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The Impact of Expenditures and Financial Aid on Racial Gaps in Institutional Graduation Rates in the U.S.

Scott M. Myers
Carrie B. Myers
Montana State University, USA

ABSTRACT

There is a persistent gap in institutional-level graduation rates between U.S. Whites and underrepresented minorities (URM). This gap remains as graduation rates have increased for both Whites and URM. We tested whether these six-year graduation rate gaps among incoming undergraduate freshman cohorts were a function of institutional expenditures and financial aid. Our results were mixed. The gaps were much wider at institutions that spent more on academic and student services and who enrolled cohorts with higher average student loan amounts. Yet, these gaps between Whites and URM narrowed at institutions where students had larger average institutional and state/local grants. Our discussion centered on the changing financial context of higher education and the contributing roles of capital and institutional racial climate.

Keywords: financial aid, graduation rates, institutional expenditures, undergraduates, underrepresented minorities

INTRODUCTION

A baccalaureate degree is an earned credential and promotes social mobility in the U.S. (DeAngelo & Franke, 2016; Hout, 2012). This degree is increasingly important and the minimum requirement for entry into the post-Great Recession middle-class labor market (Carnevale et al., 2010; Sawhill, 2013). Research found that returns from a college degree accrued more for individuals from underserved backgrounds, including underrepresented minority students (URM) (Bauldry, 2015; Schafer, Wilkinson, & Ferraro, 2013). Compared to their White peers, URM receive greater returns from a 4-year college degree in terms of social (e.g., civic engagement) and economic (e.g., income) benefits, but are often the least likely to finish college (Goldrick-Rab et al., 2016). Therefore, increasing graduation rates is not only beneficial to individuals across a wide range of outcomes, but also a potential lever to reduce social inequalities. According to the National Science Foundation (2019), the term "underrepresented minority" refers to the racial categories of Black, Hispanic, and American Indian or Alaska Native. In this study, due to data limitations (see below) and to allow our research to be compared to prior studies (Education trust, 2015, 2016). Blacks and Hispanics comprised our URM groups and were analyzed separately.

Racial gaps in enrollments persist in college. In 2013, 55% of Whites where enrolled in a 4-year institution immediately after high school compared to 47% for Blacks and 38% for Hispanics (U.S. Department of Education, 2016). Compounding this disparity is that the graduation rates of URM from 4-year institutions have historically trailed those of Whites and continue to do so today. The 6-year cohort graduation rate in 2017 for Whites was 24.4 and 9.4 percentage points higher than those for Blacks and Hispanics, respectively, with higher gaps among males (NCES, 2019). These continuing gaps led Sawhill (2013) and Zarifa et al. (2018) to argue that higher education as a mobility-enhancing vehicle is no longer through enrollment rates, but through completion rates. Lucas (2017) concurred arguing that URM groups have benefitted from greater access to higher education but are being disadvantaged by lower completion rates.

Previous research on race differentials in graduation rates have largely been at the individual level instead of the institutional level (e.g., Pascarella & Terenzini, 2005), which does not reflect the emerging attention to institutional-level racial gaps in graduation rates. The shift to the institutional level is the result of two trends: (a) whereas graduation rates are generally increasing for all students, the gains by URM at 4-year institutions have not been large enough to close the gap with White students; even

though (b) some institutions have no gaps whereas others have large gaps (Pike & Graunke, 2015; Sawhill, 2013; The Education Trust, 2015, 2016). Furthermore, there is widespread understanding that institutional characteristics—especially resources—are important to student success. Both Kuh et al. (2007) and the Education Trust (2016) argued that institutions must abandon the status quo and intentionally organize their efforts to induce higher levels of student success among URM while also benefitting White students. Resource choices create between-institution differences in educational environments so institutions must make informed decisions to promote the success of URM students to narrow the institutional-level graduation gap (The Education Trust, 2016).

In this study, we aimed to fill this research space by using data at the institutional level and examining how racial gaps in graduation rates were a function of a variety of institutional financial resources. No research of which we are aware has examined racial graduation gaps with national data, institutional-level variables, and a regression-based statistical approach. In this study, we used institutional panel data from the 2009 – 2017 Integrated Postsecondary Education Data System (IPEDS). The institutional variables we focused on captured expenditures on instruction, research, academics, and student services as well as financial aid and grants that foster aggregate student development and achievement and boost 6-year graduation rates (Bound et al., 2010; Bowen et al., 2009; Castleman & Long, 2016; Tinto, 2012). Our research question was straightforward: To what extent were White-URM racial gaps in institutional graduation rates a function of institutional expenditures and financial assistance? We addressed this question through a simultaneous regression equation that modeled racial gaps as a combined function of financial aid and expenditures, which allowed us to compare the relative impacts of each resource.

