State-level adverse impact in six-year college graduation rates: Black students 2002-2018

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ABSTRACT

Using U.S. Department of Education 6-year college graduation rate data for 17 cohorts (1996-2002 to (2012-2018), adverse impact on Black students as compared to White students was evaluated for all 50 states and D.C. Potential relationships between state adverse impact and Black population percentage, geographic location, and political affiliation were also examined. Major results included: (1) documentation of widespread adverse impact against Black students throughout the U.S., (2) a tendency for states with higher percentages of Black residents to have higher levels of adverse impact, (3) documentation of lower levels of adverse impact for states located in the Northeast than those in the West, South, and Midwest, and (4) documentation of lower adverse impact levels in Blue states as compared to Purple and Red States.

Keywords: graduation rates, national graduation trends, Black graduation rates, six-year graduation rates

INTRODUCTION

Beginning with the ground-breaking national study by Astin et al. (1996), several researchers have continued to document large differences in graduation rates between Black and White students in the United States. (Berkner, et al., 2002; Eberle-Sudre, et al., 2015; Griffin et al., under review; Hobson et al., 2020; Horn & Berger, 2004; Musu-Gillette et al., 2016; Myers & Myers, 2020; Nichols et al., 2016; Oseguera, 2005-2006; Radford et al., 2010; Shapiro et al., 2017; The Education Trust, 2014; The Journal of Blacks in Higher Education, 2006, in 2018). Hobson et al., in addition to examining 6-year graduation rates in the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) 2010-2016 cohort, recommended use of the "four-fifths rule." To determine whether adverse impact was present in differential baccalaureate degree completion rates, as a function of race.

The four-fifths rule was first introduced at the federal level in the Uniform Guidelines on Employee Selection Procedures (endorsed by the Equal Employment Opportunity Commission, Civil Service Commission, Department of Labor, and Department of Justice in 1978) for use in employment settings. It entails: (1) calculating a rate of selection (number hired divided by the number of applicants) for the majority group of applicants, (2) multiplying the majority selection rate by four-fifths or .87, and (3) calculating and comparing the rate of selection for a minority group of applicants to four-fifths of the majority rate. If the minority selection rate is less than four-fifths of the majority rate, adverse impact is documented. Within the employment arena, a finding of adverse impact in response to a charge of hiring discrimination compels the organization involved to demonstrate/prove that its selection procedure is job-related, in order to lawfully continue to use that procedure and avoid damage claims. The four-fifths rule has been successfully utilized in employment settings for over 70 years to adjudicate discrimination claims in both hiring and promotion (Noe et al., 2020).

It is often important and instructive to assess the level of adverse impact present in a particular situation. Degrees of adverse impact can be expressed in terms of the impact ratio – the minority group rate divided by the majority rate. The farther the calculated impact ratio is below .8, the more severe the adverse impact.

Hobson et al., (2020) applied the four-fifths rule to IPEDS 6-year college graduation rates for Black (35.9%) and White (60.8%) students. The Black student graduation rate was less than four-fifths of the White rate (60.8 x .8 = 48.6%), confirming adverse impact at the national level. The researchers also applied the four-fifths rule to Black and White student graduation rates and found evidence of adverse impact in 48 of 51 states (94.1%). Finally, they calculated impact ratios for all 50 states and identified the 10 best and 10 worst (all with impact ratios below 50%) states.

More recently, Griffin et al. analyzed 17 years of NCES IPEDS 6-year cohorts (1996-2002 to 2012-2018), comparing Black and White student graduation rates. Adverse impact was confirmed in each of the 17 years. The authors called for more adverse impact research at the state level to determine where the disparities are most profound and thus in need of strong corrective action.

PURPOSE

The purpose of this study is to utilize the most recent NCES IPEDS data on 6-year graduation rates for Black and White students from 2002-2018 to examine adverse impact in the

50 states and D.C. The existence of national patterns of adverse impact as a function of: (1) percentage representation of Blacks in state populations, (2) geography, and (3) political orientation will also be explored.

