



Assessing changes in the underrepresentation of Blacks, Latinx/Hispanics, and Native American doctoral students in U.S. Geography Programs, and a model for change: the Michigan State University model

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Abstract

This study used critical race theory to examine the changes in awarding of doctoral degrees in Departments of Geography to American citizens who are Black, Latinx, and/or Native American. Data were obtained from the Integrated Postsecondary Education Data System (IPEDS), 1997–2019. The data show that of 4918 doctoral degrees awarded from 1997 to 2019, only 86 or 1.64% were awarded to African American students, 122 or 2.39% were awarded to Hispanic American students, and 25 or 0.53% were awarded to Native American students. The differential awarding of degrees was related to the differential funding by race and ethnicity to support their completion of the doctorate degrees. Critical race theory may lead to consciousness for students to review the practice as disparate impact racial discrimination. If policies and practices in departments of geography are not changed there will continue to be few doctoral degrees obtained by Blacks, Hispanics, and Native Americans. The paper offers a model for change.

Keywords Critical race theory · Black · Latinx · Native American · Geography · Differential treatment

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Introduction

Historical lack of commitment to addressing underrepresentation of Non-white American students in graduate programs: the context

This paper was written during widespread protests over the differential treatment of American citizens who are Black, Latinx, and/or Native American. This differential treatment has a long history and has been experienced especially by Blacks. However, in 2020, a higher percentage of white people across the globe did appear to have a greater understanding and acceptance of the fact that the complaints of Blacks about their unfair and differential treatment are in fact true. Analysis carried out by the Pew Research Center has revealed that just one in six protesters turning out at Black Live Matter demonstrations in the United States are actually Black. The research notes that the plurality of those present at the gatherings have been white. In fact, the full breakdown reveals that just 17% of protesters were Black, while 46% were white, 22% were Hispanic, and 8% were Asian, according to the analysis of the protests and uprisings (Barroso and Minkin 2020).

Thus, unlike the protests of the 1960s, which included mostly Blacks, the 2020 protests included a sizable percentage of whites and other racial groups. The protesters have been demanding equal treatment for Blacks, in particular, as defined by the Blacks Lives Matter Movement (Black Lives Matter 2021).

The leaders of the movement have extended their demands for equal treatment beyond only police departments. Instead, they are demanding equal treatment by predominantly white institutions throughout the US. This includes mortgage lending institutions and institutions that deliver public health where the Covid-19 pandemic has been differentially infecting and killing African Americans, Latinx, and Native Americans. They are also demanding that differential treatment in the workforce cease, noting that Black unemployment had remained at least twice the rate for whites (Ajilore 2020). Finally, the protesters have been demanding equal treatment, via greater representation in institutions of higher education and radical change for racial justice (Black Lives Matter 2021).

Although research has been done using critical race theory to assess the underrepresentation of whites compared to non-whites in institutions of higher education in general, we could not find a study that used critical race theory to assess the underrepresentation of American citizens who are Black, Latinx, and/or Native Americans in departments of geography that offer doctoral degrees at public universities.

Conceptual framework

This paper uses critical race theory in order to understand how and why three racial ethnic groups have been underrepresented and/or disproportionately funded by graduate departments of geography in the United States, both historically and presently.

Critical race theory was introduced to scholars in the field of education in 1995 by Ladson-Billings and Tate (1995). Critical race theory in education has focused on the premise that racism and White Supremacy are central, endemic, and a permanent part of American society, including predominantly white universities (Smith et al. 2002; Yosso et al. 2004).

Diversity versus critical race theory

Since the 1978 *Regents of the University of California v. Bakke* decision, most U.S. universities have increasingly adopted “diversity” as the buzzword to justify their activities in recruiting students who are not white. This has also been the position of most geography departments (Darden et al. 2006). This “diversity” approach echoes the stated position of the Association of Public and Land-grant Universities (APLU 2010).

Although the issues related to a lack of representation of Blacks, Latinx, and Native Americans in predominantly white universities have existed for years, it was not until 2010 that the Association of Public and Land-grant Universities (APLU) issued a statement on its commitment to address the problem. The Association is a voluntary association whose membership consists of public research universities, land-grant institutions, state university systems, and other affiliated organizations. The Association stated that the APLU:

“is committed to advancing diversity and inclusion by exercising the principles of equal access and equal opportunity in education and employment... [that the] APLU takes seriously our leadership responsibility to provide equal access and equal opportunity through the development of policies and initiatives that foster academic excellence, diversity and inclusion...[that the] APLU prohibits discrimination against any individual on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, gender identity or expression, disability, or status as a veteran...[that the] APLU believes that human and intellectual diversity contribute to academic excellence, and that the Association and its member institutions benefit from the rich diversity of the persons who comprise our staff, faculty and students...[that the] APLU is committed to recruiting and retaining, on a nondiscriminatory basis, people who are members of groups that have been historically underrepresented in higher education and to supporting its members in their efforts to enhance the diversity of their faculty, staff and students...[that the] APLU champions diversity, educational equity and the preparation of individuals who can live and work effectively in an increasingly multicultural and interdependent world” (APLU 2010).

Notwithstanding the laudable sentiments expressed in the above, our argument is that this broad-based general statement on diversity is insufficient to address the deeply ingrained problem of structural barriers related to systemic racism in institutions of higher education. In fact, systemic racism is not mentioned in the diversity

statement. Instead, we argue that critical race theory is necessary to address this entrenched problem of systemic racism which is related to disparate impact discrimination.

Literature review on critical race theory (CRT)

Past research on critical race theory has focused on the struggle of Blacks in higher education institutions where racial barriers are the norms. Blacks have had to try to overcome these barriers by presenting their own perspectives on the system that was created to benefit white students in the dominant white society, while excluding Black students from the same benefits.

To understand the way higher education impacts Black students, Patton (2016) offered three propositions to inform educational inequity and racism/White supremacy:

Proposition 1: The establishment of U.S. higher education is deeply rooted in racism/White supremacy, the vestiges of which remain palatable.

Proposition 2: The functioning of U.S. higher education is intricately linked to imperialistic and capitalistic efforts that fuel the intersections of race, property, and oppression.

Proposition 3: U.S. higher education institutions serve as venues through which formal knowledge production rooted in racism/White supremacy is generated (p. 317).

After identifying the problem, Patton (2016) concluded that “consumers of higher education can anticipate that little change will occur in the functioning of higher education given the stagnant nature of the leadership (all of whom are college educated), policies, racial climate, curriculum, and culture, which are deeply rooted in Whiteness” (p. 324). See also Vozzella et al. (2015).

Yosso et al. (2009) used critical race theory to explain the microaggressions impacting the Latino students at Harvard University.

Critical race theory (CRT) in education positions racism as central to educational inequities and challenges claims of neutrality, objectivity, color blindness, and meritocracy (p. 232). These ideas first originated, in general, from Delgado and Stefancic (2017), and in education by Lynn and Dixson (2013).

Roberts et al. (2021) examined the motivations and experiences of doctoral students of color in colleges/departments of education. They posed two research questions: (1) What influences doctoral students of color to pursue a doctoral education? and (2) What opportunities do they encounter within their programs to carry out their motivations? (p. 228). The study’s objectives were twofold: (1) to explore if/how the pursuits of doctoral students of color align with the communities they come from; and (2) to better understand what drives doctoral students of color to thrive in their doctoral programs (p. 228). The authors focused on institutional factors supportive of their successful matriculation, such as access to research apprenticeships, mentorship, and teaching opportunities.

Roberts et al. (2021) obtained their data using a 61 item-survey of Likert-scale and open-ended, narrative items. Survey items were designed to solicit answers

about participants' experiences during their actual years of study. Survey items included those related to participants' demographic information (i.e., racial/ethnic background, gender identity, languages spoken, and year of study), and their classification (i.e., doctoral student, doctoral candidate, postdoctoral scholar, etc.) (p. 234). Online survey distribution occurred utilizing purposive sampling. Participant eligibility was limited to those who were currently enrolled in their doctoral program or were no more than two years removed from having their degree conferred (p. 235). The sample included 40 participants who self-identified as people of color. The findings indicated that participants primarily sought doctoral degrees motivated by culture-based theories of self, community, and civic engagement. Their teaching and research experiences indicated opportunities they had or lacked in order to fulfill the motivations that drove them to doctoral studies (p. 237).

Agosto et al. (2015) focused on some of the forces affecting the entry of Black women into an educational leadership program: rate of rejection; consistency (inertia) of this rate; and the forces that impede the change needed to increase their rate of acceptance and representation across the ranks of educational leadership (p. 786). Agosto et al. (2015) used critical race theory to analyze and discuss an evolving applicant selection process in order to illustrate how institutional racism was supported by a racialized discourse (i.e., policy, practices, conversations) constrained at the intersection of race and gender (p. 786). The authors viewed institutional racism as a convergence of individual and institutional interests that is subtler than individual racism since it originates in the operation of established and respected forces in society and its culture (p. 786). The ideas of Agosto et al. (2015) are consistent the ideas of Alemán Jr. and Alemán (2010). Agosto et al. (2015) argued that like the concept of interest convergence that impacts Blacks also applies to Latinx. Bell (1980) coined the term "principle of convergence" by pointing out that the principle of interest convergence holds that the interests of Blacks (in achieving racial equality) will be accommodated only when they converge with the interests of Whites (Bell 1980, p. 523).

Agosto et al. (2015) used qualitative data from the master's committee members' field notes, narratives from conversations, experiential knowledge, and memos that illustrated the actions, outcomes, and negotiations among faculty participating in the process. Analysis of the data occurred through critical race theory, which included mining the data for the presence of racial ideologies, racial discrimination related to bias, power differentials reflecting in privilege, experiential knowledge, counter-narratives, differential effects (in access, outcomes, and distribution of goods and services), relationships, and race at the intersection with gender (p. 794). The findings were that a disproportionate percentage of Black women applying to an educational leadership program got rejected. The authors noted that the higher rejection rate of Black women compared to White women, when seen through critical race theory, led some faculty to undertake a race conscious discourse (Bonous-Hammarth 2000). They also noted that faculty in such departments of educational leadership who prompted such dialog on institutional racism would likely face risks and that they would "need to (em)brace for the battle against inertia" (p. 785).

The purpose of the study by Ballard and Cintrón (2010) was to use critical race theory as a way to expand our understanding of African American success in

graduate education by allowing the participants who were African American males who have achieved academic success an opportunity to chronicle their lives as they pursued their educational goal of a PhD degree (p. 11).

African American doctoral students have been the focus of some recent studies in higher education. These studies could be organized into four broad thematic groups: (1) persistence/attrition/retention (Cujet 2006); (2) campus environment and mentoring (Harper and Patton 2007); (3) social support (Williams et al. 2016); and (4) strategies for overcoming barriers to success (Taylor and Antony 2000).

Gildersleeve et al. (2011) conducted an analysis of doctoral education to answer the question about “a critical race analysis of the everyday experiences of Latina/o and Black doctoral students” (p. 93). Their research question was “How do Black and Latina/o students experience the culture of doctoral education?” (p. 94). The authors presented the narrative “Am I going crazy?!” to argue that the culture of doctoral education can be dehumanizing and marginalizing for the Latina/o and Black students. Also, in order to better support the persistence and graduation of Black and Latina/o doctoral students, they noted that universities needed to re-imagine the doctoral education experience so it would be a “humanizing and successful experience for Latinas/os and Blacks” (p. 94). The authors’ data came from 22 students recruited from three major research universities, all of which are public, primarily residential, comprehensive doctoral institutions with very high research activity (p. 97). The authors conducted conversational, ethnographic interviews which sought to understand how participants navigated, negotiated, and made meaning of their everyday practices (p. 98). The results were limited and the conclusions could not be generalized across all doctoral programs. The study focused on only education programs and only public universities (p. 100).

Focus on underrepresented groups in graduate departments of geography

In this paper, the three groups we refer to that have experienced severe underrepresentation in graduate departments of geography are American citizens who are Black/African American, Hispanic/Latinx, and/or Native American.

To address racial inequity, U.S. graduate departments of geography must address the underrepresentation of students who have experienced, and who continue to experience, racial and ethnic discrimination, systemic racism, and other impacts of White Supremacy throughout the educational system. Such measures must recognize the reality of this historically white, American system of separate and unequal education, from elementary school to graduate school. Cook is among those who indicate that there is still substantial evidence of systemic racism in education, which needs to be addressed (2020). Cook (2020) notes that some professors at predominantly white universities, for example, are less likely to respond to email inquiries about graduate study from Black and Hispanic students than from people who are discernibly white and male.

In the remainder of the paper, we present data that document the outcomes of such systemic discrimination, i.e., that documents racial inequity by demonstrating

the severe underrepresentation of graduate students who are American citizens and are African American, Latinx, and/or Native American. These groups do not get a fair share of the financial support for graduate school.