BACKGROUND

The persistent racial gaps were a focus of Young Invincibles (2017) "blueprint for higher education equity." They argued that until this gap can be narrowed, higher education inequalities will remain in U.S. society and income and economic insecurities will also remain. Currently, higher education institutions are only held accountable for aggregate institutional-level graduation rates that are indicators of productivity and inputs in performance funding models (Heck et al., 2014; Rabovsky, 2014). There are no formal thresholds in terms of racial differences in 6-year graduation rates (Young Invincibles, 2017).

Publicly available national data on graduation rates among incoming cohorts have been required legally only since 1990, compiled initially with the incoming 1996 cohort, and published annually since the incoming cohort of 2000. Table 1 (NCES, 2019) showed that the 6-year graduation rates for Whites, Blacks, and Hispanics have improved, albeit unevenly, between the initial 1996 cohort and the 2011 cohort. Even though the cohort graduation rates increased for all race-gender categories, this rate increased the most for Hispanic males (21.1%) and females (17.5%) and the least for Black males (3.4%) and females (0.7%) with little increase for Black females. These race-specific graduation rates and uneven changes have led to persistent racial gaps as shown in Table 1. Using the initial 1996 cohort as our starting point, the White-Black gap has increased (21.4% among males; 29.1% among females) whereas the White-Hispanic gap has decreased (-21.5% among males; -26.3% among females) but still remains substantial at 10.6 and 8.7 percentage points among males and females, respectively. The graduation gap between Blacks and Hispanics continues to increase.

LITERATURE REVIEW

Conceptual Approach

We framed racial gaps between institutions through the institutional-contextual approach common in higher education studies on differential outcomes (e.g., Titus, 2004). The institutional-contextual approach posits that higher education institutions differ by structural characteristics, investments, decision-making, and environments that influence the types of and emphasis on policies, practices, and programs that characterize the institution. In turn, these characteristics create varying environments that differentially impact student learning, engagement, support, and success including graduation rates (Astin & Osequera, 2002; Pascarella & Terenzini, 2005; Tinto, 2012). Because there is no inferential research at the institutional-level, we reviewed and reconciled individual-level and institutional-level studies on graduation rates.

This institutional approach is a cornerstone of Astin's well-known I-E-O evaluation and developmental model of educational outcomes (Astin & antonio, 2012). In this model, educational outcomes (O) are a result of what students bring with them to college (I) and the educational environments (E) that they encounter. Environments include differential programs, curriculums, strategies, interventions, and social influences experienced by students that are a function of differences in between-institutional structures and characteristics. For our study, institutional expenditures and financial

aid resources are institutional environments (E) as they differentially fund academic, administrative, and student programs and practices.

Table 1

Six-year graduation rates and racial gaps at 4-year institutions in the US: 1996-2011

	MALES					
	RATES			GAPS		
Incoming Cohort	White	Black	Hispanic	White-Black	White-Hispanic	Black-Hispanic
1996	54.8	32.8	41.3	22.0	13.5	-8.5
2000	57.1	35.6	44.6	21.5	12.5	-9.0
2001	57.3	34.6	44.1	22.7	13.2	-9.5
2002	57.3	34.0	44.1	23.3	13.3	-10.1
2003	58.4	34.1	44.9	24.3	13.5	-10.8
2004	58.9	34.3	45.7	24.6	13.3	-11.4
2005	59.4	34.2	47.2	25.2	12.2	-13.0
2006	59.8	35.2	47.8	24.6	12.0	-12.5
2007	60.0	35.3	48.6	24.6	11.4	-13.2
2008	60.1	35.3	48.9	24.8	11.2	-13.6
2009	60.0	34.3	49.1	25.7	10.9	-14.8
2010	60.7	34.3	50.1	26.4	10.6	-15.8
2011	60.6	33.9	50.0	26.7	10.6	-16.1
%Change	**10.6**	**3.4**	**21.1**	**21.4**	**-21.5**	**89.4**
	FEMALES					
	RATES			GAPS		
Incoming Cohort	White	Black	Hispanic	White-Black	White-Hispanic	Black-Hispanic
1996	60.9	43.0	49.1	17.9	11.8	-6.1
2000	62.8	46.4	52.4	16.4	10.4	-6.0
2001	62.8	46.2	51.5	16.6	11.3	-5.3
2002	62.5	44.2	52.5	18.3	10.0	-8.3
2003	63.3	43.2	52.2	20.1	11.1	-9.0
2004	63.9	43.3	53.5	20.6	10.4	-10.2
2005	64.2	43.0	53.8	21.2	10.4	-10.8
2006	64.9	43.6	54.9	21.3	10.0	-11.3
2007	65.4	44.6	55.5	20.8	9.9	-10.9
2008	65.9	44.8	57.0	21.1	8.9	-12.2
2009	66.1	43.2	57.0	22.9	9.1	-13.8
2010	66.6	43.7	57.8	22.9	8.8	-14.1
2011	66.4	43.3	57.7	23.1	8.7	-14.4
%Change	**9.0**	**0.7**	**17.5**	**29.1**	**-26.3**	**136.1**