METHOD

Graduation Data

Information about 6-year college graduation rates for Black and Whites students was retrieved from the Integrated Postsecondary Education Data System (IPEDS), which is maintained by the National Center for Education Statistics (NCES) of the U.S. Department of Education. At this time, confirmed data are available for 17 6-year student cohorts, from 1996-2002 to 2012-2018.

Analyses

Adverse Impact

Using the four-fifths rule (Hobson et al., 2020), adverse impact was calculated for all 50 states and the District of Columbia for each of the 17 6-year college graduation cohorts in the IPEDS data set. This entailed retrieving the white student graduation rate for a particular state in a given year, multiplying the White student rate by four-fifths (.87), and comparing this figure to the associated Black student rate. If the Black student graduation rate was lower than four-fifths of the white rate, adverse impact was confirmed for that state in that year. During the 17-year period covered in this study, the number of years with documented adverse impact was determined for each state and DC.

The degree or security of adverse impact was operationally defined in terms of the impact ratio —the Black student graduation rate, divided by the White student graduation rate. Smaller values, below .8, are indicative of more severe adverse impact. For the 50 states and D.C., impact ratios were calculated for each of the 17 years covered in this study and then averaged to produce a single score. Thus, each state and D.C. had a mean impact ratio representing the severity of adverse impact over 17 years.

Black Population Percentages

2020 Census Bureau (www.census.gov) data were accessed to determine the percentage of “Blacks or African Americans Alone” in each of the 50 states and DC. Two analyses were conducted to examine the relationship between state-level adverse impact and Black population percentage. First, correlation coefficients were calculated between: (1) the number of years (out of 17) with documented adverse impact for the 50 states and D.C., (2) mean impact ratios for the same 51, and (3) state-level percentages of Blacks within the population.

A contrasted groups model was utilized to perform the second set of analyses. Specifically, the top 10 and bottom 10 states, in terms of Black population percentages, were identified. For each of these contrasted groups, mean scores were calculated for: (1) the number of years of adverse impact, out of 17 and (2) average impact ratios over 17 years, and statistically compared using between-groups t-tests.

Census Regions

In order to assess potential geographic differences in adverse impact, U.S. Census Bureau (2020) categories were utilized to divide the nation into four broad regions: Northeast (9 states), Midwest (12 states), South (17 states), and West (13 states). For each of these regions, mean values were computed for: (1) the number of years with adverse impact and (2) average impact ratio's and then compared using separate one-way ANOVA's, followed by post hoc comparisons using the Tukey HSD procedure.

Political Categories

Information available at the nonpartisan website www.270towin.com was employed to examine the relationship between political category (Red, Blue and Purple) and adverse impact in Black student 6-year college graduation rates. The interactive website offers a map of the US that codes states into one of three categories: (1) Red - those that have consistently voted for the Republican candidates for president since 2000, (2) Blue – those states voting consistently for Democratic candidates, and (3) Purple – those states that have no consistent voting pattern in presidential races since 2000. The period of time covered in map (2000-2020) roughly corresponds to the time period in the IPEDS dataset analyzed in this study – 1996-2018).

Mean scores were calculated for states in each of the three political categories for (1) number of years with confirmed adverse impact and (2) average impact ratios, and then compared with separate one-way ANOVAS, followed by Tukey HSD post hoc comparisons when warranted.

RESULTS

State - Level Adverse Impact

Table 1 (Appendix) offers adverse impact information for all 50 states and the District of Columbia, in alphabetic order. Two measures of adverse impact were calculated and included in the table: (1) the number of years in which adverse impact on Black college students was documented, over the 17-year period covered in this study and (2) mean impact ratios across 17 years.