Extent of racial and ethnic underrepresentation in the awarding of doctoral degrees

In the first part of the data and analysis, we compare geography departments with other social science disciplines. We found that geography departments awarded the lowest number of doctoral degrees to the three underrepresented groups compared to other social science disciplines. For example, according to the National Science Foundation *2019 Doctoral Recipients from United States Universities* survey (2020), in the year 2019, geography departments awarded only 9 doctoral degrees to Black American citizens and Hispanic/Latinx American citizens. Zero doctoral degrees were awarded to Native Americans. During the same year, 19 Blacks were awarded doctoral degrees in Anthropology, 21 in Economics, 23 in Political Science, and 47 in Sociology. The number of degrees awarded to Latinx students was also very small: Anthropology departments awarded 39; Economics awarded 32; Sociology awarded 51; and Political Science departments awarded 43. The most underrepresented group was Native American students. They were awarded only 1 degree in Anthropology and Sociology and 0 degree in Economics, Political Science, and Geography.

Historical lack of commitment to addressing underrepresentation in geography departments: the context

Geography departments in the United States' universities have had a long history of not including Blacks/African Americans, Latinx/Hispanics, and Native Americans in their doctoral programs to the same extent as they have included white students and international students. There is little evidence of departments taking any action to change the representation of these groups in their departments before the 1960s. The historical record shows that *consciousness* among some whites about the differential treatment of Black, Latinx, and Native American citizens in doctoral geography departments first occurred after the civil disorders of 1967. The use of the term "civil disorders" was derived from the *National Advisory Commission on Civil Disorders' Report* (1968) to characterize the Black rebellion in several American cities. It was used to illustrate that many predominately white institutions only respond to differential treatment after protests. Following the protests by Blacks in 100 American cities and on university campuses, some universities started to recruit both Black undergraduate and graduate students. (Horvath et al. 1969).

This study examines the historical record and then conducts a comprehensive analysis of *any changes* in differential treatment of these groups in all geography doctoral programs at public universities between 1997 and 2019. To be clear, this is not a study of diversity in geography departments and the obstacles that departments

may have faced in trying to achieve diversity. Instead, it is a study of differential treatment of American citizens who are Black, Latinx, and/or Native American compared to American citizens who are white, and non-American citizens, i.e., international students. After the protests in the 1960s, a few geography faculty members from the University of Michigan and Michigan State University started to conduct surveys to determine the reasons for exclusion of Black students from graduate departments of geography (Horvath et al. 1969).

Purpose of the study

This paper examines the historical, persistent failures of departments to address the underrepresentation, assesses any changes in the contemporary situation based on national data on public universities from the U.S. Department of Education 2020 *Integrated Postsecondary Education Data System* (1997–2019), and provides a model of how a continuous recruitment policy can be implemented to address this underrepresentation.

The aim

Our aim is to determine changes in the differential treatment of American citizens who are Black, Latinx, and/or Native American compared to white Americans and international students. The racial inequity was measured by the number and percent of these groups receiving doctoral degrees compared to white Americans and international students. This paper is intentionally focused on the most reliable data available to measure any changes in differential treatment by geography departments from 1997 to 2019 as revealed in the awarding of doctoral degrees. Thus, this paper is not focused on the obstacles some departments may have faced in trying to achieve diversity. It is our view that the concept “diversity” has lost its real meaning since diversity can be achieved without equality and equal treatment. Furthermore, whatever efforts some departments may have made, the important civil rights and social justice questions are whether departments have reduced differential treatment in the awarding of doctoral degrees. That is what this paper will determine.

Research objectives

The research objectives are fourfold:

- (1) To determine the extent of changes in the differences in the percent of doctoral degrees awarded by geography departments to white American citizens, Black American citizens, Latinx citizens, Native American citizens, and non-American citizens (international students);
- (2) To determine which geography departments issued doctoral degrees to white and international students over a 22-year period (1997–2019), while during several

- years no degree was awarded to citizens who are Black, Latinx, and/or Native Americans citizens;
- (3) To determine the extent of the difference in the source of funding received by white American graduate students and “other” American graduate students., i.e., Blacks, Latinx, and Native Americans; and
 - (4) To determine the percent of graduate departments of geography that have a recruitment policy that requires the department to recruit and fund at least one student from the underrepresented groups each year until the underrepresentation is substantially reduced.

Hypotheses

We hypothesize that (1) there has been little change in the percent of Blacks, Latinx, and Native American citizens receiving doctoral degrees over a 22-year period, 1997 to 2019, compared to white American citizens and international students. Student underrepresentation remained *extensive* with little difference between departments; (2) The data show that of 4,918 doctoral degrees awarded from 1997 to 2019, only 86 or 1.64% were awarded to African American students, 122 or 2.39% were awarded to Hispanic American students and 25 or 0.53% were awarded to Native American students. The differential awarding of degrees was related to the differential funding by race and ethnicity to support their completion of the doctorate degrees; (3) a higher percentage of students from underrepresented groups relied on their own funds to support their graduate education compared to the percentage of white students; and (4) despite the consistent recommendations over a 42-year period related to how to effectively reduce the underrepresentation of underrepresented groups, fewer than 5% of geography departments had a policy in 2019 to recruit and fund at least one graduate student from underrepresented groups each year until the underrepresentation is substantially reduced. Critical race theory may lead to consciousness for students to review these practices as disparate impact racial discrimination.

Data and methods

Methodological and analytical procedures to identify number of students studied from 1997 to 2019

The number of students studied from 1997 to 2019 was based on the data collection strategy for completion of all U.S. Department of Education (2020) *Integrated Postsecondary Education Data System (1997–2019)* (IPEDS) surveys. The survey is mandatory for all institutions that participate or are applicants for participation in any Federal financial assistance program authorized by Title IV of the Higher Education Act of 1965, as amended. The completion of the surveys, in a timely and accurate manner, is mandated by 20 USC 1094, Section 487(a) (17).

The collection and reporting of racial/ethnic groups (Blacks/African Americans, Hispanics, Native Americans, white students, and international students) were defined by the Federal government. The data are also mandatory for all institutions that receive, are applicants for, or expect to be applicants for Federal financial assistance as defined in the Department of Education (ED) regulations implementing Title VI of the Civil Rights Act of 1964 (34 CFR 100.13), or defined in any ED regulations implementing Title IX of the Education Amendments of 1972. We used the definitions provided by the Federal government to identify the number of students from these groups receiving their PhDs from departments of geography in public universities from 1997 to 2019.

Method for IPEDS data extraction

This study utilized information drawn from the *Integrated Postsecondary Education Data System (IPEDS)*, which serves as a primary source of information on American universities, colleges, and vocational/technical institutes. The specific years covered span from 1997 to 2019 and the institutional sector of focus was public four-year or above institutions. Since our study concerns a specific degree from a specific discipline, our search of IPEDS targeted data concerning completions—awards conferred by program (CIP), award level, and race/ethnicity. The CIP—or Classification of Instructional Programs—specific to Geography is 45.07 and the award level chosen was an aggregate of the “Doctor’s degree” category, which includes research/scholarship, professional practice, and other. With respect to the racial/ethnic background of the students, there were several categories to choose from and we chose the American Indian or Alaska Native, the Black or African American, the Hispanic or Latinx, the white, and the Non-resident alien (international) categories, based on the objectives of this study. We also chose the grand total category, which is an aggregation of the student counts for all groups. The data based on the above parameters were then downloaded in comma separated value (csv) format and imported into the SPSS statistical software for basic descriptive analysis. The extraction revealed that over 60 public institutions awarded doctoral degrees in Geography.

There is no comparable and reliable database. We also examined news reports, newsletters, and other published correspondence from the American Association of Geographers (2010) to determine whether any department of geography had passed a policy to recruit and fund, on an annual basis, at least one graduate student from the three underrepresented groups.

Limitation of the study

There is one limitation of this study. The racial disparities in the sources of financial support of doctoral students were based on broad fields of study and not on geography departments specifically. The broad fields of study are life sciences, physical sciences and earth sciences, mathematics and computer sciences, psychology and social sciences, engineering, education, and the humanities and arts, per the National Science Foundation (2020). We could not determine precisely whether

the racial disparities in geography departments were significantly different from the broad fields of study, although geography is, of course, a subfield of the social sciences.

Past surveys reveal persistent failure to address underrepresentation

Efforts to determine the extent of underrepresentation of at least one of the three underrepresented groups have a long history. Using the results of the surveys conducted by Deskins and Spiel (1971), Saul Cohen, then Executive Secretary of the American Association of Geographers (AAG), developed a proposal to obtain funding from the National Science Foundation to establish the Commission on Geography and Afro-America (COMGA). The project was directed by Don Deskins, Jr., one of the eight African Americans with a PhD in geography in the United States in 1971. One key mission of COMGA was to increase the representation of African Americans in geography MA and PhD degree-granting departments (Deskins and Speil 1971; Deskins and Sibert 1975).

A few departments recruited African Americans/Black graduate students with the funds from the National Science Foundation (NSF). However, when the NSF funds ran out, recruiting activities ceased, since departments were not willing to use their own graduate assistantship funds to recruit African American students. Graduate assistantships were used disproportionately, instead, to admit and fund white graduate students and international graduate students. This resulted in a failure to address the serious underrepresentation of African American doctoral students in geography departments.

In 1970, the newly established Commission on Geography and Afro-America (COMGA) distributed its own survey to graduate departments at predominately white institutions. The objective was to assess any changes in the underrepresentation of Blacks as a result of the COMGA Program (Deskins and Speil 1971). The survey revealed very few changes. The authors recommended that participation of Blacks in graduate departments of geography would occur if departments (a) *provide more graduate fellowships for Blacks*; (b) advise Blacks of the opportunities in geography; and (c) establish a clearinghouse for information on the recruitment of Black students and faculty (Deskins and Speil 1971). The article by Deskins and Speil concluded by stating that support for greater Black representation in geography must be both “moral and financial” if COMGA is to reach its full potential as a model for change (Deskins and Speil 1971, p. 289).

However, no department implemented a policy recommendation to provide fellowships to Blacks on a yearly basis. As a result, an increase in Black representation did not occur. The next effort to address the issue came in 1998. In October of that year, a group of concerned geographers and other social scientists met in Lexington, Kentucky for a workshop on “Race and Geography.” The workshop was funded by the National Science Foundation (1998) and the Canadian Embassy. The goal was to assess the “state of the art” in geographic research on race and ethnicity and propose directions for future research activity. There were 22 concerned researchers from 22 different universities in the United States and Canada who met for two days to

discuss the problem. After extensive discussion, the group concluded that they could not propose a future research agenda without first addressing the problem of *a lack of racial/ethnic representation in the geography profession* (see Dwyer, 1997).

The group then agreed to the following declaration:

“We, the Research Group on Race and Geography believe that research on race in geography depends upon our taking bold steps to racially integrate our profession. We believe that we must take *direct action now* to make the discipline more diverse. We believe that it is possible to bring about diversification through the *direct action of departments* and specifically department chairs. They have the power and control over resources to move the discipline toward meaningful diversification. Accordingly, we are proposing a *Direct-Action Now Pledge* to enhance diversity: ‘*For the next seven years my department will commit to recruit and fund (e.g., through T.A., R.A. or fellowship) at least one graduate student from the country’s racialized minority populations, including Blacks (African Americans, Afro-Canadian, Afro-Caribbean and others), Latinos, Native Americans, Aboriginal Peoples, People of First Nations and Asians.*”

The Concerned Research Group called the pledge the “Just One Plan” in this “Letter written by Joe T. Darden, Professor in the Geography Department at Michigan State University to Chairs of Doctoral Programs. It is important to note that the request from the concerned group of geographers was to recruit and fund non-white graduate students. This is the same request that Don Deskins made back in 1971 (Deskins and Speil 1971; Deskins and Sibert 1975).

Responses to the “just one” pledge request

The letter with the pledge request was sent in November 2000 to 84 graduate departments of geography in the United States and Canada. A summary of the results is as follows: Only 7 geography departments signed the pledge. Nine departments responded, giving reasons why they were opposed to the pledge and 68 departments did not respond at all. Some of the reasons given for not signing the pledge were that “the chair does not have the power to implement the pledge.” Also “my university does not have the funds for recruitment. We must rely upon faculty members recruiting from the classes.” Those who signed the pledge did not implement a *continuous recruitment plan*. As a result, there was very little or no action to address underrepresentation by the overwhelmingly majority of geography departments.

The next request to survey the problem and make recommendation occurred in 2003, when Douglas Richardson was appointed Executive Director of the American Association of Geographers. As a result of Douglas Richardson’s strong concern about the lack of diversity in the discipline, he appointed a task force to investigate the problem and make recommendations to address it. The results of the Task Force report are summarized here (Darden et al. 2006).

A key recommendation made by the Diversity Task Force was that the decision related to increasing the representation of Blacks, Latinx, and Native American

graduate students rests with the department chair. To be successful, the chair must have *the moral commitment* and the leadership skills to lead the faculty in support of the most important recommendation below:

“Each PhD-granting department of geography should develop a recruitment program with the agenda of recruiting and funding at least one minority student annually (via a graduate assistantship, if possible, but a fellowship if necessary). The commitment of financial support should be at least six years from the awarding of the baccalaureate to completion of the doctorate” (Darden et al. 2006).

This was the same recommendation that was presented by the concerned group of geographers who met in Lexington, Kentucky in 1998, as well as by Don Deskins, the Director of the Commission on Geography and Afro-America (COMGA) in 1971.

Response to the ‘recruit and fund’ recommendation of the task force on diversity

From 2006, when the Task Force issued its recommendations to 2019, very few departments of geography had implemented the most important recommendation, i.e., recruit and fund a student or students from an underrepresented group on an annual basis.

Results

Extent of changes in differential treatment of doctoral students in U.S. geography departments nationwide

Using data from *the Integrated Postsecondary Education Data System (2020) for the years 1997–2019*, we provide our findings on the extent of changes between 1997 and 2019 in the differential treatment in the awarding of doctoral degrees to American citizens who are Black, Latinx, and/or Native American compared to white Americans and international students. To be clear, this study is not about the details of specific individual geography departments. Instead, the study is about the extent to which the total number of geography departments award doctoral degrees to American citizens who are Black, Latinx, and/or Native American. We have provided the most reliable and most comprehensive data to demonstrate the extent of underrepresentation and changes from 1997 to 2019 in geography departments that offer doctoral degrees.

Table 1 presents the number and percentage of doctoral degrees awarded to the minority groups incorporated into this study by year from 1997 to 2019. Of the 4918 total PhD awards, only 86 or **1.64%** were awarded to African American/Black students. Latinx students received **122** or **2.9%** of the doctorate degrees and Native

Table 1 Geography's minority PhD awards by count and percentage: 1997 to 2019

Year	Total awards ^a	African American		Hispanic American		Native American	
		Number	Percent	Number	Percent	Number	Percent
1997–2008 results							
1997	149	0	0.00	1	0.67	1	0.67
1998	151	1	0.66	4	2.65	2	1.32
1999	135	2	1.48	3	2.22	0	0.00
2000	186	2	1.08	2	1.08	0	0.00
2001	176	3	1.70	5	2.84	0	0.00
2002	183	2	1.09	2	1.09	0	0.00
2003	164	1	0.61	3	1.83	2	1.22
2004	191	2	1.05	2	1.05	2	1.05
2005	184	1	0.54	4	2.17	0	0.00
2006	202	2	0.99	6	2.97	3	1.49
2007	198	5	2.53	2	1.01	2	1.01
2008	237	6	2.53	1	0.42	0	0.00
Total/avg	2156	27	1.19	35	1.67	12	0.56
2009–2019 results							
2009	200	1	0.50	8	4.00	2	1.00
2010	225	4	1.78	13	5.78	2	0.89
2011	228	5	2.19	4	1.75	0	0.00
2012	253	7	2.77	10	3.95	0	0.00
2013	246	8	3.25	6	2.44	1	0.41
2014	282	5	1.77	12	4.26	1	0.35
2015	300	2	0.67	9	3.00	1	0.33
2016	248	7	2.82	7	2.82	2	0.81
2017	270	5	1.85	4	1.48	1	0.37
2018	241	6	2.49	4	1.66	2	0.83
2019	269	9	3.35	10	3.72	1	0.37
Total/avg	2762	59	2.13	87	3.17	13	0.49
Overall results							
Total/avg	4918 ^a	86	1.64	122	2.39	25	0.53

Source: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 1997–2019, Awards/degrees conferred by program (CIP). Retrieved from <https://nces.ed.gov/ipeds/use-the-data> on 6/30/2021

^aTotal Awards refer to all PhDs awarded from the specified Geography Departments during the years indicated. Numbers tallied for the white and international groups were 2979 (60.6%) and 1289 (26.2%), respectively. Remaining groups outside of the study count was 417 (8.5%)

American students earned **25** or **0.53%** of the degrees. On the other hand, the overwhelming majority of the degrees were awarded to white students and non-residents, i.e., international students. White students received 1784 or 36.2% of the doctoral degrees and international students received 726 or 14.7% of the degrees. Combined, these two groups of students received 50.9% of all of the doctorate degrees issued by

61 graduate departments of geography from 1997 to 2019 (Table 1). The years have been grouped into two periods with the first incorporating the years 1997 to 2008 and the second incorporating the years 2009 to 2019. While it is not a focus of our study, the second group can almost be conceived as the “Obama Era” awardees and a significant change in numbers and percentages can be seen when comparing the two periods. The most obvious change is in the number of awards with the exception of the Native Americans, whose numbers only increased by one award. For the Blacks and Hispanics, their numbers doubled in the second period. This is all tempered, however, by the fact that these three groups, combined, only account for 4.56% of the 4,918 Geography doctoral degrees awarded between 1997 and 2019, as seen in the overall results section in Table 1.

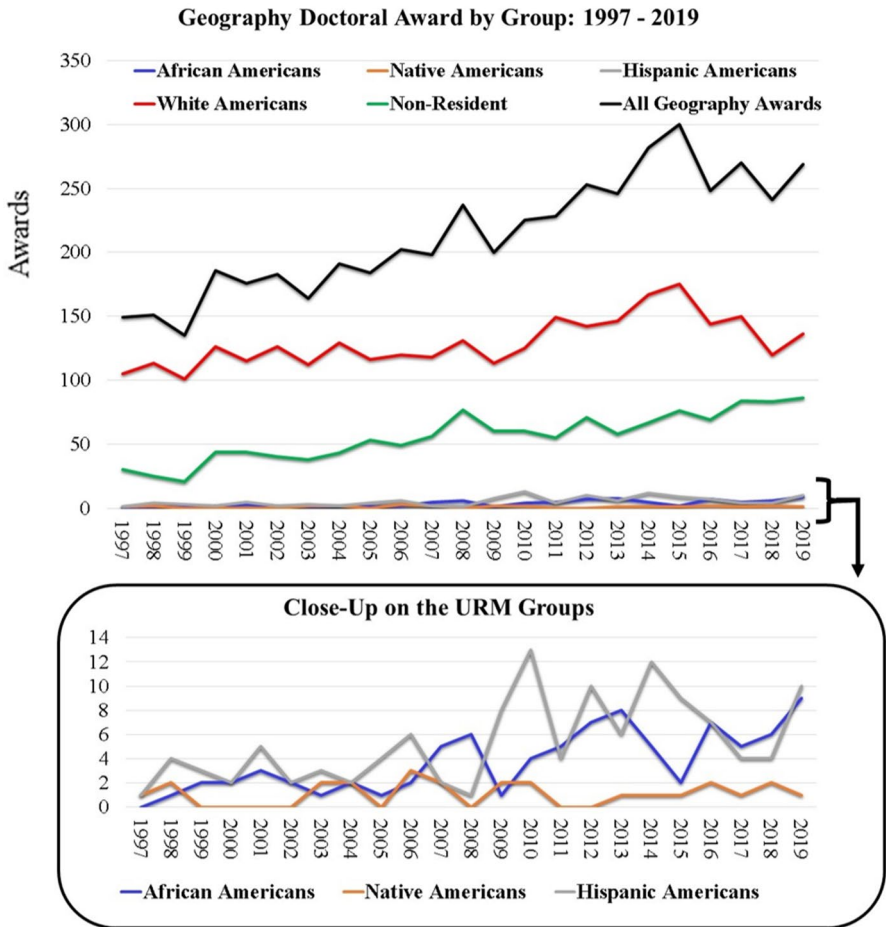


Fig. 1 Geography doctorates awarded by group between 1997 and 2019 for groups specific to this study. The bottom of the chart depicts a close-up of the underrepresented minorities of focus

Figure 1 shows the *PhDs Awarded by Group 1997–2019*. Notice the wide gap not only between white American and non-white American graduate students receiving doctoral degrees, but also the wide gap between non-white American citizens and international graduate students receiving doctoral degrees.

Summary of results

The IPEDS database, which is the most comprehensive and most reliable database, has enabled us to draw conclusions based on the evidence indicated by the data.

Thus, hypothesis 1, that there has been little change in the percent of Blacks, Latinx, and Native American citizens receiving doctoral degrees in geography over a 22-year period, 1997 to 2019, compared to white American citizens and international students is accepted.

Table 2 shows the geography departments that awarded 0 (zero) degrees to African American/Black, Hispanic [/Latinx], and Native American graduate students, 1997–2019. They consisted of 9 or 15% of the 61 departments. They

Table 2 Universities where geography departments awarded 0 doctoral degrees to non-white graduate students between 1997 and 2019

Institution	Year Est.	Total degrees awarded	White students	Non-White students	Int. students
Kansas State Univ.	1959	52	38	0	9
Northern Illinois Univ.	1968	8	7	0	1
Oklahoma State Univ.-Main Campus	1947	25	16	0	9
Southern Illinois Univ.-Carbondale	1936	12	7	0	5
Univ. of Nevada-Reno	1993	16	16	0	0
Univ. of Southern Mississippi	n.l. ^a	7	6	0	1
Univ. of Toledo	2009 ^b	8	4	0	3
Virginia Polytechnic	2006 ^b	26	17	0	8
West Virginia Univ.	n.l. ^a	46	28	0	18
Total		200 ^c	139	0	54
Percent of total			69.5%	0.0%	27.0%

The “Year Est.” column refers to the year the graduate programs for the respective universities was established. Dates were extracted from the AAG Guide to Geography Programs in the Americas: 2017–2018. In this table, the “Non-White Student” group is composed of the Black, Hispanic, and Native American students combined. Source: Computed by the Authors from data obtained from U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 1997–2019. Awards, Degrees Conferred by program (CIP). Retrieved from <https://nces.ed.gov/ipeds/use-the-data> on 5-24-21

^aNo date given is listed as “n.l.”

^bWhere specifically listed, the year the PHD program was established is noted

^cTotal for all groups receiving doctorates in Geography under this table categorization. The count for remaining groups not included in this study was 7 (3.5%)

Table 3 Universities where geography departments awarded 5–14 doctoral degrees to non-white American graduate students between 1997 and 2019

Institution	Year Est.	All degrees awarded	White students	Non-White students	Int. students
Univ. of California-Davis (1st)	1955	115	61	14	14
Univ. of Maryland-College Park (2nd)	1947	140	68	12	50
Univ. of North Carolina—Chapel Hill (3rd)	1936	115	80	11	19
Univ. of Arizona (4th)	1963	146	95	11	27
The Univ. of Texas at Austin (5th)	1950	86	58	9	12
Texas State Univ. (6th)	1983	138	85	9	29
Univ. of California-Santa Barbara (7th)	1974	242	133	9	52
Univ. of Washington-Seattle Campus (8th)	1935	133	82	8	26
Univ. of California-Los Angeles (9th)	1934	143	81	8	36
Univ. at Buffalo (10th)	1963	159	67	8	69
Rutgers Univ.-New Brunswick	1956	105	60	7	23
Louisiana State Univ	1933	177	103	6	52
Michigan State Univ	1952	94	44	6	36
Pennsylvania State Univ.-Main Campus	1946	153	102	6	34
Univ. of California-Berkeley	1908	113	80	6	12
Univ. of Florida	1947	95	47	6	33
Univ. of Oregon	1923	81	60	6	11
Oregon State Univ	1952	61	44	5	11
Texas A & M Univ.-College Station	1968	85	41	5	33
Univ. of Georgia	1951	139	86	5	42
Univ. of Kansas	1958	129	79	5	32
Univ. of Wisconsin-Madison	1928	122	89	5	19
Total		2771 ^a	1645	167	672
Percent of all doctorates awarded			59.4%	6.0%	24.3%

The number in parentheses represents the ranking of the universities with respect to non-White doctoral awardees between 1997 and 2019. Where two or more institutions awarded an equal number of doctorates to the non-minority group, the institute the higher percentage received the higher ranking. The “Year Est.” column refers to the year the graduate programs for the respective universities were established. Dates were extracted from the AAG Guide to Geography Programs in the Americas: 2017–2018

^aIndicates total Geography doctoral degrees awarded within this table’s categorization. The count for groups not included in this study is 287 (10.3%)

awarded 139 doctoral degrees to white students and 54 to international students. In these departments, 69.5% of the degrees went to the white students and 27.0% to the international students.

Table 3 shows geography departments that awarded 5 to 14 doctoral degrees to non-white American graduate students during the 22-year period. They consisted of 22 or 36% of the 61 departments. These departments awarded a total of 167 doctoral degrees to non-white American citizens. However, during the same time period, the departments awarded 672 doctoral degrees to international students, a ratio of 4 times more degrees than were awarded to non-white American citizens.

It is important to emphasize that the geography departments are part of public universities that rely on American taxpayers for their funding to operate. Some of those taxpayers are Black, Latinx, and/or Native Americans. Within the conceptual framework of critical race theory, the predominantly white public universities do not provide equitable treatment to all taxpayers. Although Black/Latinx and Native American families pay taxes to support public universities, they do not receive a fair share of the doctoral degrees awarded by graduate departments of geography.

The results of the data show, instead, that the underrepresentation was extensive. There was little difference between U.S. geography departments and the doctorate degrees in geography that were awarded to American citizens who were Black, Latinx, and/or Native American, when compared to white and/or international students.

Racial/ethnic inequality in funding

Historically, a lack of financial support from geography departments to assist underrepresented groups has been a major factor in explaining why so few graduate students who are Black, Latinx, and/or Native Americans earn doctorate degrees. That was the important factor historically. We wanted to know whether this lack of funding has continued to be an important factor more recently. We examine the issue of lack of funding in the next section. The history of graduate student enrollment in graduate departments of geography has been linked to graduate student funding in the form of graduate assistantships, fellowships, or other financial support.

Importance of funding to address underrepresentation

There is contemporary evidence to suggest that a major reason for the underrepresentation of Blacks, Latinx, and Native Americans is related to a lack of financial support from the institutions where the three groups of doctorate students are enrolled, according to the National Science Foundation, National Center for Science and Geography Statistics, *2019 Doctorate Recipients from U.S. Universities* survey, i.e., survey of earned doctorates (2020). There is a disparity between the financial support white doctoral students receive from the institutions where they are enrolled and the financial support received by Black, Latinx, and/or Native American doctoral students. In 2019, only 27.7% of all white U.S. citizens used their own resources for financial support compared to 51.5% of all Black U.S. citizens. Instead, 27.8% of all white U.S. citizen graduate students received teaching assistantships compared to only 10.6% of all Black doctoral students who were U.S. citizens. Moreover, 19.3% of all white U.S. citizens received research assistantships/traineeships compared to 10.4% of Black

doctoral students. In the case of types of financial support such as fellowships, scholarships, or dissertation support, white and Black doctoral students each received a fair or equal share of support. For example, **22.3%** of white doctoral students received this type of support compared to **22.7%** of Black doctoral students (National Science Foundation 2020). The disparity between Hispanic and white graduate students was as follows: only 22.2% of Hispanic students had teaching assistantships, a difference of 5.8% points. Only 11.4% of Hispanic students had research assistantships, a difference of 7.9% points. Hispanics had a higher percentage of fellowships, scholarships, and dissertation grants than whites. Their percentage was 32.5 compared to 22.3 for whites. However, 32% of Hispanic students used their own resources for graduate school compared to 27.7% for white students.

Finally, the data on Native Americans were limited due to issues of confidentiality because of the small number of students. Data existed only for fellowships, scholarships, or dissertation grants. In this type of funding, **40.7%** of Native Americans received such support compared to **22.3%** for whites. The percentage of Native American students who used their own resources was **29.6** compared to **27.7** for whites. In sum, among all graduate students, Black graduate students had the highest percentage (**51.5**) that used their own resources to pay for their graduate education. White students had the lowest percentage (**27.7**).

Conclusions

This study used critical race theory to help understand why so few changes have occurred in awarding of doctoral degrees to American citizens who are Black, Hispanic/Latinx, and/or Native American compared to white American citizens and international students over the 1997 to 2019 period. The data show that of 4918 doctoral degrees awarded from 1997 to 2019, only 86 or 1.64% were awarded to African American students, 122 or 2.39% were awarded to Hispanic American students, and 25 or 0.53% were awarded to Native American students. The differential awarding of degrees was related to the differential funding by race and ethnicity to support their completion of the doctorate degrees. The data support our hypotheses of differential treatment or racial inequity. There was little change in the extent of differential treatment, as indicated by the fact that most departments of geography awarded white students and international students doctoral degrees at a much higher rate compared to American citizens who were Black, Latinx, and/or Native American.

Importance of critical race theory in understanding the differential treatment and disparate impact

A higher percentage of students from the underrepresented groups above rely on their own funds to support their graduate education compared to the percentage of white students (National Science Foundation 2020). Critical race theory has led us to believe that lack of funding by geography departments is a major factor in the low number of doctoral degrees awarded to American citizens who are Black, Latinx,

and/or Native Americans. This means that the historical record of exclusion via lack of funding (Deskins and Speil 1971; Darden et al. 2006) is similar to the present record. More Black graduate students in particular (unlike white students) continue to use their own funds to pursue a doctorate degree in geography. Systemic racism still matters in graduate departments of geography.

Critical race theory is used to explain more than admission, i.e., the differential funding received by Black, Latinx/Hispanic, and Native American students compared to white students to assist the non-white students in earning a doctoral degree. As we indicated, the types of funding include graduate student teaching assistantships, research assistantship/traineeships, fellowships, and dissertation grants. These students, who are overwhelmingly white, receive greater social interaction and greater academic training from faculty in the departments. As a result, these white students are more likely to be successful in earning their degree and graduating without a large debt because of the reliance on their own resources. A smaller proportion of white students fall into the latter category. Critical race theory provides *consciousness* that non-white students can use to reveal what may be disparate impact racial discrimination.

Our use of critical race theory enabled us to provide comprehensive, reliable data that will be helpful and necessary to reveal disparate impact racial discrimination against African Americans, Latinx/Hispanics, and Native American graduate students applying for admission to geography departments. Disparate impact is often referred to as unintentional discrimination, whereas differential treatment is intentional. Disparate impact occurs when policies, practices, rules, or other systems that appear to be neutral result in a disproportionate impact on protected groups (U.S. Department of Justice 2021).

Departments of geography are located in public universities, which receive federal money. According to the Department of Justice (2021), policies that may appear neutral on their face (e.g., the support of graduate students financially) may be traceable to the nation's long history of invidious race discrimination in education. The disparate impact regulations are designed to ensure that public funds—to which all taxpayers of all races contribute—are not spent in any fashion which encourages, entrenches, subsidizes, or results in racial discrimination. Any policies that the departments of geography may consider “neutral” must not exclude racial and ethnic minorities from benefits or services, or inflict a disproportionate share of harm on them (U.S. Department of Justice 2021).

Our data document that geography departments have not been providing equitable financial support to racial and ethnic minority Americans so they may complete their doctoral degrees. Researchers have provided evidence of the disparate impact that these minority groups have been harmed by due to racial discrimination.

For example, Greenwald and Krieger (2006) introduced the idea of *implicit bias*—an aspect of the new science of unconscious mental processes that has substantial bearing on discrimination law. Theories of implicit bias argue that it is quite common for the overwhelmingly white faculty graduate committees that decide on students who will receive financial support during their student doctoral term to have “implicit negative stereotypes about African American, Hispanic and Native American Graduate students” (p. 946). According to Greenwald

and Krieger (2006), such stereotypes are especially relevant to bias and discrimination (p. 948). Stereotypes are plausible causes of such discriminatory biases. If, among equally qualified student applicants, the all white or predominantly white admission and financial awards committee favors white students over Black, Latinx/Hispanic, and Native American students, the underrepresented students could claim that disparate impact racial discrimination has been occurring. Our data lead to the strong possibility that the committees have been favoring white graduate students more than non-white students when it comes to admission and funding.

Based on Greenwald's and Krieger's (2006) research, this would be implicit discriminatory biases based on implicit attitudes or implicit stereotypes. Biases can be either favorable or unfavorable. In-group bias designates favoritism toward groups to which one belongs (p. 951).

Based on our data, most departments of geography are extremely underrepresented by faculty who are African American, Hispanic, and/or Native American. They are all white or predominantly white. According to the American Association of Geographers' disciplinary data dashboard, the proportion of faculty members who were Black, Hispanic, Native American, and white revealed that only 2.3% were Black, 2.5% were Hispanic, and only 0.4% were Native American in 2016, which is the most recent data we have available. However, 70.8% of the geography faculty were white (American Association of Geographers 2016).

Greenwald and Krieger (2006) note that when the decision making group designates favoritism toward student groups to which they belong (p. 951), this is a discriminatory disadvantage to the group that is not treated equally in the graduate admissions and financial support process (p. 951). For other examples of research on this type of discrimination see: Dasgupta (2004); Blasi (2002); Kang (2005); Jolls and Sunstein (2006); and Bagenstos (2006).

According to Greenwald and Krieger (2006), evidence that implicit attitudes produce discriminatory behavior is substantial (p. 961). We have presented data using critical race theory to provide evidence for racial and ethnic underrepresented student groups to use to bring a complaint against a department of geography for disparate impact discrimination.

According to the Department of Justice, courts have adopted a three-part test to determine whether a recipient's policy or practice violates the Title VI disparate impact regulations. First, does the adverse effect of the policy or practice disproportionately affect members of a group identified by race, color, or national origin? Some courts refer to this first inquiry as the "prima facie" showing. If so, can the recipient demonstrate the existence of a substantial legitimate justification for the policy or practice? A violation is still established if the record shows the justification offered by the recipient was pretextual (U.S. Department of Justice 2021).

Finally, is there an alternative that would achieve the same legitimate objective but with less of a discriminatory effect? If such an alternative is available to the recipient, even if the recipient establishes a justification, the policy or practice will still violate disparate impact regulations (U.S. Department of Justice 2021).

If not prohibited in the future, such pattern of underrepresentation based on unequal funding of doctoral students who are Black, Hispanic/Latinx, and Native

American will ensure a continuation of inequity in the percent of white students and Black, Hispanic/Latinx, and Native American students receiving a PhD degree in geography. Since a PhD is required for most faculty positions in institutions that offer doctoral degrees, white applicants, as has happened in the past, will continue to have the advantage in faculty appointments. Steps to achieve diversity, equity, and inclusion will be very difficult to reach without removing the disparate impact racial discrimination.

2021: time for measurable change via policy implementation

After 2020, a year of widespread protests over systemic racism and White Supremacy, U.S. geography departments (and other social science departments, as warranted) should finally take the opportunity to act and demonstrate that they are actually committed to changing the differential treatment and unequal outcomes in the awarding of doctoral degrees to American citizens who are Black, Latinx, and/or Native American, compared to the awarding of doctoral degrees to white Americans and international students. In the case of geography departments in the U.S., the following recommendations provide a possible roadmap for making such necessary change.

If policy changes are to be made to address the low number of non-white American citizens receiving doctoral degrees, studies of all graduate departments in all disciplines are necessary to examine trends in each of those departments over time. This paper examined the data and documented the extent of the underrepresentation. In the next section, we make recommendations for change.

Recommendations

Since it is more difficult to practice differential treatment when there is *transparency*, we propose the following recommendations:

1. The American Association of Geographers (AAG) should collect data on every graduate department of geography and publish it annually. The database should include the following information on students pursuing a doctoral degree: (a) the number of students who are American citizens and are white, Black, Latinx, and/or Native American, and international students; (b) the number of students from each group who have financial support in the form of a teaching assistantship, research assistantship, traineeship, fellowship, scholarship, or dissertation support, and the amount of support for each of the awards to each group of students; and (c) the number of students from each group that are pursuing the doctoral degree using their own resources.
2. The American Association of Geographers should collect and publish data on which departments have passed a continuous recruitment policy.

3. Departments should consider using the Michigan State University Model as a guide to address underrepresentation. This model has revealed measurable results (see below).

The Michigan State University Model

The exact policy that was passed by the faculty is cited below.

Motion to establish a recruitment program within the Department of Geography, Environment and Spatial Sciences at Michigan State University to admit and fund at least one underrepresented American Doctoral Graduate student each year until such underrepresentation is addressed. The financial support may be from any of the following funding sources: teaching assistantships, research assistantships or traineeships, fellowships, or grants. Underrepresented American Graduate students include African Americans/Blacks; Hispanic/Latinos and Native Americans or Alaska Natives (Department of Geography, Environment and Spatial Sciences, Minutes of Meeting on December 7, 2018.)

Background on the policy and its progress

The *MSU Model* has a clear focus on what really works to address underrepresentation in graduate doctoral geography departments. The Model was based on research obtained from the historical struggle over underrepresentation, which was detailed previously in this paper.

What the *MSU Model* understands is that addressing underrepresentation must involve financial support for underrepresented students. The *MSU Model* has a chair of the department who has *a moral commitment* to changing the underrepresentation by demonstrated *measurable action*.

Summary of progress made by the MSU model

To demonstrate that the policy works, in the three years before the policy was passed (2015–2017), there were 3 Blacks, 2 Latinx, and one Native American admitted and funded by the department. Three years after the policy was passed (2018–2020), 10 Blacks, 3 Latinx, and one Native American were admitted and funded. The results reflect a demonstrated *measurable commitment* to increase the representation of American citizens who are Black, Latinx, and/or Native American.

How did the department achieve such historic success?

The most important factors in the Department's success in recruiting the underrepresented graduate students were *progressive leadership* and *measurable commitment*. Measurable commitment is demonstrated by actually *funding* the underrepresented students once the department admits them (Darden 2018). The then Chairperson of

the Department accepted the evidence that the primary reason was the lack of funding via a graduate assistantship or fellowship support. The Chairperson viewed the condition of such severe underrepresentation as a *moral issue*. Already considered a progressive leader in support of civil rights issues, the Chairperson was willing to take his Department Chair role as an *agent of change*, as recommended by the *Diversity Task Force Report* of 2006 (see Darden et al. 2006). Thus, he led the department faculty in passing a *continuous recruitment policy*, which has resulted in increasing the number of American citizens in the department who are Black, Latinx, and/or Native American.

Application of this research study and model to other geography departments

This study and the MSU Model provide one approach—which is proving to be successful—to address the underrepresentation of non-white American citizens in Michigan State University’s Department of Geography, Environment and Spatial Sciences doctoral degree program. The authors believe this knowledge and approach can be successfully adapted and applied to other geography departments in the U.S. and that through such actions, racial inequity and differential treatment experienced by non-white American citizens in geography doctoral programs may be reduced, if not entirely eliminated.

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Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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