Source: Digest of Education Statistics, National Center for Education Statistics (2019)

Such funding, we proposed below, have the potential to narrow the outcome (O) of racial gaps in institutional graduation rates as shown and suggested by The Education Trust (2016).

Prior Research and Hypothesis: Financial Aid Resources

Our first research hypothesis was that racial gaps in graduation rates would be smaller at institutions that provided more financial aid and grant resources. Existing research at the individual level has shown that these resources boost academic outcomes including graduation rates. For example, Goldrick-Rab et al. (2016) and Chen (2012) found that the provision of financial add was especially beneficial for URM and other underserved groups. As argued by the authors, financial aid for these students partial relieved issues they were more likely to face than their White counterparts including but not limited to lowering the cost of attending college, adding value to other sources of financial aid, reducing the amount of work hours, heightening campus integration, reducing stress, and taking more credits.

Research has generally found that financial aid and grants were positively associated with individual-level academic outcomes, although the results were not unambiguous (Castleman & Long, 2016; Chen, 2012; Chen & DesJardins, 2008, 2010; Linn et al., 2018). For example, Goldrick-Rab et al. (2016) examined the effect of a renewable need-based $3,500 grant and found that it increased on-time bachelor's degree completion rates by 4.7 percentage points. The impact of the aid on credits earned was larger for racial minorities (1.5 percentage points). Further, the aid reduced the gaps between Pell Grant recipients and the average rate from 14 to 9 percentage points. Similar results were found by Castleman and Long (2016) in Florida and by Gershenfeld et al. (2019) in Illinois. However, three studies using state-wide data on Indiana college students (Gross & Berry, 2016; Gross et al., 2015a; Gross et al., 2015b) found that many forms of grants and aid slowed leaving school before an earned degree and transfer rates but overall reduced the likelihood of earning a bachelor's degree.

At the institutional level, there is much less research. Several studies have found that institutional graduation rates were lower when a larger percentage of the students received federal aid (Marsh, 2014; Scott et al., 2006) and at higher levels of aid per student (Webber & Ehrenberg, 2010). Research by Heck et al. (2014) also demonstrated that institutions with a higher share of students who received federal aid had lower 6-year graduation rates. But institutions with a higher share of students who received federal aid experienced greater growth increases in their graduation

rate over a 10-year period. This relationship between aid and graduation rates is argued by Heck et al. (2014) to occur because the negative association between aid and 6-year graduation rates was not due to the aid, per se. Rather, students who received aid also had other incoming characteristics (e.g., low standardized test scores) associated with lower 6-year graduation rates.

Prior Research and Hypothesis: Institutional Expenditures

Our second research hypothesis was that racial gaps would be lower at institutions with higher expenditures in academic, instruction, and student services. Existing research at the institutional level has shown that these three broad expenditure categories generally boost academic outcomes including graduation rates. As with Goldrick-Rab et al. (2016), Webber and Ehrenberg (2010) also found that URM and other underserved groups especially benefitted. Within categories, "instruction" refers to general and specialized academic programs, "academic" refers to activities that support the institution's primary missions of instruction, research, and public service, and "student services" refer to non-instructional activities that contribute to student support and development.

For expenditures, all extant research at the institutional level examined aggregate graduation rates, not gaps. The results were mixed. Using IPEDS and state data, Heck et al (2014) found that the proportional amount of all expenditures going to instructional and institutional expenditures were negatively associated with 6-year graduation rates (standardized effects of -.039 and -.087, respectively) but positively associated with 10-year changes in these rates. Yet, other studies found that instructional and academic expenditures were associated with higher graduation rates (Gansemer-Topf & Schuh, 2006; Hamrick et al., 2004; Ryan, 2004; Scott et al., 2006). Using the IPEDS cohort of 2004-06, Horn and Lee (2016) found higher institutional graduation rates at institutions that spent more per FTE on student services, academic support, and instruction. Webber and Ehrenberg (2010) found a positive association between instructional and student services expenditures per FTE and 6-year graduation rates but a negative association for research expenditures. They found that an increase in student services expenditures of $100 per student led to a 0.2 percentage point increase in an institution's 6-year graduation rate. The same increase in instructional and academic support services expenditures led to a 0.08 percentage point increase. Similar increases in research expenditures drop graduation rates by 0.9 percentage points. Importantly for our study, Webber and Ehrenberg (2010) found that student

services mattered more at institutions with lower average entrance test scores and larger average Pell Grant aid—institutions that also enrolled more URM and other underserved groups.

There is much less research at the individual level that examined how institutional expenditures impacted graduation rates. Chen (2012) discovered that higher levels of institutional student service expenditures equally lowered the risk of all students dropping-out over a 6-year period. The institutional level research by Webber and Ehrenberg (2010) suggested that certain expenditures may help graduation rates for less prepared and underserved students by better balancing expenditures across categories and perhaps providing optimal support systems as argued by The Education Trust (2015, 2016). Webber (2012) found that higher student services but not instructional expenditures increased the graduation rates only for students who entered with low ACT scores. Data from IPEDS and the Cooperative Institutional Research Program's (CIRP) annual survey found that expenditures on instruction, student services, and academic support services enhanced four-year degree completion for all student groups with some expenditure categories helping graduation rates more for URM (Oseguera, 2005).

METHODS

Data and Analytical Sample

We used institutional-level panel data from the 2009 – 2011 and 2015 – 2017 IPEDS to estimate the 6-year graduation rate gaps of the incoming 2009, 2010, and 2011 Cohorts of freshman at 4-year public and private not-for-profit institutions. We included the most recent three cohorts for which IPEDS final release graduation data were available to make our results as contemporary as possible and to smooth out year-to-year fluctuations and yearly outliers (Jaquette & Parra, 2014; The Education Trust, 2016). IPEDS collects data from postsecondary institutions in the United States and other jurisdictions (e.g., Puerto Rico). Participation in IPEDS is a requirement for the institutions that partake in Title IV federal student financial aid programs such as Pell Grants during the academic year. The IPEDS definition of "cohort" refers to full-time, first-time, degree-seeking students.

Six-year cohort graduation rates are those required by the 1990 "Student Right-to-Know and Campus Security Act" (SRK), represent the only common metric to compare rates across the array of 4-year institutions in the U.S., and are used for federal policy decisions (Cook & Pullaro, 2010; Hess et al., 2009). We focused solely on 4-year institutions to guard against

the substantial differences between 2-year and 4-year institutions (Newell, 2014) and to allow our findings to be compared to other studies (The Education Trust, 2016, 2016; Bound et al., 2010). We followed the methodology of The Education Trust (2016) that required each cohort to have at least 30 students of each race and limited the races to White, Black, and Hispanic. This size restriction further minimized potential influential and outlier observations and provided more conservative estimates. The focus on White, Black, and Hispanic graduation rates occurred because graduation data on Asians, Pacific Islanders, and two or more races have been collected only since 2011 and relatively few institutions satisfied our cohort size requirement if we included American Indians. Our final analytic sample included 627 institutions and 1,881 institutional data points.

Variables and Analysis

Our outcomes measured the 6-year graduation race gaps between Whites and Blacks and Whites and Hispanics separately for males and females to mimic the approach of NCES (2019) as in Table 1. We first calculated race-gender specific 6-year graduation rates by dividing the sum of the 2015, 2016, and 2017 completer cohorts by the sum of the 2009, 2010, and 2011 entering cohorts, respectively. Then, the *race-gender specific gaps* were calculated by subtracting the Black and Hispanic rates from White rates. We choose White as the comparison baseline group for two reasons: (a) White males and females historically and currently have higher 6-year graduation rates than do their Black and Hispanic counterparts (NCES, 2019); and (b) White males and females comprised the modal groups. Our focal independent variables included four IPEDS-created institutional expenditure categories measured in absolute dollars per student FTE: instructional, research, academic support, and student services. We analyzed four IPEDS-created measures of average financial aid resources received by students at each institution: federal grants, state/local grants, institutional grants, and student loan aid. All variables are in Table 2.

