consistent tracking of students at a national level more challenging and limiting the exposure to the challenges faced by first-generation students.

It is also worth noting that most of the institutions interviewed in this research chose to collect data on first-generation status at the time of application rather than relying on the FAFSA information that is used in the NCES longitudinal data studies that inform several of the national research studies on first-generation students (Chen, 2005; Redford & Mulvaney Hoyer, 2017; RTI International, 2019a, 2019b, 2019c). The fact that most institutions collected first-generation data at the time of application rather than using the FAFSA is a clear disconnect between the literature and how institutions are using the data, and indicates that the literature might be missing a significant portion of

students in the research on first-generation status. This disconnect also points to the need for the NCES to collect first-generation data as a part of the IPEDS process so that these competing definitional needs could be resolved when researchers examine a population that constitutes a significant portion of postsecondary enrollment, and clearly demonstrates a need for services directed at its success.

The results of the study align with previous research indicating that first-generation students are a population more likely to struggle in postsecondary education. As in previous research, first-generation students in this study earned more DFWI grades (Engle & Tinto, 2008; Weston et al., 2019), were less likely to be retained (RTI International 2019c), and were less likely to graduate (Redford & Mulvaney Hoyer, 2017; RTI International, 2019c). This study also clearly demonstrates the intersectionality of first-generation students with other student populations that have been traditionally underserved in U.S. higher education and thus are more likely to be at risk of not being successful, aligning with the previous literature indicating first-generation students were more likely to be Hispanic (Redford & Mulvaney Hoyer, 2017; RTI International, 2019a), Black (Redford & Mulvaney Hoyer, 2017; RTI International, 2019a), less likely to be White (Redford & Mulvaney Hoyer, 2017; RTI International, 2019a), more likely to be veterans (RTI International, 2019a), and more likely to be from low-income families (Redford & Mulvaney Hoyer, 2017; RTI International, 2019a). It adds to these findings by also demonstrating that first-generation students were more likely to be required to enroll in developmental education courses.

While the patterns can sometimes be complex, the results of this study also indicate that, most commonly, students who are both first-generation students and members of other higher-risk student populations are at even greater risk of struggling at their institutions. The results of the cross-tabular analysis and the logistic regression equations demonstrated that, while several indicators exhibit a stronger negative relationship with student outcomes—in particular being Black, needing developmental education, and being a Pell recipient—first-generation status was always predictive of the likelihood of a student being less successful, even when considered with all the other indicators of higher-risk populations examined in this research. These results demonstrate the need to consider the intersectionality of first-generation status when examining student success on campuses as it is a contributing factor to the risk of a student being less successful at their institution.

The results from this study point to the need to better serve first-generation students in postsecondary education. The need becomes even more compelling when considering the potential size of the student population, sitting in the range of one out of every four students. The results of the study also indicate the present challenge in consistently identifying first-generation students to better understand the scope of their experience in higher education. A national standard for defining first-generation status would benefit both the study of the students' experience, but also the ability to better direct services at a large student population that is less likely to succeed and then to ultimately examine the impact of those services on first-generation student success with the goal of ultimately helping more students earn degrees. As with all student-level data related to identification of a student and how it relates to their academic record, there is the need for ongoing security for the data and training for the proper use of sensitive information. However, ignoring an enormous portion

of the higher education student population that clearly demonstrates a higher risk of not being successful, and thus not serving those students, would be far more problematic and negligent by institutions of higher education.

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