Making the invisible visible: advancing quantitative methods in higher education using critical race theory and intersectionality

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Making the invisible visible: advancing quantitative methods in higher education using critical race theory and intersectionality

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ABSTRACT

We appeal to critical race theory and intersectionality to examine achievement gaps at a large public university in the American southwest from 2000 to 2015. Using white, high-income women as our reference group, we report linear combinations of marginal effects for six-year graduation rates and developmental course taking across 20 distinct social locations varying according to race-ethnicity, gender, and class. We find substantial achievement gaps that remain unseen in conventional models treating such characteristics as independent. Nearly every group has a significantly lower likelihood of graduation compared to the reference group, and there is substantial variation in estimated achievement gaps. Low-income, American Indian men are approximately 45 percent less likely to graduate within six years relative to the reference group. For high income, black men this gap is approximately 30 percent. Our paper proposes a method and praxis for exploring the complex, interdependent relationship between race-ethnicity, gender, and class.

Introduction

The 'achievement gap' in higher education is often the .topic of conversation at many institutions of higher education. At a packed faculty governance meeting at Southwest Public University[1] (SPU), one of the co-authors made note of the comments made by a high-level white male administrator:

> Less than half of first-time, first-year undergraduates graduate within six years and this figure drops significantly when we examine graduate rates by race and ethnicity. Women graduate in higher percentages than men. Because we care about improving the achievement gap for racial and ethnic minorities, our funding formula will reward institutions of higher education that make improvements in the graduation rates of PELL-qualified students, as we also know that low-income students also have low graduation rates and racial and ethnic minorities tend to come from low-income backgrounds. We are also exploring the possibility of limiting our universal scholarship program for state residents to students coming from household incomes under $75,000.

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This comment begs several questions: Are all women, including those from racial and ethnic minority backgrounds, graduating at higher rates than all men? Do racial and ethnic minorities in low-income and high-income brackets experience the same level of graduation as their white counterparts? What patterns of inequality can be revealed when quantitative researchers embrace critical race theory and intersectionality to interrogate whether there are race–gender–class gaps in six-year graduation and developmental class placements?

The answers to these questions have many implications for addressing the 'achievement gap' and advancing equity in higher education (Musu-Gillette et al. 2017). We argue that part of the answer to these questions depends on 'making the invisible visible' or exploring those inequalities that may remain invisible when we engage critical race theory or 'the ways that race manifest itself to create oppressive educational experiences for students of color (and their families) in seemingly "race neutral" contexts relative to pedagogy, policy and curriculum' (Dixson and Lynn 2013, 3; Gillborn 2005, 2006a, 2006b, 2008). Another part of the answer rests on the insights of intersectionality or the need to interrogate '*configurations of inequality*,' in which race, gender, and class intersect in a variety of ways in a given sociohistorical and political context (McCall 2001, 6).

The purpose of this paper is twofold. We provide an empirical investigation of 'achievement gaps' in education that we hope contributes to the emerging field of 'QuanCrit,' or quantitative methodologies anchored in the insights of critical race theory (Solórzano and Ornelas 2002; Solórzano and Villalpando 1998; Solórzano and Yasso 2002). Second, we advance the use of intersectionality for quantitative methods (Crenshaw 1991; Fine 1991; Hancock 2013; LaVeist 1994; McCall 2001, 2005; Museus and Griffin 2011; Solórzano, Villalpando, and Oseguera 2005; Villalpando 2003, 2004; Zuberi 2001). Our overarching goal is to offer new ontologies and accompanying methodological analytical strategies and toolkits for revealing social inequalities for race–gender–class social locations that may remain invisible in conventional approaches to studying inequality in education as well as many other policy arenas.

For our analysis, we focus on higher education outcomes, specifically six-year graduation rates and developmental course placement for full-time undergraduate students in the top and bottom income quartiles. We find surprising race–gender–class gaps between both high- and low-income quartiles that would ordinarily remain unseen in conventional race-only, gender-only, and class-only reporting on graduation rates and developmental class placement. Nearly every group (not high-income, Hispanic and Asian women) has a significantly lower likelihood of graduation compared to high-income, white women (reference group). There is substantial variation in the magnitude of such disparities, however. We estimate especially large achievement gaps for students in American Indian and black social locations. For example, low-income, American Indian men are approximately 45 percent less likely to graduate within six years relative to the base group (high-income, white women). For high-income, black men, this gap is approximately 30 percent, which is surprisingly similar to the estimated achievement gap for low-income, white men. We argue that 'QuantCrit' coupled with intersectional knowledge projects can help us reframe the question from 'what's more important: race, gender, class?' to how can we examine unique constellations of race, gender, class social location as categories of experience in a given sociohistorical and political economic context?

The remainder of the paper is organized into four major sections. The first section provides a brief synopsis of our major theoretical guideposts, namely critical race theory and intersectionality, focusing on empirical studies that advance 'QuantCrit' and intersectional

inquiry and praxis in education. The second section describes the methodology, context, analytical approach, data, and limitations. The third section provides our results focusing on race–gender–class gaps in six-year cohort graduation and developmental class placement in English and mathematics for first-time, full-time, undergraduate students in the top and bottom income quartiles. We end with a fourth and final section that discusses the implications of our empirical, conceptual, ontological, theoretical, and methodological contributions for researchers, scholars, practitioners, policy-makers, as well as communities interested in advancing QuantCrit or critical race and intersectional social justice inquiry and praxis in higher education through the use of quantitative research methods.

Theoretical guideposts

Critical race theory (CRT)

Critical Race Theory (CRT) as a theoretical framework and organizing tool for social justice departs from the premise that racism in the form of white supremacy is a normal and ubiquitous part of our daily fabric (Allen 2006). Accordingly, racism is not limited to individual acts; it is systemic, structural, multilevel, and accomplished via liberal reforms that are particularly visible in the routine rule of law (Bonilla-Silva 2009; Crenshaw et al. 1995). For example, the birth of the #BlackLivesMatter movement is a social movement protesting the ways in which the ordinary application of laws reinforces structural racism in the criminal justice systems through the normal operations of the legal system.

Another anchoring principle of CRT is that all scholarship is political. Rather than denying this reality, CRT scholars embrace it and aim to achieve transparency about their positionality (Zuberi and Bonilla-Silva 2008). For instance, CRT scholars clearly describe their endeavors as scholarship that not only studies society but also aims to change existing structures of racial domination in order to advance social justice ends (Crenshaw 1991, xiii). According to Collins (1998, xiv), 'What makes critical social theory "critical" is its commitment to justice, for one's own group and/or for other groups.'

CRT also involves the use of counter-stories that challenge majoritarian narratives anchored in stereotypes and misrepresentations of racially stigmatized communities (DeLeon et al. 2017; Yasso 2005). CRT is anchored in rectifying the historical amnesia that plagues many discussions on social inequalities that fail to engage the tenets of critical race theory which include a critique of liberalism and color blindness, 'the absolute centrality of history and context in any attempt to theorize the relationship between race and legal discourse' (Crenshaw et al. 1995, xxiv), the structural, endemic nature of racism, and importance of the counter-narratives emanating from the knowledge of racially oppressed communities (Allen 2006; López and Parker 2003). For example, the opening vignette is an excellent example of the majoritarian neoliberal narratives that are echoed by many university administrators across the country. What makes this narrative majoritarian is that it is devoid of any reference to the historic and ongoing dynamics of setter colonialism, capitalism, and structural racism in the state via-a-vis curriculum, employment, and other policy arenas.

In contrast, CRT scholars articulate counter-narratives that reject explanations about individual-level student 'deficits':

> Our critiques of racial power reveal how certain conceptions of 'merit' function not as a neutral basis for distributing resources and opportunity, but rather as a repository of hidden, race-specific preference for those who have the power to determine the meaning and consequences of 'merit' (Crenshaw et al. 1995, xxix).

A counter-narrative anchored in power and color blind approaches to 'merit' was palpable at SPU. When university administrators tried to raise the ACT and GPA requirements for the universal tuition scholarship program available to all students that graduate from a high school in the state, multiple protests erupted. Student groups organized panels and community forums where they accused the university administration of promoting institutionalized racism and engaging in 'exclusion masquerading as excellence.'