A parsimonious set of varying institutional characteristics that consistently predict differences in graduation rates when modeled with expenditures and financial aid served as control variables to guard against spurious relationships. We measured all controls at the entry year of each cohort to explicitly recognize the importance of first-year environments on 6-year graduation rates (Heck et al., 2014; Tinto, 2012). They included the institutional 1-year retention rate, cohort year, cohort size, the 2005 Carnegie classification code (doctoral, master's, baccalaureate), selectivity,

control (public or private), percent of URM, FTE student/faculty ratio, average total cost to attend, and average faculty salary.

Table 2

Description of study variables: IPEDS cohorts of 2009, 2010, and 2011 (n=1,881)

Variables	Coding/Range	M	SD
Graduation Rate Gaps			
Male			
White-Black	-2.67 – 45.18	23.09	11.00
White-Hispanic	-4.88 – 40.49	8.61	8.51
Female			
White-Black	-2.33 – 55.74	18.27	12.77
White-Hispanic	-3.01 – 45.39	7.18	6.36
Expenditures per FTE			
Instructional	3,456.00 – 28,134.00	7,137.67	3,689.41
Research	0.00 – 22,078.00	3,423.48	4,171.98
Academic	241.00 – 8,152.00	1,947.33	1,228.33
Student services	377.00 – 3,419.00	1,168.97	522.82
Average Aid Received per Student			
Federal grant aid	840.00 – 10,221.00	4,072.09	905.52
State/local grant aid	552.00 – 9,682.00	3,345.70	1,488.48
Institutional grant aid	70.00 – 31,540.00	6,220.19	5,818.20
Student loan grant aid	1,152.00 – 15,464.00	5,357.20	1,859.90
Institutional Characteristics			
1-year retention rate	48.81 – 99.27	79.20	19.34
Cohort year	1=2009; 2=2010; 3=2011	2.02	0.83
Cohort size	341.00 – 8458.00	2995.18	1660.56
Doctorate	0 = no; 1 – yes	0.61	---
Masters	0 = no; 1 – yes	0.29	---
Baccalaureate	0 = no; 1 – yes	0.10	---
Selectivity	1 = noncompetitive to 6 = most competitive	3.73	1.11
Control	0 = private; 1 = public	0.67	---
Percent URM	8.00 – 88.00	32.52	14.50
FTE student/faculty ratio	4.85 – 148.19	28.57	20.01
Average total cost	15692.00 – 54718.00	29026.60	9406.76
Average faculty salary	42189.00 – 140052.00	80809.17	14642.47

To test our predictions, we estimated a series of ordinary least squares regression equations by modeling graduation rate gaps as a function of expenditures and financial aid resources while controlling for the set of controls. In the regression analyses, we transformed the expenditures variables to represent the effect of every $1,000 per FTE and the financial aid variables to represent the effect of each average $1,000. Doing so made the presentation and interpretation of the coefficients more manageable. Our analyses were complicated by two data issues. First, each institution was represented three times. Second, institutions were clustered in states suggesting that our outcomes could have been correlated given the role of states in funding and legislating higher education, especially the wide disparities in funding, tuition costs, and financial aid since the Great Recession of 2008 (Horn & Lee, 2016; Mitchell & Leachman, 2015). To minimize these issues, all statistical inferences were estimated with cluster-robust standard errors (Cameron & Miller, 2015). Our regression diagnostics indicated that these robust standard errors were normally distributed with no influential observations and indicated no multicollinearity among the independent and control variables.

FINDINGS

Table 2 revealed the persistent aggregate racial gap in institutional graduation rates. This gap was largest between Whites and Blacks for both males (23.09) and females (18.67), while smaller though notable between Whites and Hispanics (8.61 for males and 7.18 for females). However, the ranges contained negative values suggesting that a few institutions graduated Blacks and Hispanics at slightly higher rates than Whites—consistent with data presented by the Education Trust (2015, 2016). The IPEDS data also revealed wide differences in institutional expenditures and the amount of aid their average student received. The regression results in Table 3 showed a remarkably consistent pattern for the association between expenditures and financial aid with gender-specific racial gaps in graduation rates.

Institutional Expenditures

The results for expenditures *generally opposed our research prediction* that racial gaps in graduation rates would be lower at institutions with higher expenditures for instruction, academics, and student support services. The most consistent results were for student services where higher levels of expenditures were associated with wider institutional racial gaps in

graduation rates between URM and White students. The sizes of the practical effects were noticeable: an additional $1,000 per FTE in expenditures was associated with a widening in the graduation gap from a low of 1.6 percentage points for the male White-Hispanic gap to a high of 2.1 percentage points in the female White-Black graduation gap. The widening of the gaps for White-Black males and White-Hispanic females were also robust at 2.0 percentage points each.

For academic expenditures, each additional $1,000 per FTE was associated with a widening in three of the gender-race specific gaps: about 1.4 percentage points each for the male White-Black and White-Hispanic gap and the female White-Hispanic gap. We did not find any statistical association between instructional expenditures and racial gaps in graduation rates. Lastly, while not part of our predictions, we found that increased expenditures in research also contributed to a widening of two of the gaps—White-Black males and White-Black females.

Financial Aid

The results for the sources of financial aid *generally supported our research prediction* that racial gaps in graduation rates would be lower at institutions where students had more financial aid. There was one glaring exception: student loans. At institutions where students carried more student loan debt there was a much wider gap in graduation rates between Whites and URM. The effect sizes were non-trivial. An additional $1,000 in student loans was associated with a widening in the graduation gap from a low of 1.2 percentage points for the male White-Hispanic gap to a high of 3.0 percentage points for the female White-Black gap. On the other hand, other forms of financial aid were associated with the narrowing of the racial gap in graduation rates. The most consistent results occurred for state/local aid where higher levels of aid were associated with narrower institutional racial gaps. Again, the practical effects were robust: an additional $1,000 in aid was associated with a narrowing in the graduation gap from a low of 1.3 percentage points for the female White-Hispanic gap to a high of 2.4 percentage points in the female White-Black graduation gap. Higher state/local aid narrowed the male graduation gap among White-Black (1.6 percentage points) and White-Hispanic (1.9 percentage points). Institutional aid was significant only for the White-Hispanic graduation gap where each additional $1,000 in average aid narrowed the gap by 1.3 percentage points each among males and females. The final significant result was for federal financial aid where it only narrowed the female White-Black graduation gap but no other gaps.

Table 3
Regression coefficients for 6-year graduation rate gaps among IPEDS of 2009, 2010, and 2011 (n=1,881).

	Male Cohorts		Female Cohorts	
Variables	White-Black	White-Hispanic	White-Black	White-Hispanic
Expenditures per FTE ($1,000)				
Instructional	0.83	-0.49	0.59	0.79
Research	0.98**	1.69	1.76***	0.33
Academic	1.41***	1.48***	1.07	1.43**
Student services	1.95***	1.62***	2.09***	2.01***
Financial Aid ($1,000)				
Federal	-0.14	-0.65	-2.65**	-0.31
State/local	-1.62***	-1.88***	-2.43***	-1.31**
Institutional	-1.21	-1.33**	-0.19	-1.28**
Student loan	2.81***	1.22**	3.03***	1.36**
Institutional Controls				
1-year retention rate	-0.34***	-0.20***	-0.40****	-0.11*
Cohort year	-0.85	-0.77	-0.23	-0.54
Cohort size	0.01***	0.02***	0.02***	0.02***
Doctoral (Reference)	---	---	---	--
Masters	2.71***	3.33***	4.44***	2.87***
Baccalaureate	-0.33	0.17	0.23	-0.12
Selectivity	0.97***	1.03***	2.02***	1.87***
Public	-4.99***	-4.02***	-3.88***	-3.43***
Percent non-White	-0.78***	-0.39***	-0.26***	-0.64***
Faculty-student ratio	0.00	0.00	0.01	0.00
Faculty salary	-0.18	-0.09	-0.07	-0.11
Average cost to attend	0.22***	0.17**	0.33***	0.21***
Intercept	19.05	13.65	34.23	9.76
R-square (no controls)	0.13	0.10	0.14	0.12
F-value	9.06***	8.33***	8.85***	6.12***
R-square (with controls)	0.33	0.36	0.40	0.31
F-value	8.03***	7.08***	6.34***	4.98***

Note: Statistical tests for the coefficients were estimated using cluster-robust standard errors.
* p < .05. ** p < .01. *** p < .001 (two-tailed)

Model Fit and Institutional Controls

The R-square values indicated how well the model fit the data and the explained variance. We presented two sets of R-square values: those for models with only the expenditures and financial aid variables and those for models that also included the institutional controls. The R-square values without controls showed that these eight variables capturing expenditures and financial aid explained a modest amount of institutional variation in graduation gaps between white and URM students, ranging from a low of

10% for the male White-Hispanic gap to a high of 14% for the female White-Black gap. With controls in the regression equations these R-squares values increased by 20 percentage points or more to explaining between 31 – 40% of the racial gaps in institutional graduation rates. The F-tests revealed that these R-square values were statistically significant.

The results for the institutional controls operated nearly identically across all four racial gap comparisons. While these variables served entirely as controls and no research expectations were addressed, the results do shed light on the institutional characteristics that were associated with wider or narrower gaps. There were two findings especially relevant for URM. First, we found that all racial gaps were narrower in institutions with better 1-year retention rates. Second, we found that all racial gaps in graduation rates were lower at institutions with a higher percentage of URM. We will return to these findings in the next section.

DISCUSSION AND IMPLICATIONS

We examined an important but empirically neglected academic outcome—the enduring racial gaps in institutional-level graduation rates (Education Trust, 2015, 2016; Young Invincibles, 2017). Our institutional-centric approach found that expenditures and financial aid created differences in the width of these racial gaps across institutions. Lukas (2017), Sawhill (2013), and Zarifa et al. (2018) all argued that higher education as a mobility-enhancing vehicle is no longer through enrollment rates, but through completion rates. Indeed, our results and the R-square values suggested that our institutional approach in understanding racial gaps in graduation rates had merit and can add to our understanding of the historical and enduring disparities in academic outcomes between URM and their White counterparts. The results also indicate that the 1990 SRK Act needs to be updated to hold institutions not just accountable for aggregate graduation rates but for race-specific graduation rates and gaps.

Before discussing our results, it is important to point out the two main limitations of the study. First, it is possible that the data did not contain institutional characteristics that could further account for the racial gaps in graduation rates given our modest R-square values. Second, as per the SRK, we followed institutional cohorts over 6 years, where this cohort was comprised of first time and full-time freshmen who stayed at the same institution. This definition covers about 25 – 30% of all college students in 4-year institutions, depending on the institution's characteristics, and does not take into account the academic outcomes after transferring out of the initial institution or part-time students (Hess et al., 2009).

We fully expected that racial gaps in graduation rates would be narrower at institutions with higher expenditures on academic- and student-related programs and policies. By all accounts, this expectation was soundly contradicted. Instead, we found that racial gaps in graduation rates between White and URM students were wider at institutions that had higher levels of academic and student services expenditures as well as research expenditures. The most consistent result across gender-race comparisons was for student services. Further, the results showed that the magnitude of this widening for each additional $1,000 per FTE was practically meaningful. For example, each $1,000 dollar increase in student services widen the graduation gap between 1.62 and 2.09 percentage points, which is about one-fifth of the gap between White and Hispanic males and one-tenth of the gap between White and Black females.

Our other research question focused on financial aid sources where we expected racial gaps in graduation rates to be narrower at institutions where the average student had more aid. We found a consistent set of findings that provided mixed support. At institutions where the average student had more student loan debt, we found a significantly wider gap in graduation rates among White and URM students for both genders. Yet other forms of financial aid, especially state and local grants, were associated with a narrowing of these racial graduation gaps.

The implications of these results are important given several trends in higher education. First, research finds that institutions dramatically increased their expenditures per FTE since 1987 and easily outpaced inflation (Hinrichs, 2016). Between 1987 and 2013, in constant dollars, academic expenditures increased by 42% or about $850 per FTE, student services expenditures by 54% or about $550 per FTE and research expenditures by 62% or about $2,000 per FTE. As our findings showed, increases in these expenditures appeared to benefit White students the most—institutions with greater academic and student services expenditures also had wider graduation gaps between White and URM students.

Secondly, the institutional graduation gap between White and URM students was narrower in the presence of higher levels of grants but wider in the presence of higher levels of student loans. This importance of grants in achieving educational equality was also found at the individual level by Goldrick-Rab et al. (2016) and Gershenfeld et al. (2019). Thus, it appears that the source and type of aid matters for reducing racial gaps in graduation rates. Fortunately, there has been an increase in both institutional and state grants in absolute dollars as well as in their share of total aid going to undergraduate students (College Board, 2019). These increases may help to

narrow the racial gap in graduation rates. However, as many states switch to merit-based grants instead of need-based grants this may affect URM and low-income students from entering and completing college because (a) grants from merit-based programs are disproportionately given to White and upper-income students and (b) adequate financial aid is a significant predictor of college persistence (National Academy of Sciences, 2011)

Unfortunately, in the U.S. one of the major source of grants for URM and underserved students—Pell Grants—continued its downward trend. Between 2011 and 2019, the share of undergraduates receiving Pell Grants declined from 38% to 31% and total Pell Grant expenditures declined from $40 billion to $28 billion in constant 2019 dollars. Much of these decreases occurred because of federal changes in eligibility standards and maximum grant formulas. As a result, Pell Grant awards can now fund only 28% of the cost of college, down from 35% just a decade ago (The College Board, 2019).