There were 29 (29/51 = 56.9%) States with documented adverse impact in all 17 years covered in this study. They included (alphabetically):

Alabama	Missouri
Arkansas	Montana
California	Nebraska
Colorado	New Jersey
Delaware	New York
Illinois	North Carolina
Indiana	North Dakota
Iowa	Ohio
Kansas	Oklahoma
Kentucky	Pennsylvania
Louisiana	South Dakota

Maryland	Texas
Michigan	Virginia
Minnesota	Wisconsin
Mississippi	

The 22 states and DC (22/51 = 43.1%) having the fewest numbers of years with documented adverse impact are listed below, along with their total years in parentheses, in ascending order:

New Hampshire (1)
Maine (2)
Hawaii (3)
Rhode Island (3)
Massachusetts (5)
Vermont (10)
Georgia (12)
Oregon (13)
Alaska (14)
Wyoming (14)
Arizona (15)
D.C (15)
Florida (15)
Idaho (15)
South Carolina (15)
Tennessee (15)
Connecticut (16)
Nevada (16)
New Mexico (16)
Utah (16)
Washington (16)
West Virginia (16)

Descriptive statistics for the outcome variable "Mean Impact Ratio" included a mean of 65.2, standard deviation of 10.5, minimum of 49.9, and maximum of 94.9. The ten states with the lowest mean impact ratios and thus the most pronounced adverse impact were (in ascending order):

Michigan	(49.9%)
Wisconsin	(51.4%)
South Dakota	(53.0%)
Illinois	(53.1%)
Ohio	(53.9%)
Delaware	(54.2%)
Kansas	(54.2%)
Arkansas	(55.4%)
Montana	(56.0%)
North Dakota	(56.0%)
Utah	(56.0%)

The ten states with the highest mean impact ratios and nonexistent or lowest levels of adverse impact were (in descending order):

Hawaii	(94.9%)
Maine	(92.8%)
New Hampshire	(92.7%)
Rhode Island	(83.1%)
Massachusetts	(81.5%)
Vermont	(77.4%)
Georgia	(74.9%)
Connecticut	(73.4%)
Oregon	(72.9%)
Tennessee	(72.7%)

State Black Population Percentage

2020 census figures for the 50 states and DC, retrieved from www.census.gov, were utilized to determine the percentage of "Blacks or African Americans Alone" in the respective populations. The correlation between Black population percentages and the number of years with documented adverse impact was not statistically significant ($r = .26$, $p = .062$).

Using a contrasted group's comparison, the top ten and bottom ten states, in terms of population percentage of Blacks, were identified:

Top 10	Bottom Ten
District of Columbia (41.4%)	South Dakota (2.0%)
Mississippi (36.1%)	Oregon (2.0%)
Louisiana (31.4%)	Maine (1.9%)
Georgia (31.0%)	Hawaii (1.6%)
Maryland (29.5%)	New Hampshire (1.5%)
Alabama (25.8%)	Vermont (1.4%)
South Carolina (25.0%)	Utah (1.2%)
Delaware (22.1%)	Wyoming (0.9%)
North Carolina (20.5%)	Idaho (0.9%)
Virginia (18.6%)	Montana (0.5%)

The mean numbers of years with documented evidence of adverse impact were:

Top 10 – 16.1
Bottom 10 – 10.8

A between groups t-test (with equal variances not assumed – Levine's test for equality of variances: $F = 18.6$, $p < .001$) produced statistically significant results ($t = 2.5$; $dF = 10.2$; two-sided $p = .030$; point biserial correlation squared = .38). Thus, states with higher percentages of Blacks in their populations tended to have more years with documented adverse impact than those with lower Black percentages.

The correlation between Black population percentages and mean impact ratios for the 50 states and D.C. was not statistically significant ($r = -.05$, $p = 710$). A between groups t-test comparing the mean impact ratios for the Top 10 states (65.8), in terms of Black population percentages, with the Bottom 10 states (72.4), (equal variances not assumed, Levine's Test = .0, $F = 11.6$, $p = .003$) failed to produce statistically significant results ($t = -1.2$; $dF = 11.4$; two-sided $p = .25$).

Census Regions

The U.S. Census Bureau divides the 51 states and D.C. into the following four geographic regions.

Region 1: Northeast (9)	Region 2: Midwest (12)
Connecticut	Illinois
Maine	Indiana
Massachusetts	Iowa
New Hampshire	Kansas
New Jersey	Michigan
New York	Minnesota
Pennsylvania	Missouri
Rhode Island	Nebraska
Vermont	North Dakota
	Ohio
	South Dakota
	Wisconsin
Region 3: South (17)	**Region 4: West (13)**
Alabama	Alaska
Arkansas	Arizona
Delaware	California
District of Columbia	Colorado
Florida	Hawaii
Georgia	Idaho
Kentucky	Montana
Louisiana	Nevada
Maryland	New Mexico
Mississippi	Oregon
North Carolina	Utah
Oklahoma	Washington
South Carolina	Wyoming
Tennessee	
Texas	
Virginia	
West Virginia	

For each of the four census regions, the mean number of years in which adverse impact was documented using 17 years of IPEDS graduation rate data, are provided below.

Northeast – 9.8
Midwest – 17.0
South – 16.2
West – 14.5

A one-way ANOVA testing mean differences was statistically significant ($F = 8.4$; $dF = 3, 47$; $p. < .001$; eta-squared = .35). Follow-up post hoc comparisons using Tukey HSD revealed that the means for the Midwest (17.0), South (16.2), and West (14.5) were significantly larger than that for the Northeast (9.8). It is noteworthy that all 12 states in the Midwest region had

documented adverse impact on Black students for each of the 17 years covered in this study; thus producing a regional mean of 17. Mean impact ratio scores for the four regions were:

Northeast – 78.0
Midwest – 56.3
South – 64.7
West – 65.2

Oneway ANOVA results evaluating mean differences between the four regions were statistically significant (F = 12.1; dF = 3, 47; p. < .001; eta-squared = .44). Using Tukey HSD to evaluate post hoc comparisons yielded the following outcomes. The most pronounced severity in mean impact ratios was in the Midwest (56.3) region, as compared to the South (64.7), West (65.2), and Northeast (78.0). The lowest level of impact ratio severity was in the Northeast, as compared to the remaining three regions.

Red v. Blue v. Purple

Based upon information from the nonpartisan website www.270towin.com on state-level presidential voting patterns since 2000, there were 20 Red, 17 Blue and 14 Purple states, as listed below.

Red (20)	Blue (17)	Purple (14)
Alabama	California	Arizona
Alaska	Connecticut	Colorado
Arkansas	Delaware	Florida
Idaho	District of Columbia	Georgia
Kansas	Hawaii	Indiana
Kentucky	Illinois	Iowa
Louisiana	Maine	Michigan
Mississippi	Maryland	Nevada
Missouri	Massachusetts	New Mexico
Montana	Minnesota	North Carolina
Nebraska	New Hampshire	Ohio
North Dakota	New Jersey	Pennsylvania
Oklahoma	New York	Virginia
South Carolina	Oregon	Wisconsin
South Dakota	Rhode Island	
Tennessee	Vermont	
Texas	Washington	
Utah		
West Virginia		
Wyoming		

The mean numbers of years with documented adverse impact over the 12-year period covered in this study for the three political categories were:

Red – 16.3
Blue – 11.9
Purple – 16.2

ANOVA results were statistically significant (F = 7.2; dF = 2, 48; p. = 002; eta-squared = .23). Post hoc comparison using Tukey HSD confirmed that the means for Red (16.3) and Purple (16.2) states were larger than that for Blue (11.9) states. Thus, states that consistently voted for Democratic candidates in presidential elections since 2020 had significantly fewer years with documented adverse impact than Republican and Independent voting states.

Mean impact ratios for the three political categories were:

Red – 60.8
Blue – 72.9
Purple – 62.2

Results for the ANOVA comparing these three means were statistically significant (F = 9.2; dF = 2, 48; p. < .001; eta-squared = .28). Tukey HSD post-hoc comparisons indicated that the mean for Blue (72.9%) states was significantly larger than those for Purple (62.2) and Red (60.8) states. This suggests that the mean severity level of adverse impact was more pronounced in Republican-voting states and those states with no consistent presidential voting pattern than in Democratic ones.

DISCUSSION

Conclusions

Adverse Impact

Given that Griffin et al. (in Press) found adverse impact against Black college students at the national level for all 17 of the 6-year cohorts (1996-2002 through 2012-2018) on the most recent NCES IPEDS data, it is not surprising that 29 of 50 states and D.C. (56.9%) also had confirmed adverse impact in all 17 cohorts. The average number of years with adverse impact was 14.8 out of 17 (87.0%). Only five states (9.8%) had fewer than 10 cohorts with adverse impact: New Hampshire (1), Maine (2), Hawaii (3), Rhode Island (3), and Massachusetts. Thus, with few exceptions, the majority of states and D.C. have chronic problems with adverse impact against Black college students.

In terms of the severity of adverse impact (as measured by impact ratios – the Black graduation rate divided by the White graduation rate), the mean impact ratio for all 50 states and D.C. was 65.2% — well below the four-fifths rate cut-off of 86.0%. The ten states with the lowest impact ratios were all at or below 56.0%, with Michigan the lowest in the country at 49.9%. There were only five states with impact ratios above 80%

Hawaii — 94.9%
Maine — 92.8%
New Hampshire — 29.7%
Rhode Island — 83.1%
Massachusetts — 81.5%

State Black Population

The correlations between state Black population percentages and both measures of adverse impact (number of years and impact ratios) were not statistically significant. The two contrasted groups analyses, comparing the top 10 states (in terms of Black population

percentages), produced mixed results. The differences in means for the number of years with adverse impact were statistically significant (top 10 = 16.1, bottom 10 = 10.8) but those for impact ratios were not (top 10 = 65.8, bottom 10 = 72.4). Thus, there is preliminary evidence that states with higher Black population percentages tend to have higher levels of adverse impact. Conversely, states with lower Black population percentages tend to have lower levels of adverse impact.

Census Regions

ANOVA's comparing the four census regions (Northeast, South, Midwest, and West) on both measures of adverse impact yielded consistent results. In terms of the number of years with adverse impact, statistically significant ANOVA findings, followed by Tukey HSD post hoc tests, revealed that the mean for the Northeast (9.8) was lower than those for the other three regions — West (14.5), South (16.7) and Midwest (17.0). The 12 states in the Midwest region all had adverse impact present in each of the 17 years covered in this study. Similar ANOVA and Tukey HSD results were found comparing mean impact ratio scores for the four census regions. Specifically, the Northeast mean (78.0%) was significantly larger than the means for the West (65.2%), South (64.7%), or Midwest (56.3%). Taken together, these statistical outcomes confirm that adverse impact in Black student college graduation rates is less frequent and severe in the 9 states that comprise the Northeast Census region than in the remaining three regions.

Political Affiliation

The results of one-way ANOVA's followed by Tukey HSD post hoc tests for both measures of adverse impact were similar. Specifically, the 17 Blue states had a significantly lower mean number of years with adverse impact (11.9) and higher mean impact ratio (72.9%) than those for the 14 Purple states (16.2 and 62.2%) and 20 Red states (16.3 and 60.8%). Thus, adverse impact frequency and severity were lower in Democratic states than in non-Democrat voting States.

Recommendations

Based upon the results obtained in this research, the following four recommendations are offered for consideration. First, a public awareness initiative is needed to inform and educate citizens about the concept of adverse impact in college graduation rates and the specific figures in individual states. Annual adverse impact calculations for Black students and other under-represented groups should be published and widely disseminated, and formally presented/discussed by state leaders, who should be held accountable for current levels of adverse impact and concrete plans for improvement. The U.S. Department of Education could facilitate these efforts by requiring states to annually submit adverse impact figures.

Second, states with persistent and pronounced adverse impact in Black student college graduation rates (most notably, the states in the Midwest Census Region) should formulate comprehensive plans, with specific goals and timetables, to address this problem. Once again, the U.S. Department of Education could be very helpful by providing incentives for states to make progress in reducing adverse impact.

Third, as states continue to compete for population and business investment, those with persistent and pronounced adverse impact in minority student graduation rates will not fare well. They may be perceived as less welcoming and supportive of people of color, and thus unattractive to potential new residents and businesses. Conversely, those states with strong records of fairness in college graduation rates would enjoy a competitive advantage.

Finally, as the U.S. population continues to rapidly diversify, major political parties are faced with the challenge of competing for minority voters. Strong support for and effective action in reducing adverse impact in college graduation rates for students of color could, and perhaps should, become a litmus paper test of genuine interest and concern in issues facing minority communities.

Limitations

The following two limitations should be considered when interpreting the results of this study. First, characteristics of the college student samples used in the IPEDS data set to calculate graduation rates exclude students in the following categories: (1) those who start college in the spring or summer semesters, (2) those who attend college on a part-time basis, (3) those who transfer to other institutions, and (4) those who take longer than six years to graduate. Given these restrictions, Cook and Pullaro (2010) estimated that 40% of all college students may not be represented in IPEDS published statistics.

Second, the state data analyzed in this study are only available for a 17-year period of time, from 2002 to 2018. Thus, adverse impact levels before and after this period are unknown.

Future Research

Focused future research would be helpful in the following three areas. First, states with lower levels of adverse impact in Black student college graduation rates (New Hampshire, Maine, Hawaii, Rhode Island, and Massachusetts) should be carefully studied to identify common “best practices.” These successful strategies could then be shared throughout the nation.

Second, research is needed to fully capture graduation rates and adverse impact for a more comprehensive and inclusive sample of college students than is currently provided by IPEDS. Knowledge of completion rates and adverse impact for part-time and transfer students, along with those who take longer than six years to graduate, is sorely needed.

Third, research on post-baccalaureate degree completion rates and adverse impact in masters and doctoral programs would provide a more complete analysis of higher educational outcomes for Black students.

APPENDIX

Table 1

Number of Years of Adverse Impact[1] (max. = 17) and mean Impact Ratios[2] (over 17 years) for 50 states and D.C.

States/D.C	Years of Adverse Impact	Mean Impact Ratios
Alabama	17	61.5%
Alaska	14	58.0%
Arizona	15	56.1%
Arkansas	17	55.4%
California	17	64.7%
Colorado	17	62.7%
Connecticut	16	73.4%
Delaware	17	54.2%
District of Columbia	15	71.4%
Florida	15	71.5%
Georgia	12	74.9%
Hawaii	3	94.9%
Idaho	15	65.9%
Illinois	17	53.1%
Indiana	17	59.0%
Iowa	17	57.5%
Kansas	17	54.2%
Kentucky	17	64.5%
Louisiana	17	65.2%
Maine	2	92.8%
Maryland	17	59.7%
Massachusetts	5	81.5%
Michigan	17	49.9%
Minnesota	17	64.8%
Mississippi	17	65.5%
Missouri	17	66.3%
Montana	17	56.0%
Nebraska	17	56.6%
Nevada	16	61.3%
New Hampshire	1	92.7%
New Jersey	17	70.7%
New Mexico	16	65.9%
New York	17	61.3%
North Carolina	17	70.6%
North Dakota	17	56.0%
Ohio	17	53.9%
Oklahoma	17	58.0%
Oregon	13	72.9%

Pennsylvania	17	69.0%
Rhode Island	3	83.1%
South Carolina	15	67.6%
South Dakota	17	53.0%
Tennessee	15	72.7%
Texas	17	59.5%
Utah	16	56.0%
Vermont	10	77.4%
Virginia	17	67.2%
Washington	16	71.4%
West Virginia	16	61.1%
Wisconsin	17	51.4%
Wyoming	14	62.5%

[1] For comparison purposes, the national figure was 17 years.
[2] For comparison purposes, the national average impact ratio was 63.7%, over 17 years.
For the outcome variable “Years of Adverse Impact”, the mean was 14.8, standard deviation 4.3, minimum 1.0 and maximum 17.0.

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