At one of the forums attended by one of the co-authors, students, alumni, and community advocates leveraged their own version of 'QuantCrit' by providing statistical analysis and experiential knowledge to craft their own counter-narrative. They illustrated how the imposition of the new 'merit' criteria would disproportionately negatively impact the access of racial and ethnic minorities to higher education.[2] One of the student organizers, a visible minority woman, admonished administrators:

> I am a first-generation college student. I am also the daughter of immigrants. If these so-called 'merit' criteria were in place, I would not have been able to receive the scholarship, and I would not be graduating today. This talk about merit implies that those who do not meet the criteria are lazy, don't value education or are less intelligent. Regardless of intent, this proposal contributes to institutionalized racism and settler colonialism.

With over 200 people in audience, including single mothers, veterans, and others from marginal social locations that vociferously opposed the administration's plans, the university administrators withdrew their proposal to institute the new 'merit' criteria for scholarship recipients.

Lastly, another tenet of critical race theory is interest convergence, or the idea that liberal, reform-oriented policies are instituted only when they are of benefit to racial majority groups (Bell 1993).[3] In the case of SPU, the principle of interest convergence can be applied to the universal tuition scholarship program that was instituted over a decade ago. At first glance, the tuition scholarship program appears to be inclusive because it is theoretically accessible to any student graduating from a high school (public or private) in the state regardless of household income. Upon closer inspection, the program has many technical requirements that render it inaccessible to many, particularly for those students from marginalized social locations and communities. There are several conditions that must be met before a student can access the program. First, students must enroll for full-time student status *immediately* after graduating from high school in order to qualify for this program. University administrators may justify this rule by saying it incentivizes students who may not otherwise enroll college to do so; however, they may ignore how this criterion may negatively impact students with family responsibilities that prevent them from enrolling immediately after high school or on a full-time basis.

The second barrier that students faced is that they must apply for a transitional scholarship for the first semester. Any student earning less than a 2.5 GPA in any semester, including the first semester loses access to the universal scholarship *permanently*. That is, there is no way a student could regain the scholarship, even if they successfully raise their GPA in subsequent semesters. The rules for scholarship access are not anchored in the lives of students from marginalized social locations and communities. In fact, analysis of this program has found that the overwhelming majority of students who retain the scholarship through graduation are white students and students from the highest income brackets. Interest convergence is applicable here because this 'universal' program primarily benefits students from privileged backgrounds.

Intersectional knowledge projects

In an invitation to 'do' intersectionality, Collins and Bilge (2016) outline six core ideas that appear and reappear when people use intersectionality as analytic tools: inequality, relationality, power, social context, complexity, and social justice (25). Collins (2009) outlines the two major components of what she calls 'the matrix of domination.'

The first is intersecting systems of oppression, which include settler colonialism, race/structural racism, gender/patriarchy, class/capitalism, sexual orientation/heterosexism, age/ageism, ethnicity/ethnocentrism, and disability/ableism, as well as other systemic oppressions. The second feature of the matrix is a particular arrangement of hierarchical power relations. The organization of power is visible along multiple levels including the macro/structural domain of power, the meso/institutional practices or disciplinary domain of power, and the micro/individual or interpersonal domain of power. The last level Collins pays particular attention to is the hegemonic (ideological) domain of power, which she conceptualizes as the crosscutting 'glue' that connects all these levels of power through the use of ideas and ideology (In their book on intersectionality, Collins and Bilge (2016) appear to rename the hegemonic domain of power as the cultural domain of power) (see Figure 1).

One of the conceptual tools that Collins offers for unpacking the hegemonic domain of power is the concept of controlling images. An example of a disempowering controlling image includes the idea that some students, for instance, those that do not meet 'merit'-based criteria, are best served at vocational education or technical community colleges rather than in research-intensive public universities. See Crenshaw (1991) on structural, political and representational intersectionality. Despite these disempowering hegemonic controlling

VISUAL MATRIX OF DOMINATION (Collins 2009)
Part 1: Intersecting Systems of Oppression
-Colonization-Patriarchy-Sexism-Structural Racism-Nativism-Ableism-
Part 2: Arrangements of Power

Hegemonic/Cultural Domain of Power
- Permeates all levels of Power

Ideological Glue that cuts across all domains

Structural Domain of Power	• Organizations • Institutional Arrangements
Disciplinary Domain of Power	• Management • Rules of the Game
Interpersonal Domain of Power	• Lived Experience • Consciousness

Figure 1. Visualizing the matrix of domination.

images, it is important to highlight that there are always moments of counter-hegemony and resistance, as seen in the proliferation of student organizations and community groups at SPU organizing to advance social justice and equity in high education or what Yasso (2005) refers to as resistance capital.

Quantitative intersectionality and education

Our review of the literature on quantitative intersectionality and education did not uncover many studies that employed intersectional methodologies in higher education and K-12. The work by Covarrubias (2011), 'Quantitative Intersectionality: A Critical Race Analysis of Chicana/o Educational Pipeline in the U.S.,' is a great starting point as it provides a model for testing relationships via cross-tabulations that may help us understand the manner in which various intersections of race, class, citizenship, and gender (social locations) may be associated with different educational outcomes. Covarrubias (2011) unpacks the nuances of why students are pushed out of the college pipeline. Using a quantitative intersectional approach, Covarrubias (2011) found that noncitizen Chicanas (women) are twice as likely to earn a bachelor's degree relative to noncitizen Chicanos (men) when looking at low- and high-income quartiles in his sample.

Other empirical studies employing intersectional approaches in K-12 were rare (Hancock 2007); however, Irizarry (2015) uses multidimensional measures of race to capture the intersection of race, gender, and citizenship status as it is related to the ratings that teachers give their students. Irizarry (2015) finds that Asian students were more likely than non-Hispanic white students to be associated with positive remarks.[4] Using a quantitative intersectional approach, Irizarry (2015) found that not all Asian students are beneficiaries of positive perceptions. East and South Asian immigrant students were more likely to be associated with positive remarks when compared to non-Hispanic white students. However, the same was not true for U.S.-born East and South Asian students.

> Our review of the literature did not uncover any empirical studies that specifically interrogated differences in six-year graduation rates or developmental class placement between high and low-income women and men from different racial groups in higher education; however, there were some descriptive studies of the pipeline (Zambrana and MacDonald 2009). While there have been important conceptual studies paving the way for intersectional analysis (Griffin and Museus 2011), there is a dearth of intersectional quantitative studies on race-gender-class gaps in education that employ intersectional approaches (Bowleg 2008; Hancock 2013). Most have employed qualitative methods and/or focus on K-12 (López 2003; Morris 2007). Our search for research focusing on intersectionality in quantitative approaches did find other studies in the health literature (Bowen, Chingos, and McPherson 2009; Brown et al. 2016; Brown et al. 2016; Cacari Stone et al. 2017; Hoxby 1997; Van Hattum, Ghiorse, and Villamil 2017).

Toward 'QuantCrit': placing CRT and intersectional knowledge projects at the center of quantitative methods

> Although the 'master' may have meant for scientific words to be used one way, reclaiming scientific tools and recasting them for different purposes can benefit both science and subordinate groups. (Patricia Hill Collins as quoted in Zuberi 2001, 106)

CRT, intersectionality knowledge projects, and the emerging field of 'QuantCrit' invite us to reflect on a powerful question: Data for whom and for what?[5] Given the infamous origins

of statistics, which include eugenicist logics and methods, Zuberi and Bonilla-Silva (2008) answer this question by urging all researchers to employ racial statistics for racial justice and begin the long project of 'deracializing statistics:'

> Statistical models that present race as a cause are really statements of association between the racial classification and a predictor or explanatory variable across individuals in a population. To treat these models as causal or inferential is a form of racial reasoning … Before the data can be deracialized we must deracialize the social circumstances that created race. Statistical research can go beyond racial reasoning if we dare to apply the methods to the data appropriately. (132–33)

Zuberi (2008) further argues that part of the faulty logic underlying most statistical analysis can be remedied if race is placed within a social context and if researchers understood that the history of race relations is not benign, but rather representative of oppressive structural forces, including conquest, slavery, and coerced labor that inform current day structural oppression.

In coining the concept of 'indigenous statistics,' Walter and Anderson (2013) underscore the reality of the ontological power of statistics:

> Rather than representing neutral numerics, quantitative data play a powerful role in *constituting* reality through their underpinning methodologies by virtue of the social, cultural and racial terrain in which they are conceived, collected analyzed and interpreted … Indigenous statistics can be construed as challenging colonizer settler quantitative practice (76) … An indigenous quantitative methodology is a quantitative methodology that embodies an indigenous standpoint. (82)

A necessary first step in working toward decolonizing our statistical methods is to take an inventory of the ontological universes we operate in (Smith 2012).

Self-reflexivity and transparency about researchers' embodied social locations and positionalities

In an effort to advance transparency of our standpoint and ethical commitment to social justice, we position ourselves as scholars who pursue knowledge projects that have the potential to make the invisible visible through critical inquiry and deep ongoing self-reflexivity of our own positionality. When employing critical race theory and pursuing critical race theory and intersectional knowledge projects, we aim for engaging in self-reflexivity about our own social locations and how this shapes our cognitions, values, epistemologies, ontologies, and meaning-making when we engage in knowledge production. We acknowledge that our values, cognition, and standpoints are shaped by our social locations and lifelong cumulative experiences in systems of power, privilege, and disadvantage.

Dr Nancy López is currently an associate professor of sociology at the University of New Mexico and director and co-founder of the Institute for the Study of 'Race' and Social Justice (race.unm.edu). Dr Lopez's first language is Spanish. Dr López grew up in de facto-segregated public housing and she graduated from a de facto-segregated, vocational public high school for girls.

Christopher Erwin is currently a doctoral student in the economics program at the University of New Mexico. Mr Erwin self-identifies as white and comes from an upper middle-class suburb north of Seattle, Washington, which was pretty much all white and Asian. He went to a private high school with almost no students of color.

Dr Melissa Binder is an associate professor of economics and director of the Masters in Public Policy program at the University of New Mexico. Dr Binder self-identifies as a feminist white woman who grew up in suburban New York City.

Mario Javier Chavez is currently a PhD student at the University of New Mexico and a UNM Health Policy Doctoral Fellow. Mario was born in Ciudad Juarez, Chihuahua, Mexico and raised in Canutillo, Texas, a colonia in West El Paso County, Texas. He is the eldest of four children of immigrant Mexican parents, all of whom make a unique mixed-status family. Because of his lived experience rooted in his school district's tracking system, where student outcomes are strongly associated with their placement in various tracks (usually a spectrum from English as a Second Language (ESL) to 'gifted and talented,' or GT), one of Mario's research interests focuses on the effects of educational policies on the outcomes of Latinas/os/x along the U.S.–Mexico border.

Methods and sociohistorical context: a first step toward deracializing statistics and interrogating complex and intersecting race, gender, and class inequalities

> Studies should not rely on a decontextualized racial identity. It is, in fact, this decontextualization that has leads to racial reasoning (Zuberi 2001, 101) … I am suggesting that we place our statistical analysis of race within a historical and social context. It is not a question of how race causes disadvantage and discrimination. The real issue is the way society responds to an individual's race. (133)

SPU is located in New Mexico, a majority minority state (Chapman and Berggren 2005; McCall 2001; Nakano Glenn 2015). Although New Mexico had been a U.S. territory since 1848, it only became a state in 1912, when a critical mass of white settlers had populated the state (Gómez 2007). The underlying economic drivers in the state are agriculture, mining, oil and gas production, as well as tourism, and federal government spending. About half of the residents are Latina/o/x and about 10 percent is American Indian. Hispanic families have lived in this region for centuries, long before the state was admitted to the union. Unlike other states where the Hispanic community is mostly immigrant, the percentage of Hispanics who are U.S.-born is exceptionally high at nearly 80 percent. Seventy-four percent of children are racial and ethnic minorities. Over a third of households speak a language other than English at home, mostly Spanish but also indigenous and Asian.

It is important to note that SPU is a public university that embodies a glaring disconnect between the increasing diversity of the university's students and the lack of diversity among faculty. While over 60 percent of students are racial and ethnic minorities (nearly 40 percent Latina/o/x, followed by a substantial American Indian population) and over 60 percent are women, faculty demographics belie this trend. Just under three-quarters of the faculty is white and just under half are women.

Second, this state is a case study of settler colonialism and intersecting historic and ongoing racialized structural inequalities (Gómez 2007). The state ranks 49th in areas vital to child and youth well-being: economics, health, and family and community life (Harris 2015). It has the second highest poverty rate in the nation, with 21 percent of children living at or below the poverty line. Additionally, the contours of poverty are visibly racialized: 59 percent of Native American, 25 percent of Hispanic, 20 percent of black, and 10 percent of

white children grow up in concentrated poverty.[6] The state also has the second highest rate of working families who are low-income (42 percent).

Finally, these inequities are magnified in educational attainment. While only 4 percent of whites in the state have less than a high school education, for Hispanics this figure is 24 percent.[7] At the largest school district in the state, 80 percent of students come from New Mexico and 80 percent of students are racial and ethnic minorities. In 2015, the four-year high school graduation rate was only 62 percent, one of the lowest in the nation. Alarmingly, only 46 percent of Native Americans, 51 percent of African Americans, and 60 percent of Hispanics graduated compared to 69 percent of whites and 75 percent of Asians. While the six-year graduation at SPU is consistently under 50 percent, the four-year graduation rates is less than half of that rate.

As scholars that embrace QuantCrit, we center the lives of racially marginalized communities through what Chapman and Berggren (2005) call 'radical contextualization' of the historic and social-structural social conditions that produce structures of inequality, opportunity, and privilege for some and not others (Gulson 2011). In the case of SPU, we recognize the historicity of the sedimentation of racialized poverty for American Indian and Latina/o/x communities in the Southwest, including long-term and ingrained patterns of racialized employment and educational trends that have remained intact for generations as a function of colonization and ongoing racialization that are a byproduct of white supremacist logics (Gómez 2007; Telles and Ortiz 2008). Below, Figure 1 provides a visual representation our logic model for interrogating intersecting and overlapping historic and ongoing structural sedimentation of inequalities vis-à-vis settler colonialism, structural racism, classism, patriarchy/sexism, ableism, heterosexism, and other structural inequities for our analysis. Opportunity structures, not innate, genetic, or cultural differences, shape the contours of higher education outcomes and accompanying sedimented inequalities (Figure 2).
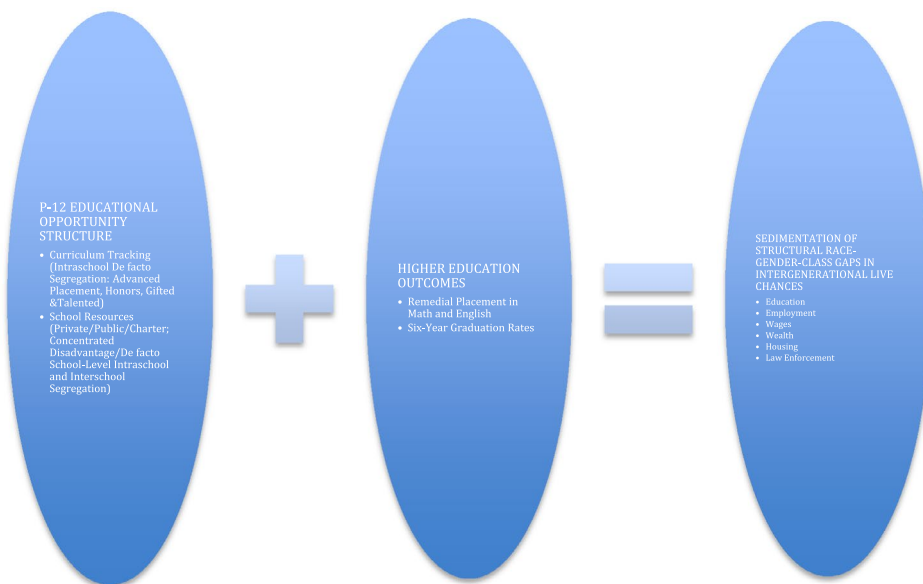
Figure 2. Logic model. Radical contextualization of educational opportunity structures and the sedimentation of structural race–gender–class gaps in intergenerational life chances in U.S. Southwest.

Data

To examine disparities in completion rates and developmental course-taking in college, we use an administrative data-set from SPU, a large Hispanic-serving research university in the southwestern United States. Data capture the population of first-time, full-time students matriculating in the fall from 2000 to 2015. These data do not include transfer students. In order to be included in this data-set, a student must have graduated from a high school in the state. We target the population of students that graduated in the state because those coming from out of state may have very different experiences and we would not have any high school data readily available. Data include socio-demographic information (race, ethnicity, gender, family income), high school information (high school type and location, grade point average (GPA), standardized test scores), and college information (indication of developmental coursework taken in college, date of college completion). Table 1 presents descriptive statistics for students included in models of college completion and developmental course-taking, respectively.

These are presented separately due to the time necessary to capture students' college completion within six years of their first enrollment (the 2008 cohort is the last which appears to have complete records on graduation within six years). Upon application, the university decides whether a student will require developmental mathematics, developmental English, or both; thus, we are able to use data through the Fall 2015 cohort for models focusing on developmental course-taking.

Students may fall into one of the five race and ethnicity categories: white, black, Hispanic,[8] American Indian, and Asian. A gender dummy variable was included that is equal to one if the student identified as male, and zero otherwise. All students were coded as either male or female in the data. We also include a binary dummy variable capturing the household income of the student. This variable is equal to one if the student's family income fell into the lowest quartile of the income distribution for students in the sample, and zero otherwise. Students with family income in middle quartiles were excluded in order to highlight differences between high- and low-income students. This avoids comparing students at the 49th percentile to those in the 51st percentile, for example, which may not be very revealing.[9]

Table 1. Descriptive statistics, graduation, and remediation models.

Variable	2000–2008	2000–2015
Graduated within 6 Years	.406	–
Developmental English	.294	.268
Developmental Mathematics	.326	.301
Any developmental	.431	.397
Female	.582	.577
White	.406	.371
Black	.030	.024
Hispanic	.444	.499
American Indian	.069	.058
Asian	.050	.047
Low-income	.539	.498
Observations	6427	13953

Note: Graduation models include cohorts from 2000 to 2008. Remediation models include cohorts from 2000 to 2015. Low-income is defined by being in the bottom quartile of the income distribution. High-income is defined as being in the top quartile of the income distribution. Students in the middle quartile range are not included in the analysis. The sample is limited to students that graduated high school in the same state as the university. Six-year graduation rates for students in the developmental models are not reported as they have not had sufficient time to graduate.

Limitations: race and ethnicity data and missing income data

The collection of race data was problematic for several reasons. Up until 2010, it was not possible to identify anyone as being mixed race (e.g. one could not be both American Indian and black). This means it is not possible to ascertain if those who are graduating tend to be mixed race or single race. This may be particularly important because previous research has uncovered very different social inequalities in educational attainment and employment patterns for Latinas/os/x and Native Americans who identify as single race versus those who identify as multi-race (Huyser, Sakamoto, and Takei 2010; López 2003; Qian 2005; Saenz and Morales 2015; Telles 2014; Vidal-Ortiz 2004). A major limitation of the data is that since the difference between Hispanic origin and race is flattened it is not possible to detect if there are different outcomes among Hispanics along the color line (Hogan 2017). For example, a plethora of studies suggest that a color line among Latinos is operating whereby those who identify as white Latinos/as/x have better outcomes than those who identify as 'some other race/brown' or 'black/AfroLatina/ox' (Bonilla-Silva 2004; Hogan 2017; Rodriguez, Argeros, and Miyawaki 2011; See López et al. 2017, measure of 'street race' or how other Americans perceive your race based on what you look like). Another limitation is that we did not have the ability to discern differences among Latinx individuals by specific national origin and nativity. And finally, African-American and Asian data cells are small, which is reflective of the school and state demographics. We believe it is our ethical responsibility not to contribute to statistical analysis projects that regardless of intent erase or trivialize the lives of marginalized individuals and communities.

Perhaps the most important limitation for our analysis is that household income is not readily available for all students. Importantly, 58 percent of students in the graduation model are missing income as reported on the Free Application for Federal Student Aid (FAFSA) or the federal financial aid form; they are not included in the analysis. The high incidence of non-random missing family income observations suggests we must be particularly cautious of non-response bias.[10] We suspect that those with missing income data as measured by the FAFSA may include an overrepresentation of those with high incomes and those who may not be documented. While we acknowledge that the missing data for those not reporting income limits the interpretation of our analysis, we realize that we may never have a full data-set that includes the household income and wealth of every single student at a public university until there is a federal mandate to collect this data. We also did not have systematic data collection on parental educational attainment, which could have served as another indication of social class. Notwithstanding these very important data limitations, we believe that the high proportion (42%) of student filling the FASFA maybe be among the highest number of students of any major public university in the country. This information is valuable for interrogating race–gender–gaps in higher education.

Descriptive statistics

Table 1 reveals that over the period 2000–2008, 41 percent of students completed within six years. Developmental course-taking is common over both the sample periods: approximately 40 percent of students were required to take at least one developmental mathematics or English course over these cohort years. Students at the university most commonly identify themselves as Hispanic. The second most frequent race category reported is white

non-Hispanic, while American Indian, Asian, and black students each make up less than 10 percent of the student body. Just fewer than 60 percent of students identified themselves as female in both sample periods.

Empirical model
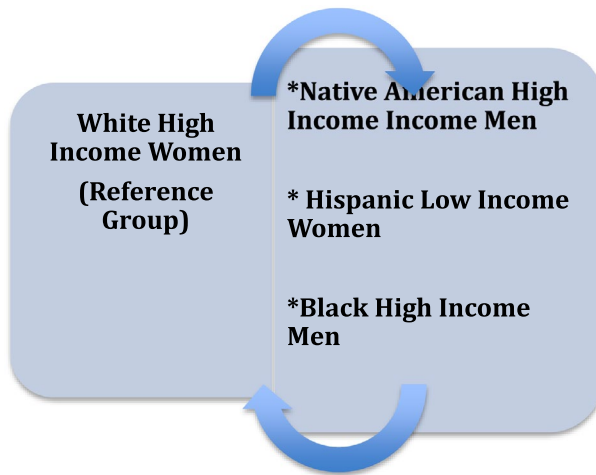
Dynamic centering

> Using dynamic centering for multiple social groups with diverse configurations of race, ethnicity; sexuality, class, age, gender, ability and citizenship status should expand sociology knowledge even further. Continuing this ongoing process of dynamic centering should, over time, yield a more complex and robust understanding of … multiple sites of inequality whether, health, education, or law enforcement. (Collins 2007, 594)

If we think of Collins's description of dynamic centering as anchored in relationality, we visualize that being in the category of white high-income women (e.g. the reference group for each of our analyses) is a fundamentally different category of experience from being a white low-income woman. Below, Figures 3 and 4 illustrate the concept of dynamic centering for exploring intragroup differences among whites and between whites and racial and ethnic minoritized groups in our data-set.

It is important to clarify that we use white high-income women as our reference group because we are talking about educational attainment, and white high-income women have the highest educational attainment of any of the other social locations we investigate. If we were doing a wage equity study, we would instead use white highly educated men, as they would be the reference group that has the highest wages and salaries when compared to other groups at the same level of education.

White High Income Women (Reference Group)

*White high Income Men

*White Low Income Women

*White Low Income Men
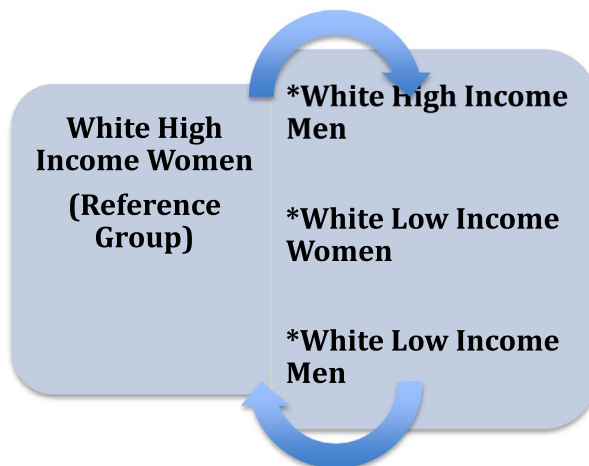
Figure 3. Dynamic centering of other white students graduating from a high school in the state as compared to white high-income women as the reference group; this is an example of what McCall (2005) refers to as intracategorical intersectionality.

Figure 4. Dynamic centering of men and women of color graduating from a high school in the state as compared to white high-income women as the reference group. This is any example of what McCall (2005) refers to as intercategorical intersectionality.

Hypotheses

We propose the following hypotheses:

1. We expect there will be race–class gaps in graduation rates whereby black, American Indian, and Hispanic women and men in the same class status will have lower graduation rates than their white and Asian counterparts in the same class status as measured by family income.
2. We expect that there will be a race–gender gap in graduation rates whereby men and women in the same racial and ethnic group will have different graduation rates. Specifically, women in each group will have higher graduation rates than men at the low- and high-income quartiles.
3. We expect that black, American Indian, and Hispanic women will have lower graduation rates and higher levels of placement in developmental classes than white and Asian women.
4. We expect that black, American Indian, Hispanic men will have lower graduation rates and higher levels of placement in developmental classes than white and Asian men.

Regression model

In order to examine the simultaneity of gender, race, and class as social locations and proxies for categories of experience in terms of college outcomes, we estimate saturated logistic models for three outcomes: the six-year completion rate, developmental English course-taking, and developmental mathematics course-taking. Models are saturated in that they include a full set of gender, race, and class dummy variables, as well as all possible interactions. Subjects in the sample report two genders, five mutually exclusive race categories, and fall into one of the two income quartiles. Thus, we have $2 \times 5 \times 2 = 20$ social locations or unique 'groups' that we conceptualize as distinct categories of experience in our models

(Landry 2007). In typical fashion, we report marginal effects. However, our main focus is on how distinct social locations varied by students' gender, race, and class intersect with one another to produce unique categories of experience. This ontology allows us to engage in interrogating what McCall (2005) refers to as 'intracategorical intersectionality,' or within group differences, as well as 'intercategorical intersectionality,' or between group differences. For this reason, we also report linear combinations of marginal effects, providing estimates for each of the 20 unique groups in the sample. Each of these methods of reporting has its advantages. Reporting 'raw' marginal effects allows us to look at main effects, such as the association between identifying as black on completion likelihood, holding all other factors constant. This association should not be interpreted as meaning that 'innate' or 'cultural' differences among blacks is causing this relationship, but that instead those individuals racialized and identifying as black may be subjected to different treatment, opportunities, and exposure to structural, institutional, and interpersonal racism than others individuals in this context (See Zuberi 2001, 2008 on deracialization of statistics; Jones 2001). However, these raw results require difficult mental accounting in order to examine the estimated completion likelihood of low-income, male, American Indian students relative to high-income, white women (the reference group), for example. Again, we choose high-income, white women as the reference group because our data reveal they have the highest graduation rates. Because of this, when we report estimated achievement gaps for six-year graduation rates, all other groups are expected to have negative coefficients, making it easier for the reader to compare achievement gaps across groups. We present results in both formats as we feel they are each important in addressing our hypotheses, although the latter represent our main contribution to the area of QuantCrit.

Our preferred specification is a mixed effects logistic model accounting for the natural clustering of students within high schools.[11] In such random intercept models, the fixed part includes the full set of gender, race, and class dummy variables in addition to cohort effects; the random part consists of common high school-level random effects. Maximization uses QR decomposition with 30 integration points for increased precision. Using the latent response form, the models may be expressed as:

$$y_{ij}^* = \alpha_0 + X\beta + Z\gamma + W\delta + \zeta_j + \varepsilon_{ij} \tag{1}$$

$$\zeta_j \sim N(0, \psi) \tag{2}$$

where i denotes the student, j denotes the high school, and y denotes one of the three outcomes described above. Idiosyncratic errors, ε_{ij}, are assumed to have a standard logistic distribution with variance ϕ. The model assumes that ζ_j are independent across high schools and independent of main and interaction effects for student i. X is a vector of main effects, Z is a vector of interaction effects, and W is a vector of cohort effects. Cohort effects are included to capture differences in incoming students over time. Binary outcomes, y_{ij}^*, are determined by latent continuous responses via a threshold model

$$y_{ij} = \begin{cases} 1 & \text{if } y_{ij}^* > 0 \\ 0 & \text{otherwise} \end{cases} . \tag{3}$$

We perform likelihood ratio tests to examine whether the mixed model is a better fit compared to simple logistic models ignoring the natural clustering of data. Again, we limit the

sample to students that attended high school within the same state as the university because we believe it is important to focus on students that were exposed to schooling in the state, and we suspect that out of state students are demographically different than those who graduated from high schools in the state. As a robustness check, we examine the sensitivity of results to the inclusion of students that attended private high school. We hypothesize that the inclusion of private school students in the sample results in smaller effects of social location on college outcomes.

We are particularly interested in the natural clustering of students within high schools. The intraclass correlation coefficient, defined as

$$\rho = \frac{\psi}{\psi + \phi}, \tag{4}$$

is informative in how much the grouping of students within high schools explains college outcomes. In other words, the intraclass correlation coefficient expresses how much of the error variance is explained by the grouping structure of the data. The intraclass correlation coefficient can also be interpreted as the expected correlation for two randomly chosen students from the same high school. A high coefficient indicates that high schools are an important determinant of college graduation and developmental course-taking.

Results

Table 2 presents marginal effects for the hierarchical model of six-year graduation rates. Here, we are individually reporting the coefficients on all main and interaction effects in the model.

Table 2. Multilevel logistic estimates of probability of six-year graduation by race, ethnicity, gender, and class, 2000–2008.

Variable	Marginal effect		Standard error
Black	−.226	***	.069
Hispanic	−.033		.026
American Indian	−.093	*	.055
Asian	.0009		.071
Low-income	−.142	***	.026
Male	−.137	***	.025
Black × Low-income	.183	**	.091
Hispanic × Low-income	−.051		.036
American Indian × Low-income	−.161	**	.074
Asian × Low-income	.004		.085
Male × Low-income	−.009		.040
Black × Male	.058		.144
Hispanic × Male	−.002		.039
American Indian × Male	−.140		.091
Asian × Male	−.075		.099
Black × Low-income × Male	.050		.175
Hispanic × Low-income × Male	.133	**	.056
American Indian × Low-income × Male	.230	*	.123
Asian × Low-income × Male	.141		.124
Likelihood ratio statistic			48.39
Residual intraclass correlation			.026
Observations			6427

Note: Marginal effects from a saturated logistic model are reported. The baseline group is high-income, white women. *, **, and *** Denote statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are reported. Cohort fixed effects are included in the model. Low-income is defined as being in the bottom income quartile in the sample. Students from middle income quartiles are not included in the analysis.

Results suggest significant disadvantage for black and American Indian students, being nearly 23 and 9 percent less likely to graduate within six years compared to white students, all else equal. As mentioned, men fare worse in terms of degree completion relative to women at SPU, being nearly 14 percent less likely to graduate within six years, everything else held constant. A similar achievement gap appears when we compare low- and high-income students. Being Hispanic or Asian does not necessarily translate into a lower graduation rate compared to white students; however, when we take linear combinations of the appropriate coefficients to arrive at estimates for the 20 groups in our data-set, a more complex picture emerges.

Table 3 presents an alternative way of viewing our graduation rate results. By taking linear combinations of select individually reported coefficients in Table 2, we arrive at overall estimates for each of the 20 groups in our analysis.

Recall the comparison group is high-income white women. Our results reveal surprising patterns. Nearly every group (not high-income Hispanic and Asian women) has a significantly lower likelihood of graduation compared to high-income white women. There is substantial variation in the magnitude of such disparities, however. We estimate especially large achievement gaps for students in American Indian and black social locations. For example, American Indian low-income men are approximately 45 percent less likely to graduate within six years relative to the base group (white high-income women). For black high-income men this gap is approximately 30 percent (although cell sizes are unreasonably small), which is surprisingly similar to the estimated achievement gap for low-income white men. This stark finding can provide pause for discussion on the ways in which even black high-income men graduate at rates similar to low-income white men or the idea that being racialized as black and male produces a unique set of experiences and exposure to

Table 3. Multilevel logistic estimates of probability of six-year graduation by race, ethnicity, gender, and class, 2000–2008.

Variable	Marginal effect		Standard error	Cell size
White, high-income women (base)	–	–	–	869
White, low-income women	−.142	***	.026	594
White, high-income men	−.137	***	.025	705
White, low-income men	−.288	***	.031	440
Black, high-income women	−.226	***	.069	57
Black, low-income women	−.185	***	.059	76
Black, high-income men	−.305	**	.126	18
Black, low-income men	−.223	***	.077	45
Hispanic, high-income women	−.033		.026	599
Hispanic, low-income women	−.225	***	.024	1094
Hispanic, high-income men	−.172	***	.029	462
Hispanic, low-income men	−.240	***	.027	699
American Indian, high-income women	−.093	*	.055	85
American Indian, low-income women	−.396	***	.050	186
American Indian, high-income men	−.371	***	.072	66
American Indian, low-income men	−.453	***	.066	108
Asian, high-income women	.0009		.071	50
Asian, low-income women	−.137	***	.046	128
Asian, high-income men	−.211	***	.069	54
Asian, low-income men	−.217	***	.055	92
Likelihood ratio statistic				48.23
Residual intraclass correlation				.025
Observations				6427

Note: Probabilities for groups based on linear combinations of marginal effects from a saturated logistic model. The baseline group is high-income, white women. *, **, and *** Denote statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are reported. Cohort fixed effects are included in the model. Low-income is defined as being in the bottom income quartile in the sample. Students from middle income quartiles are not included in the analysis.

structural racism that may negatively impact schooling opportunities even at the highest income brackets.

High-income Hispanic women are no less likely to graduate in six years relative to the comparison group (white high income women). For all other Hispanic social locations, we estimate achievements gaps on the order of 17–24 percent. High-income Asian women are also not any less likely to graduate compared to high-income white women, while other Asian social locations do not fare as well. All other Asian students are estimated to be between 14 and 22 percent less likely relative to the comparison group (high-income white women). Why high-income Asian women but not their male counterparts do not have any major differences in graduation outcomes from their white female counterparts may be related to the idea that women are seen as less threatening than men but nevertheless subjected to racialized and gendered macro and microaggressions related to their sexuality (Pyke and Johnson 2003). We also don't have any detailed national origin data on Asians. For example, to what degree are the experiences of a high-income child of light-skinned Tawainese or Japanese family living in a privileged neighborhood equivalent to those of brown-skinned Vietnamese or South East Asian refugees living in some of the most structurally disadvantaged neighborhoods of the state? It is also important to point out the presence of a color line among Asians whereby many South East Asians may be visible as 'brown' and subjected to the same racist racial projects that brown-skinned Latinas/os/x navigate on a daily basis in their neighborhoods. All of this points to the need to collect detailed data on the national origin of diverse Asian communities so that we can serve the most vulnerable (Ocampo 2016).

Tables 4 and 5 present estimates from models using developmental English course placement as the dependent variable. All race main effects are statistically significant and positive, suggesting that white students are less likely to be placed in developmental English relative to other social locations.

Table 4. Multilevel logistic estimates of probability of developmental English by race, ethnicity, gender, and class, 2000–2015.

Variable	Marginal effect		Standard error
Black	.188	***	.047
Hispanic	.142	***	.019
American Indian	.152	***	.041
Asian	.129	***	.049
Low-income	.085	***	.022
Male	.032		.021
Black × Low-income	.017		.061
Hispanic × Low-income	.065	**	.026
American Indian × Low-income	.163	***	.049
Asian × Low-income	.129	**	.057
Male × Low-income	.015		.031
Black × Male	.020		.081
Hispanic × Male	.004		.027
American Indian × Male	.074		.056
Asian × Male	−.075		.072
Black × Low-income × Male	−.062		.102
Hispanic × Low-income × Male	−.031		.038
American Indian × Low-income × Male	−.179	**	.070
Asian × Low-income × Male	.039		.085
Likelihood ratio test statistic			372.37
Residual intraclass correlation			.075
Observations			13,953

Note: Marginal effects from a saturated logistic model are reported. The baseline group is high-income, white women. ** and *** Denote statistical significance at the 5 and 1 percent levels, respectively. Robust standard errors are reported. Cohort fixed effects are included in the model. Low-income is defined as being in the bottom income quartile in the sample. Students from middle income quartiles are not included in the analysis.

Table 5. Multilevel logistic estimates of probability of developmental English by race, ethnicity, gender, and class, 2000–2015.

Variable	Marginal effect		Standard error	Cell size
White, high-income women (base)	–	–	–	1843
White, low-income women	.085	***	.022	1043
White, high-income men	.032		.021	1578
White, low-income men	.133	***	.023	718
Black, high-income women	.188	***	.047	97
Black, low-income women	.291	***	.040	118
Black, high-income men	.240	***	.066	45
Black, low-income men	.295	***	.048	75
Hispanic, high-income women	.142	***	.019	1665
Hispanic, low-income women	.292	***	.018	2455
Hispanic, high-income men	.178	***	.020	1260
Hispanic, low-income men	.312	***	.019	1588
American Indian, high-income women	.152	***	.041	153
American Indian, low-income women	.400	***	.029	331
American Indian, high-income men	.258	***	.040	126
American Indian, low-income men	.342	***	.033	203
Asian, high-income women	.129	***	.049	118
Asian, low-income women	.343	***	.031	233
Asian, high-income men	.086		.053	117
Asian, low-income men	.354	***	.033	187
Likelihood ratio test statistic				372.37
Residual intraclass correlation				.075
Observations				13,953

Note: Probabilities for groups based on linear combinations of marginal effects from a saturated logistic model. The baseline group is high-income, white women. *** Denotes statistical significance at the 1 percent level. Robust standard errors are reported. Cohort fixed effects are included in the model. Low-income is defined as being in the bottom income quartile in the sample. Students from middle income quartiles are not included in the analysis.

The largest disparity is between black and white students, where black students are found to be nearly 19 percent more likely to be placed in a developmental English course relative to white students, all else being equal. Students in the lowest income quartile are over 8 percent more likely to be placed in such a course relative to students in the top income quartile, everything else held constant. Results also suggest additional disadvantage accruing to Asian, Hispanic, and American Indian students from low-income households.

Turning to estimates for the 20 social locations in the data, we find that every social location, with the exception of high-income white and Asian men, has a higher probability of developmental English placement at SPU than high-income white women (reference group). Achievement gaps range from 8.5 percent (low-income white women) to 40 percent (low-income American Indian women). Other social locations that have large estimated achievement gaps are low-income Asian men and women (34–35 percent), low-income American Indian men (34 percent), and low-income Hispanic men (31 percent). Several other social locations experience achievement gaps between 20 and 30 percent.

Tables 6 and 7 present estimates from models using developmental mathematics course placement as the dependent variable. Results are markedly different than before, as we estimate that men are 10 percent less likely to be placed in a developmental mathematics course compared to women, everything else held constant.

Asian men are also *ceteris paribus* estimated to be less likely to be placed in developmental mathematics, although the estimate is imprecise. Low-income students are nearly 16 percent more likely to be placed than their high-income counterparts. Social locations for black, Hispanic, and American Indian students are between 13 and 23 percent more likely

Table 6. Multilevel logistic estimates of probability of developmental mathematics by race, ethnicity, gender, and class, 2000–2015.

Variable	Marginal effect		Standard error
Black	.231	***	.049
Hispanic	.176	***	.019
American Indian	.134	***	.042
Asian	−.027		.059
Low-income	.157	***	.020
Male	−.103	***	.022
Black × Low-income	−.025		.065
Hispanic × Low-income	−.028		.025
American Indian × Low-income	.053		.052
Asian × Low-income	.014		.069
Male × Low-income	−.062	*	.034
Black × Male	−.005		.092
Hispanic × Male	−.011		.029
American Indian × Male	−.013		.067
Asian × Male	−.029		.097
Black × Low-income × Male	.127		.116
Hispanic × Low-income × Male	.027		.042
American Indian × Low-income × Male	.006		.083
Asian × Low-income × Male	.025		.114
Likelihood ratio test statistic			407.11
Residual intraclass correlation			.081
Observations			13,953

Note: Marginal effects from a saturated logistic model are reported. The baseline group is high-income, white women. * and *** Denote statistical significance at the 10 and 1 percent levels, respectively. Robust standard errors are reported. Cohort fixed effects are included in the model. Low-income is defined as being in the bottom income quartile in the sample. Students from middle income quartiles are not included in the analysis.

Table 7. Multilevel logistic estimates of probability of developmental mathematics by race, ethnicity, gender, and class, 2000–2015.

Variable	Marginal effect		Standard error	Cell size
White, high-income women (base)	–	–	–	1843
White, low-income women	.157	***	.020	1043
White, high-income men	−.103	***	.022	1578
White, low-income men	−.008		.026	718
Black, high-income women	.231	***	.049	97
Black, low-income women	.363	***	.044	118
Black, high-income men	.123		.078	45
Black, low-income men	.320	***	.054	75
Hispanic, high-income women	.176	***	.019	1665
Hispanic, low-income women	.305	***	.018	2455
Hispanic, high-income men	.061	***	.021	1260
Hispanic, low-income men	.155	***	.019	1588
American Indian, high-income women	.134	***	.042	153
American Indian, low-income women	.345	***	.031	331
American Indian, high-income men	.018		.053	126
American Indian, low-income men	.172	***	.037	203
Asian, high-income women	−.027		.059	118
Asian, low-income women	.145	***	.036	233
Asian, high-income men	−.159	**	.077	117
Asian, low-income men	−.025		.046	187
Likelihood ratio test statistic			372.37	
Residual intraclass correlation			.075	
Observations			13,953	

Note: Probabilities for groups based on linear combinations of marginal effects from a saturated logistic model. The baseline group is high-income, white women. ** and *** Denote statistical significance at the 5 and 1 percent levels, respectively. Robust standard errors are reported. Cohort fixed effects are included in the model. Low-income is defined as being in the bottom income quartile in the sample. Students from middle income quartiles are not included in the analysis.

to be placed in a developmental mathematics course relative to white students at the same income quartiles. Looking at estimates for each of the 20 social locations, we again see a complex picture of achievement gaps in mathematical preparedness for college.

Black students experience the largest achievement gap in mathematics, with low-income black women being 36 percent more likely to be placed in a developmental course relative to high-income white women. Upon closer inspection, it is clear that low-income women of color are much more likely to be placed in such a course when compared to high-income white women. Notably, while low-income Asian women are found to be 14.5 percent more likely to be placed in a developmental course compared to the comparison group (high-income white women), high-income Asian men are nearly 16 percent *less* likely to be placed in such a course.

Although results from likelihood ratio tests for all three models suggest that hierarchical linear modeling is superior to that of a simple logistic fixed effects model, we find that results are largely similar. Estimated intraclass correlation coefficients are all very small (under 10 percent), suggesting that the natural clustering of students within high schools explains very little variation in graduation rates and developmental coursework placement at SPU. It is important to note that we do not examine curriculum track for this paper, but in a future paper we hope to examine whether these race–gender–class gaps are reduced if we compare those who took advance placement math and English classes. In other words, there is substantial variation in academic preparedness and college prep classes and completion at each of the in-state feeder high schools sending students to SPU. If we had instead found intraclass correlation coefficients that were very high, this would indicate that some schools are only sending students that succeed at SPU, while others are overwhelmingly sending students that fail to complete or start their postsecondary careers at SPU with the additional burden of developmental coursework.

Sample selection bias

Because the majority of our sample is missing family income data due to not filling out the FAFSA form, we are concerned that our model suffers from significant selection bias. Students filling out the FAFSA likely have financial need, and so are likely very different from students that have no use in filling out the form. Table 8 presents descriptive statistics broken out by students that did fill out a FAFSA and those that did not. Not surprisingly,

Table 8. Student characteristics by missing family income, graduation model, 2000–2008.

Variable	Present	Missing	Diff.
Graduation within 6 Years	.406	.435	−.028***
Developmental English	.294	.229	.065***
Developmental Mathematics	.326	.269	.057***
Any developmental	.431	.362	.069***
Female	.582	.533	.049***
White	.406	.578	−.172***
Black	.030	.018	.013***
Hispanic	.444	.344	.100***
American Indian	.069	.023	.047***
Asian	.050	.038	.012***
Observations	6427	8930	

*** Represents statistical significance at the 1 level.

Table 9. Incidence of missing income by race, ethnicity, and gender, graduation model, 2000–2008.

Group	Proportion missing	Cell size
White women	.648	4154
White men	.683	3614
Black women	.409	225
Black men	.508	128
Hispanic women	.502	3400
Hispanic men	.541	2527
American Indian women	.279	376
American Indian men	.356	270
Asian women	.475	339
Asian men	.549	324
Overall	.582	15,357

we find that FAFSA-filers are less likely to graduate, take more developmental coursework in college, are more likely female, and less likely to be white. These differences are highly statistically significant. Table 9 illustrates FAFSA-filing behavior by race.

These figures reveal that the groups most likely to file a FAFSA are (from most to least) American Indian students, black students, Hispanic students, Asian students, and white students.

Clearly, selection into FAFSA-filing is biasing our estimates. The important question is in which direction. Because students that do not file a FAFSA are likely the least financially constrained when it comes to attending college, and thus more likely to complete college conditional upon enrolling, it can be argued that our analysis is missing many of the most successful students at SPU. In this light, we would then expect estimated achievement gaps to be even larger if these students were included in the sample. For this reason, we feel our estimates are conservative, as missing non-FAFSA-filers likely only bias our results downwards.

Despite the shortcoming of the data-set employed in this analysis, we feel our main contribution is in providing a quantitative strategy to unmask the complicated nature of race–gender–class gaps in higher education (Bowleg 2008; Davis 2008; Davis, Brunn-Bevel, and Olive 2015; Mitchell 2014). Moreover, most research employing statistics does not define what they mean by 'control' for race (Zuberi 2001). We believe our conceptual model for the sedimentation of intersecting inequalities (Figure 1) as well as our specific statistical techniques offer promising strategies for conceptualizing race as a relational social status embedded in a given sociohistorical context, therefore taking a modest step toward what Zuberi (2001) calls deracializing statistics or moving away from erroneous genetic or cultural essentialist logics that conceptualize differences in intelligence and academic performance as innate and unchanging (Herrnstein and Murray 2010; Lerner 2015; Zuberi 2001).

Another major contribution is we also go beyond just critiquing mainstream research on race to showcasing alternative logics and methods that can be a necessary first step in advancing a casual model. The development of a casual model should starts from the deracialization premise that Zuberi (2001) outlined in his work:

> The real issue is the way the society responds to an individual's racial identification. The question has more to do with society itself, not the innate makeup of individuals. Racial identity is about a shared social status, not shared individual characteristics. Race is not about an individual's skin color. Race is about an individuals' relationship to other people within a society … a result of the merging of self-imposed choice within an externally imposed context. When we forget or make slight of this point, social science becomes the justification for racial stratification. (7)

There are many dangers in engaging in analyzing race–gender–class gaps in higher education. Specifically, we heed Collins and Bilge's (2016) caution that not all intersectional analyses are anchored in social justice goals. Just as we aim to engage in intersectional knowledge projects for liberation for oppressed groups, others may use the same data and findings we uncovered to justify exclusion and create structures of domination and oppression to limit access to education for marginalized groups. In other words, just because a method employs intersectional social locations in their analysis does not automatically translate into emancipatory goals for the liberation of oppressed group. Despite the many dangers of engaging in research that may be used for injustice, we believe that exposing these inequalities can advance equity in higher education.

Conclusions: critical race theory (CRT) and intersectionality ontologies matter

We began our paper with a snapshot of some of the discussions taking place across colleges and universities in the U.S. as well as across the globe about advancing equity in higher education. A decade from now we envision a different conversation taking place across colleges and universities:

> A panel of diverse administrators begin their comments to the faculty body by embracing social justice goals: 'Inclusive excellence or the critical insight that we cannot achieve excellence without inclusion is our brand. This commitment is visible in terms of faculty, staff, and administrative hires and appointments. It is also visible in our graduate and undergraduate admissions policies and practices, our curriculum offerings and required coursework for all students, as well as in our student centered critical pedagogy and community scholarship, teaching and partnerships. Our task is to advance equity and create inclusive practices that break the cycle of the sedimentation of educational opportunities for communities that have experienced inequities for generations.'
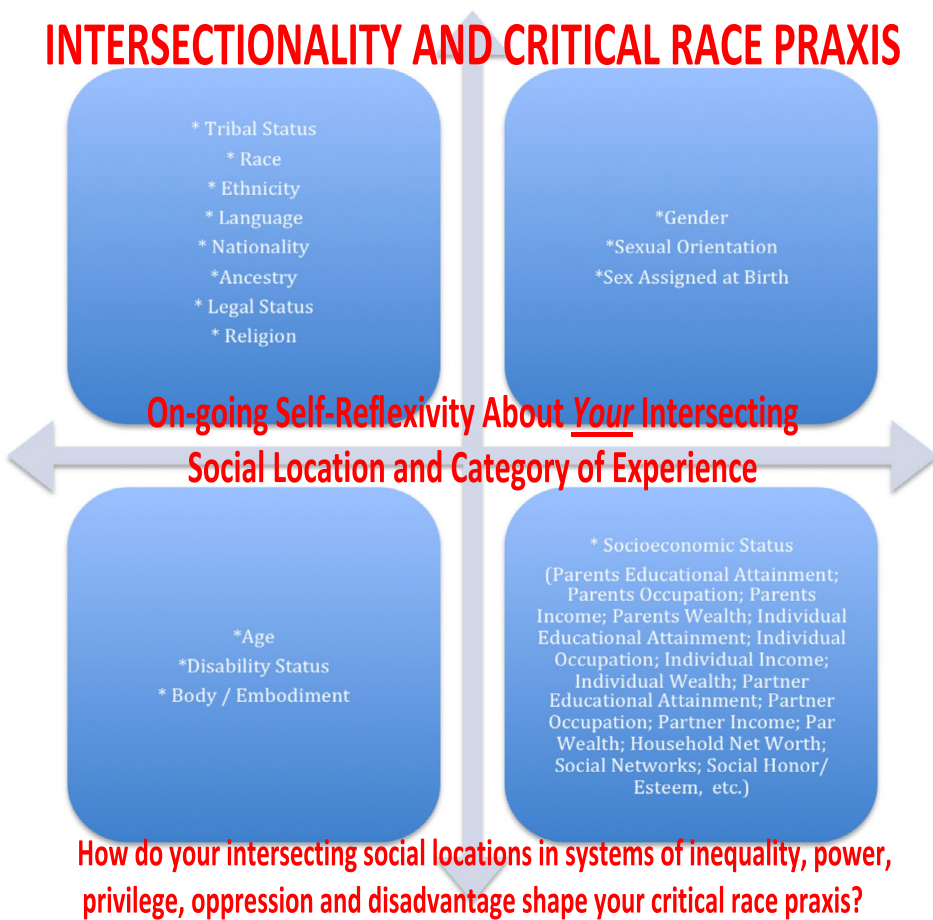
Imagine the possibilities for social justice policy and praxis if administrators, faculty, staff, and policy-makers embraced critical race theory and intersectionality praxis that advanced educational equity from PreK to college graduation and beyond. To facilitate this reimagining, we provide two Figures that could help us engage in ongoing and lifelong self-reflection about our own positionalities and social locations in what Collins (2009) has described as the Matrix of Domination (Figure 5).

We invite you to always be conscious of your location in systems of racialized, gendered, and class power, privilege, and disadvantage and to consider how to strategically engage in advancing a more perfect union for all.

On the heels of a Supreme Court ruling (Fisher v. University of Texas), which affirmed the value of race-sensitive practices in higher education (and potentially gender-sensitive practices in fields where women are traditionally underrepresented), and the 2017 federal judge overturning the ban on Mexican American Studies courses in Tuscon Unified School District, Arizona high schools, the potential for critical race theory and intersectional equity-based policy has never been more important. The sedimentation of intergenerational intersecting structural configurations of inequality vis-à-vis race–gender–class in education, employment, wages, wealth, health, and criminal justice for entire categories of people in our state took a long time. Consequently, social justice liberatory movements will also require continued strategic dedicated and sustained social justice efforts over a long period

CONCEPTUALIZING & VISUALIZING INTERSECTIONALITY AND CRITICAL RACE PRAXIS

* Tribal Status
* Race
* Ethnicity
* Language
* Nationality
*Ancestry
* Legal Status
* Religion

*Gender
*Sexual Orientation
*Sex Assigned at Birth

On-going Self-Reflexivity About _Your_ Intersecting Social Location and Category of Experience

*Age
*Disability Status
* Body / Embodiment

* Socioeconomic Status

(Parents Educational Attainment; Parents Occupation; Parents Income; Parents Wealth; Individual Educational Attainment; Individual Occupation; Individual Income; Individual Wealth; Partner Educational Attainment; Partner Occupation; Partner Income; Par Wealth; Household Net Worth; Social Networks; Social Honor/ Esteem, etc.)

How do your intersecting social locations in systems of inequality, power, privilege, oppression and disadvantage shape your critical race praxis?

Figure 5. An invitation and a tool for critical race intersectional self reflexivity.

of time; however, as long as historic and ongoing intersecting race–gender–class gaps are not interrogated, they remain invisible and inactionable. We invite scholars, researchers, practitioners, and community advocates to commit to advancing critical race theory and intersectional ontologies for rigorous ethical data collection and analysis that embrace praxis anchored in social justice liberatory transformations (López 2016).

> Gender-only and class-only perspectives each fall short when they fail to explicitly incorporate a racial analysis (McCall 2001, 178) … the necessity of a joint gender, race, and class perspective lies in it being the best, most accurate, perspective on the contemporary problem of inequality. (192)

Are you collecting rigorous, reliable, and value-added race, gender, class, LGBTQ, disability and other data that are informed by critical race theory and intersectional knowledge projects for social justice? If not, consider how you can use your own networks to cultivate a community of practice around Critical Race Theory and more specifically 'QuantCrit' and intersectional knowledge projects that are anchored in community-based participatory

methods and praxis (listening, action, and reflection) for social justice transformations (Binder and Ganderton 2004; López 2016).

Notes

1. Southwest Public University (SPU) is a pseudonym for a large minority serving public university in the U.S. Southwest.
2. In this case, counter-narratives serve as challenge to the hegemonic assumption that we live in a meritocracy. Omi and Winant's (2015, 130) definition of merit is useful here: 'Merit' is a political construct, by which employers, schools, state agencies, etc. legitimate the allocation of benefits to favored (i.e. organized) constituencies, and deny the validity of competing claim.'
3. Bracey (2015, 555) offers a critical race theory of the state that is anchored in key principles: 'racialization of the state; state as white institutional space; instrumentalism; interest convergence; fluid boundaries; and permanent racist orientation – that characterize the CRT of State for the United States.'
4. We recognize that panethnic/racial labels such as Hispanic, Asian, and other categories may simultaneously provide a heuristic category for understanding intercategorical intersectionality but it may mask the within group heterogeneity that is important for understanding the distinct racialization each constitutive group may undergo; however, we employ terms like 'Hispanic,' 'Asian,' etc. because this is how Southwest University provided us the data. We recognize that the terms Latina/o/x may be more reflective of the current nomenclature that aims to represent the ways in which relevant communities in the U.S. refer to themselves; however, we employ the term Hispanic, but use this because this is the label that was employed for the data that we received from the institution.
5. I am grateful to my colleague, Dr Veronica Velez for posing this question to me at the 2015 Critical Race Studies in Education Conference in Vanderbilt University.
6. See 2015 New Mexico Kids Count Report, Accessed July 31, 2016. http://www.nmvoices.org/wp-content/uploads/2015/09/LHHS-Presentation-9-21-15.pdf
7. See 2013 Charting Our Course Report. Accessed July 31, 2016. missiongraduate.org
8. