Graduating Midwest Liberal Arts Colleges:
The influence of student characteristics on graduation rates

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Introduction

In higher education, graduation rates play a vital role in understanding an institution's performance and quality by indicating the academic competency and student care that the institution provides to help students develop the skills required to succeed in their choice of career. Research has shown multiple personal and societal benefits of obtaining a college degree; for instance, bachelor's degree students are 24% more likely to be employed than high school graduates and earn over $1 million more over a lifetime (Association of Public & Land-Grant Universities 2021). Despite the benefits of a college degree, only 22.5% of people aged 25 and older had completed four-years of college in 2019 (United States Census Bureau). To increase graduation rates, President Obama implemented the American Graduation Initiative in 2009 which provides community colleges with resources, such as grants, infrastructure support, and virtual support, to support its students towards completing their degree (Obama White House Archives). The use of these funds may help increase graduation rates but their equitable distribution among students should be ensured.

It is necessary to understand the various financial, cultural, and socioeconomic obstacles that people face while obtaining a college degree. Over 40% of first-time students do not graduate within 6 years and only 9% of low-income, first-generation, and minority students graduate with a bachelor's degree by the age of 24 compared to the 77% of the top-income quartile (U.S. Department of Education). To help institutions improve their graduation rates understanding the influence of each of student characteristics on the likelihood of graduating is critical.

This research will study the graduation rates of students at Luther College and determine methods that the college can use to support all its students. This paper addresses the question

Does being a student historically underrepresented in higher education (racial minority, low-income, and female) decrease the probability of graduation in private liberal arts colleges in the Midwest?

It is hypothesized that white students, male students, and students who do not receive financial aid will have higher graduation rates. Colleges can support the disadvantaged students through mentorship and culturally diverse programs and clubs to help them succeed navigate academic and personal lives.

Literature Review

Previous research on degree completion provide a foundation for the present research by recognizing the different factors that may affect graduation rates for various educational institutions and suggesting methods to improve degree completion (DeAngelo et al. 2011; Chen, Chen, and Oztekin 2017; Crisp, Doran, and Salis Reyes 2018; Pike and Robbins 2020; Zwick et al. 2021). This following section provides a synthesis of theory and findings that guided the work of this research.

Student Characteristics

There are extensive studies on student characteristics that influence the likelihood of graduating. These studies show that graduation rates are related to race/ethnicity, standardized test scores, gender, and high school scores. The influence of these different variables in predicting graduation rates vary on the econometric model used and additional variables evaluated, such as financial status and pre-enrollment decisions.

Studies show that the race of a student can impact the probability of that student graduating. In 2004, the 4-year graduation rates of Asian/Pacific Islander students ranked the highest at 44.9% while those of African American students and American Indian were 21% and

16.8%, respectively; this trend continues for 6-year graduation rates as well (DeAngelo at al. 2011). Six-year graduation rates show a similar trend where the overall degree attainment rates for American Indian, African America, and Latinx students are much lower than their White and Asian American counterparts (ibid).

In contrast to looking at the effect of race on graduation rates, Crisp, Doran, and Salis Reyes suggest disaggregating work on graduation rates by race to understand the effects of candidate characteristics, like religious affiliation and socioeconomic status, on attaining a degree (Crisp, Doran, and Salis Reyes 2018). They find little to no evidence to suggest a relationship between religious affiliation or socioeconomic status on the likelihood of graduating for African American and Latinx students (ibid). While De Angelo et al. (2011) find a correlation between the likelihood of graduating and ethnicities of students, Chen, Chen, and Oztekin (2017) are unable to find a statistically significant relationship between the ethnic background of a student and their graduation rate. Hence, previous research suggest that race may be a strong predictor of graduation and this research will analyze the impact of this variable on students in private liberal arts colleges in the Midwest.

Studies on graduation rates also focus on the impact of gender on the probability of graduating or on institutional graduation rates. Work on exploring the gender gap in degree attainment has shown that women complete their degree in four years at higher rates than men, with a gap of 10.9 percentage points, and this gap has increased in the past decade (DeAngelo at al. 2011). Similarly, Pike and Robbins find that the percentage of females in a cohort is positively related 4-year graduation rates (2020). Crisp et al. analyze institutional-level data and find that the percentage of women in a cohort positively predicts graduation rates (2018). Using

an econometric model, the present research will add to the literature on the impact of gender on graduation rates of educational institutions.

Studies of undergraduate degree completion find a relationship between a student's performance on standardized tests in school and their graduation rates. DeAngelo et al. find that students with SAT scores of 1300 or more have the highest four-, five-, and six-year graduation rates (2011). After six years, standardized test scores are, however, have a smaller impact on degree attainment. High school performance measured by GPA is has a statistically significant relationship with graduation rates in college (Chen, Chen, and Oztekin 2017; Zwick et al. 2021) and mean ACT scores are positively related to institutional graduation rates (Pike and Robbins 2020). However, these studies use survey data to obtain high school performance that contain missing values and imputation processes may have created bias (Zwick et al. 2021; Crisp, Doran, and Salis Reyes 2018).

Institutional Characteristics

Along with student characteristics, institutional characteristics can be used to understand graduation rates. Institutional characteristics refers to the size of the institution, financial support provided to students, and expenditures. Pike and Robbins analyze the effects of cohort and institutional characteristics on graduation rates and find that per-student expenditures were positively correlated to 4-year graduation rates and that expenditures on education, institutional support, and gift aid could largely affect graduation rates (2020). Overall institutional expenditure and revenue has a positive relationship with graduation rates (Crisp, Doran, and Salis Reyes 2018; Pike and Robbins 2020).

Further studies on institutional characteristics find that the socio-economic status of students and the enrollment size of an institution are statistically strong predictors of 4-year

graduation rates (ibid). Previous research show that initiatives to improve the student success outcomes of institutions, such as grants, have increased institutional selectivity while enrolling students leading to decreased admission rates of minority and Pell grants students (Pike and Robbins 2020). Pike and Robbins find that the aforementioned institutional characteristics are positively related to higher graduation rates implying that colleges are trying to maximize their performance metrics at the cost of diversity (ibid). In contrast to this finding, Chen et al. find little to no evidence to support a relationship between monetary factors and institutional graduation rates (Chen, Chen, and Oztekin 2017). The differences in their results may stem from the different econometric models and independent variables they used to analyze the impact of these factors; hence, the effect of financial support provided by the institution on graduation rates should be investigated further.

Previous work on graduation rates have shown the effects of various variables on the likelihood of graduating for students across the nation. According to these results, while Asian students do have the highest likelihood of graduating, White students have higher rates of graduation than other minority students (DeAngelo at al. 2011). Further, unlike what was hypothesized, female students have higher graduation rates than male students (ibid) and financial support from institutions raises graduation rates (Pike and Robbins 2020). These papers have provided a theoretical foundation for this research and contextual support to understand how to understand and analyze graduation rates.

While most of these works analyze the completion rates of colleges and universities across the United States, this research will focus on private liberal art colleges in the Midwest. This allows for more specified research to investigate the rates of completion for students in the Midwest, a place historically not as diverse as the country's coasts. This research will quantify

the relationship between graduation rates and race, gender, and Pell grant status for colleges within the Midwest.

Methods

This research estimates the effects of race, gender, and Pell grant on the graduation rates of students in private liberal arts colleges in the Midwest. I estimate these effects for three models, one for each of the variables listed above. Please note that these variables were not combined into one regression model due to the lack of data describing graduation rates for male/female students from a certain race and their Pell grant status.

The regression model for race is:

$$\begin{aligned}\text{grad\_rate}_i = {} & \beta_0 + \beta_1 * \text{Black/African\_American}_i + \beta_2 * \text{Hispanic/Latino}_i + \beta_3 \\ & * \text{Native\_Hawaiian\_Pacific\_Islander}_i + \beta_4 + \text{Non\_resident\_Alien}_i + \beta_5 \\ & * \text{Two\_or\_more\_races}_i + \beta_6 * \text{White}_i + \beta_7 * \text{grinnell\_college}_i + \beta_8 \\ & * \text{lawrence\_university}_i + \beta_9 * \text{macalester\_college}_i + u_i\end{aligned}$$

In this model, the dependent variable is the graduation rate and the variable of interest is race (in this case, the dummy variables for each category of race). The explanatory variables in this model are dummy variables for race and college; the variables for Asian students and Carleton College have been excluded to avoid the dummy variable trap. The variables of interest are each category of race and their parameters will help quantify the likelihood of graduating. The expected sign of White students is positive due to the systemic support provided to white students during their education, while the expected signs of the other categories of race is negative.

The regression model for sex is:

$$\text{grad\_rate}_i = \beta_0 + \beta_1 * \text{male}_i + \beta_2 * \text{grinnell\_college}_i + \beta_3 * \text{lawrence\_university}_i$$

In this model, the dependent variable is the graduation rate and the variable of interest is sex (in this case, the dummy variables for each category of sex). The explanatory variables in this model are dummy variables for sex and college; the variables for female students and Carleton College are excluded to avoid the dummy variable trap. The parameters of interest are those of female students compared to male students in each college. Hence, the variables of interest are the categories of sex. The expected sign of male students is negative, as expected from previous work and because, even though there are inherent biases against females, male members of families are expected to lead and take care of their family after high school which may lead them to drop out.

The regression model for Pell grant is:

$$\text{grad\_rate}_i = \beta_0 + \beta_1 * \text{Received\_neither}_i + \beta_2 * \text{Recevied\_loan\_only}_i + \beta_3 * \text{coe\_college}_i + \beta_4 * \text{grinnell\_college}_i + \beta_5 * \text{lawrence\_university}_i$$

In this model, the dependent variable is the graduation rate and the variable of interest is the Pell grant status (in this case, the dummy variables for each category of Pell status). The explanatory variables in this model are dummy variables for Pell status and college; the excluded variables are those of students who received the Pell grant and Carleton College. The parameters of interest are those of students who received some form of aid compared to those students who did not receive any aid in each college. Hence, the variables of interest are the categories of Pell status. The expected sign of students who did not receive any form of aid is positive while that of students that received either the Stafford loan or a Pell grant is expected to be negative because Pell grant recipients often come from need-based, low-income households which may cause them to have lower graduation rates compared to students who do not require any financial assistance.

The regression equations described above do not control for year. However, the results section will show the regression results for these models and three other models with year as a control variable. This will allow for an assessment that controls for year when estimating the parameters.

Data

Data Description

The analysis used data from the Institutional Research departments of Carleton College, Grinnell College, Lawrence University, Macalester College, and Coe College. Datasets from each college cover different time periods ranging between 2000 and 2017. After wrangling and appending individual datasets, the final datasets used for the analyses are panel datasets. The dataset describing graduation rates aggregated by race ranges from 2000 to 2017; there are 468 total observations, one for each category of race in a college during a year. The dataset describing graduation rates aggregated by sex ranges from 2000 to 2017; there are 108 observations, one for each sex in a college during a year. Lastly, the dataset describing graduation rates aggregated by Pell grant status range from 2005 to 2017; there are 156 observations, one for each Pell grant status in a college during a year.

Variable Name	Description	Unit of Measurement
college	A categorical variable that identifies the college of an individual observation. This variable is present in all three datasets.	N/A
year	A numeric variable identifying the year that the data points were reported. This variable is present in all three datasets.	N/A
grad_rate	A numeric variable that describes the graduation rate of students from a particular race, sex, or Pell status from a specific college during a certain year. This variable is present in all three datasets.	Percentage (%)

race	A categorical variable that identifies the race of the observation.	N/A
sex	A categorical variable that identifies the gender of an individual observation.	N/A
grad_rate	A numerical variable that describes the graduation rate of male or female students from a specific college during a certain year.	Percentage (%)
pell_status	A categorical variable that identifies the Pell status of an individual observation.	N/A
grad_rate	A numerical variable that describes the graduation rates of students with a particular Pell status from a specific college during a certain year.	Percentage (%)

Summary Statistics

The dummy variables used in this regression analysis have been created from the variables of 'race', 'sex', 'pell_status' and 'college.' This allows for a fixed effects regression analysis. There is a dummy variable describing the state of each category of sex, Pell status, college, and race. A value of 1 indicates that the observation is from a particular college, particular race, sex, or Pell status. Since the data has been cleaned to ensure that nearly all colleges have the same categories of race, sex, and Pell status, each dummy variable will be "turned on" for nearly the same number of observations varying by years. Carleton College reported data from 2000 to 2016 for race and sex and from 2005 to 2014 for Pell grant. Coe College reported data from 2010 to 2016 for Pell. Grinnell College reported data from 2007 to 2017 for race and sex and from 2010 to 2017 for Pell. Lawrence University reported data from 2003 to 2014 for sex and from 2005 to 2014 for race and Pell grant. Lastly, Macalester College reported data from 2012 to 2021 for race and sex.

1) Race

The value in the summary statistics that is the most difficult to believe is the minimum value of 0 for graduation rates aggregated by race. This is because it implies that none of the students from a particular race in one of the colleges graduated within four years. Further investigation showed that none of the Native Hawaiian students and students from two or more races from Lawrence University graduated within four years in certain academic years. This is interesting and requires further exploration to understand why these students did not graduate.

According to the second table, the mean graduation rate for Native Hawaiian students are the smallest at only 4.2% whereas the mean graduation rates for all other race groups are close to 50%. This disparity between Native Hawaiian students and other students is interesting as it indicates that they may be extremely disadvantaged compared to other students. However, it needs to be kept in mind that imputation took place before producing these results which may create bias.

Variable Name	**Mean**	**Standard Deviation**	**Minimum**	**25th percentile**	**Median**	**75th percentile**	**Maximum**
year	2008	5.1937	2000	2004	2008	2013	2017
grad_rate (%)	0.760	0.4	0	0.69	0.818	0.875	1

For the categorical variables, the mean of each of the dummy variables have been computed after imputing 0 for missing values.

Asian	**Black/African American**	**Hispanic/ Latino**	**Native Hawaiian/Pacific Islander**	**Non-Resident Alien**	**Two or more races**	**White**
0.523	0.46	0.51	0.042	0.557	0.497	0.578

Carleton College	**Grinnell College**	**Lawrence University**	**Macalester College**
0.703	0.416	0.282	0.345

2) Sex

An interesting statistic from these tables are that male and female students appear to have a similar likelihood of graduating differentiated by less than two percentage points. This may be indicative of not a large difference between graduation rates for male and female students. Further, it appears that students from Carleton College have close to 50% higher likelihood of graduating than students from the other two colleges.

Variable Name	**Mean**	**Standard Deviation**	**Minimum**	**25th percentile**	**Median**	**75th percentile**	**Maximum**
year	2008	5.212	2000	2004	2008	2013	2017
grad_rate (%)	0.787	0.363	0.53	0.68	0.843	0.884	0.949

female	male	Carleton College	Grinnell College	Lawrence University
0.59	0.576	0.841	0.494	0.415

3) Pell Grant

As hypothesized, students that received neither form of financial aid appear to have the highest mean graduation rates. Similar to the previous results, Carleton College has the highest average graduation rate.

Variable Name	**Mean**	**Standard Deviation**	**Minimum**	**25th percentile**	**Median**	**75th percentile**	**Maximum**

year	2011	3.754	2005	2008	2011	2014	2017
grad_rate (%)	0.734	0.363	0.449	0.616	0.72	0.868	1

Received Pell	**Received Neither**	**Received Loan**	**Carleton College**	**Coe College**	**Grinnell College**	**Lawrence University**
0.461	0.518	0.504	0.677	0.325	0.497	0.476

There are two numerical variables in each of the final datasets (year and grad_rate) and none of the variables are highly correlated, i.e., the correlation between the two values is not greater than 0.5. Therefore, this model does not violate the perfect multicollinearity rule.

Limitations

It is necessary to consider the limitations of the data that may influence the preliminary and/or regression analysis. The final datasets have missing values in them because of the discrepancy in the years that colleges reported their graduation rates, as described above. Missing values have been created because the colleges did not report graduation rates for the same years causing there to be gaps in the information. To generate some of the summary statistics listed above, missing values had to be imputed with zero due to which any analysis would be biased because there are values that indicate that some students did not graduate at all.

The data collected from each college is for approximately for only 10 years which could lead to biased results when not accounting for various shocks to enrollments during these years, such as data from recent years is influenced by the effects of COVID on college enrollment possible resulting in lower graduation rates for students of certain races during these years. Furthermore, the final datasets do not include all the variables that may influence graduation

rates for students, such as family income and extracurricular participation, causing the parameter estimates to be larger than their true value. This might cause omitted variable bias in the regression analysis.

Results

1) Graduation Rates by Race – Table 1

Table 1 shows that students of most racial backgrounds have lower likelihood of graduating across all colleges. In this table, Asian students and data from Carleton College are excluded to avoid the dummy variable trap; hence, the intercept describes the graduation rate for Asian students at Carleton College. A strange result to note is that the relation between any of the colleges and graduation rates is negative implying that being a student in any of these colleges have a negative effect on graduating.

As was hypothesized, a White student has a 5-percentage point higher probability of graduating while being in a minority group decreases the probability of graduating in general. Some of these race groups, such as Black/African American and Native Hawaiian/Pacific Islander, have statistically significant effects at the 1% significance level.

Variable	**Estimate** (without year)
(Intercept)	0.862 *** (0.021)
raceBlack/African American	-0.094 *** (0.026)
raceHispanic/Latino	-0.02 (0.0259)
raceNative Hawaiian/Pacific Islander	-0.225 *** (0.052)
raceNon-resident Alien	0.025 (0.028)
raceTwo or more races	-0.004 (0.026)
raceWhite	0.054 * (0.028)

collegegrinnell college	-0.062 ** (0.02)
collegelawrence university	-0.293 *** (0.0202)
collegemacalester college	-0.014 (0.025)

2) Graduation Rates by Sex – Table 2

Table 2 shows that males have a negative likelihood of graduating across all colleges, on average. In this model, the excluded variables are female students and students from Carleton College; hence, the intercept describes the graduation rate for female students at Carleton College. Similar to the previous model, the coefficients do not vary by more than half a percentage when controlling for year and the negative relationship between the colleges and graduation rate persists in this model. Unlike the hypothesis, according to the results males have a lower likelihood of graduating than females; however, this variable is not statistically significant.

Variable	**Estimate** (without year)
(Intercept)	0.899 *** (0.010)
sexmale	-0.018 (0.011)
collegegrinnell college	-0.082 *** (0.014)
collegelawrence university	-0.268 *** (0.013)

3) Graduation Rates by Pell grant – Table 3

Table 3 shows the effect of Pell status on the likelihood of students graduating. In this model, students who received federal Pell grant and students from Carleton College are excluded; hence, the intercept describes the graduation rates of students who received the

Pell grant at Carleton College. Like the previous model, the negative relationship between the colleges and graduation rate persists in this model. One strange result to note is that all variables in this table are statistically significant.

Unlike the hypothesis, students who did not receive either a Pell grant or a Stafford loan had an 8% higher likelihood of graduating than students who received Pell grants at the 1% significance level. This could be because Pell grant recipients may come from low-income families where other external factors, such as familial responsibilities, may be a cause for lower graduation rates.

Variable	**Estimate** (without year)
(Intercept)	0.831 *** (0.012)
pell_statusReceived Neither Pell Grant nor Stafford Loan	0.084 *** (0.011)
pell_statusReceived Subsidized Stafford Loan, No Pell Grant	0.063 *** (0.011)
collegecoe college	-0.276 *** (0.014)
collegegrinnell college	-0.072 *** (0.013)
collegelawrence university	-0.261 *** (0.012)

The regression result tables have coefficient estimates for each explanatory variables with its standard error reported beneath in parentheses. The asterisks indicate the significance of an explanatory variable according to different significance levels - *** = significant at 1% significance level, ** = significant at the 5% significance level, * = significant at the 10% significance level.

Conclusion

The three regression models described in the tables above display the effects of different categories of race, sex, and Pell status on graduation rates of students in private, liberal arts colleges in the Midwest. The economic significance of the estimates is that white students have a positive likelihood of graduating by 5% while students from other minority groups have a negative likelihood of graduating. Males are less likely to graduate by approximately 2% than females and students who do not receive any federal aid or just received the Stafford Loan have a positive probability of graduating. Lastly, there is a negative relationship between graduation rates and the colleges; this is interesting because it indicates that being a student in one of these colleges decreases the likelihood of graduating compared to being in Carleton College.

These results are consistent with existing empirical research that suggest that white students have higher probabilities of graduating than students from other minority groups. This is because of the systemic support for white students and lack of resources for people of color. Minority group students may find it hard to find academic and financial resources to help them meet their needs and succeed in college; further, due to the less diversity in Midwestern colleges ("The Most Ethnically Diverse Regional Universities in the Midwest" n.d.), students of color may feel isolated causing them to dropout.

Results from the second model suggest that female students have higher probability of graduating than male students. As previous research demonstrated, females have higher probabilities of graduating than their male counterparts largely due to recent increase in enrollment numbers and females are more likely to complete their degree (DeAngelo et al. 2011). Further, women start college with better high school grades and GPA and a more rigorous course load which helps accelerate their path to graduation (ibid).

On the other hand, previous research has indicated that the lack of financial aid makes graduating within 4 years more strenuous and difficult; such findings are at odds with results presented in this research since students who have not received any form of financial aid are 8% more likely to graduate than students who receive the Pell grant. Since Pell grants are need-based financial aids, they are provided to students who require assistance to pay for college tuition. These students often come from low-income households and need additional support, such as scholarships and loans, to complete their degree (Delisle 2017).

As mentioned in the thesis, colleges can support students who have lower likelihood of graduating, students from racial minorities, male students, and students requiring financial assistance, through mentorship, financial counselling, and culturally diverse programs. By providing mentorship, these students will be able to navigate academic decisions with information and they will be better able to understand the decisions that suits their interests and capabilities. Culturally diverse programs and clubs will help students from different racial backgrounds find familiarity within campus to battle isolation; further, through such clubs, students will be able to make friends and have a healthy social life. Lastly, through financial counselling, students who are struggling to finance their college education will be able to talk to professionals and understand how various methods, like budgeting, can help them save and prepare for future payments.

The results from this paper show that there are students that are at a disadvantage when they join a private liberal arts college in the Midwest and through the above policy recommendations such disadvantages can be overcome. However, these recommendations are based on data from multiple colleges and the demographics within each college are different which makes policy prescriptions vague. Further research on graduation rates in the Midwest can

investigate the aggregated effect of race, gender, and financial status on graduation rates to understand, for instance, if white male students from low-income families are less likely to graduate than Asian female students from high-income households.

Hence, due to the broad nature of this research, any policy applications require further research into the demographics of the specific educational institution, and they should be used to help students with lower probabilities of graduating within that institution. This research provides a foundation for colleges in the Midwest to receive a bird's eye perspective on the current graduation rates within the region. By using this research as a foundation to investigate graduation rates within their college, administrators can implement policies and programs that will provide all students with the support they need to complete their degree.

References

Association of Public & Land-Grant Universities. "How Do College Graduates Benefit Society at Large?" n.d. Accessed October 24, 2021. https://www.aplu.org/projects-and-initiatives/college-costs-tuition-and-financial-aid/publicuvalues/societal-benefits.html.

Crisp, Gloria, Erin Doran, and Nicole A. Salis Reyes. 2018. "Predicting Graduation Rates at 4-Year Broad Access Institutions Using a Bayesian Modeling Approach." *Research in Higher Education* 59 (2): 133–55. https://doi.org/10.1007/s11162-017-9459-x.

DeAngelo, Linda, Ray Franke, Sylvia Hurtado, John H Pryor, and Serge Tran. 2011. "Completing College: Assessing Graduation Rates at Four-Year Institutions." *Los Angeles: Higher Education Research Institute, UCLA*, 61.

Delisle, Jason. 2017. "The Pell Grant Proxy: A Ubiquitous but Flawed Measure of Low-Income Student Enrollment." *Brookings* (blog). October 12, 2017. https://www.brookings.edu/research/the-pell-grant-proxy-a-ubiquitous-but-flawed-measure-of-low-income-student-enrollment/.

Obama White House Archives. "Remarks by the President on the American Graduation Initiative in Warren, MI." July 14, 2009. https://obamawhitehouse.archives.gov/the-press-office/remarks-president-american-graduation-initiative-warren-mi.

Pike, Gary R., and Kirsten R. Robbins. "Using Panel Data to Identify the Effects of Institutional Characteristics, Cohort Characteristics, and Institutional Actions on Graduation Rates." *Research in Higher Education* 61, no. 4 (June 2020): 485–509. https://doi.org/10.1007/s11162-019-09567-7

Pike, Gary R., Michele J. Hansen, and Janice E. Childress. 2014. "The Influence of Students' Pre-College Characteristics, High School Experiences, College Expectations, and Initial

Enrollment Characteristics on Degree Attainment." *Journal of College Student Retention: Research, Theory & Practice* 16 (1): 1–23. https://doi.org/10.2190/CS.16.1.a.

"The Most Ethnically Diverse Regional Universities in the Midwest." n.d. U.S. News. Accessed May 16, 2022. https://www.usnews.com/best-colleges/rankings/regional-universities-midwest/campus-ethnic-diversity?ranking=campus-ethnic-diversity&schoolType=regional-universities-midwest.

U.S. Department of Education. "College Affordability and Completion: Ensuring a Pathway to Opportunity." n.d. Accessed October 24, 2021. https://www.ed.gov/college.

United States Census Bureau. "U.S. Census Bureau Releases New Educational Attainment Data." March 30, 2020. https://www.census.gov/newsroom/press-releases/2020/educational-attainment.html.

Zwick, Rebecca, Andrew Blatter, Lei Ye, and Steven Isham. 2021. "Using an Index of Admission Obstacles with Constrained Optimization to Increase the Diversity of College Classes." *Educational Assessment* 26 (1): 20–34. https://doi.org/10.1080/10627197.2020.1841626.