As a result of these trends, URM students are much more likely to carry student loans in order to afford the rising cost of higher education. For example, the NCES (Radwin et al., 2018) estimated that 86.8% of black students and 65.0% of Hispanic students borrow federal student loans to attend a four-year public college compared to 59.9% of their White colleagues, and Black students graduate with the most student debt. Unlike grants, student loans must be repaid either during college or after leaving college depending on whether the loans were subsidized. This pressure may disproportionately affect URM academic success as loan burdens cause stress and anxiety especially among URM that then may negatively influence persistence and completion (Johnson & Rochkind, 2009; Tran et al., 2018). Our results certainly supported this assertion.

Our results for expenditures are troubling, especially for academic and student services that are two categories directly targeted at enhancing student development and success. It is important for future research at the individual and institutional levels to further examine why heightened expenditures disproportionally benefit White incoming freshman cohorts compared to their URM counterparts. We offer two possible interconnected issues at the institutional level. First, much like the college choice model approach, it is possible that URM have less social and cultural capital as it pertains to higher education institutions and this may restrict their willingness to, awareness of, access to, and use of institutional resources. Indeed, Ovink and Veazey (2011) found that institutional programs aimed at developing the social and cultural capital of URM students allowed them to better navigate the university environment, supporting our I-E-O approach.

Given that URM students are less likely to reach out for help, we concur with The Education Trust (2016) that institutions must be proactive with their programs in order to reach and help URM students. This will be especially important during the first year given our results for the impact of 1-year retention rates on narrowing the graduation gap.

Second, an institution's racial climate may affect the way that URM leverage their capital and access and use resources given that our study found that racial gaps were narrower at institutions with a higher percentage of URM students. Cabrera et al. (1999) and Johnson et al. (2014) argued that the racial ecology of a campus is often omitted in theories and studies on academic achievement. Part of this ecology is the Whiteness of a campus—or race and space—that influences culture, climate, ecology, and student development and would be an important environment in our I-E-O approach. Indeed, research finds that when URM perceive a campus to be dominated by Whiteness, prejudice, and discrimination they are also less likely to use institutional resources, have more negative social experiences, have lower commitments to program and degree completion, and experience lower academic and intellectual development (Cabrera et al., 1999; Dancy et al., 2018; Johnson et al., 2014). The processes that led to these outcomes included their feelings of limited mobility, lack of entitlement of space, and heightened hostilities, especially at predominately White institutions.

Numerous studies have found that the Whiteness of a campus, often measured by the racial composition of the student body and campus spaces, increased the likelihood that racial minorities reported having experienced micro-aggressions, feelings of being unwelcomed and inferior, that certain spaces were off limits to them, heightened levels of stress and coping, and institutional alienation, exclusion, and commitment (Anderson, 2015; Ballinas, 2017; Cabrera et al., 1999; Evans & Moore, 2015). Karkouti (2016) summarized that a racially and ethnically diverse campus environments led to positive outcomes for URM students, including a more richly varied educational culture, enhanced social, cognitive, academic, and psychological skills, less self-segregation, less stress, and a greater sense of being able to navigate the social and educational benefits of the campus. Thus, the racial climate of the institution may be an institutional environment that influences the relationship between expenditures and graduation gaps.

Our study filled an important research gap in identifying two prominent institutional characteristics that can both widen and narrow persistent racial gaps in institutional graduation rates. It is incumbent upon institutions to use emerging research to better inform their policies and

practices if these racial gaps are to be closed. Besides financial aid and expenditures, we offered two theoretical possibilities—social and cultural capital and racial climate. Both of these features can be addressed though developmental programs (e.g., orientation, first-year seminars, advising, workshops) as well as structural considerations (e.g., hiring, admissions). Indeed, as suggested by Kuh et al. (2007) and The Education Trust (2016), institutions must "institutionally intentional" about narrowing the graduation gap through resources, practices, and programs.

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SCOTT M. MYERS, PhD, is a Professor of Sociology at Montana State University. His interests include Sociology of Education and Demography. He is currently examining the role of dual enrollment experience during high school on college outcomes. Email: smyers@montana.edu

CARRIE B. MYERS, PhD, is a Professor of Higher Education & Administration and Director of the College Teaching Certificate Program at Montana State University. Her current research examines the graduate school experiences and outcomes of Native American/Alaskan Natives students as well as international students. Email: cbmyers@montana.edu.

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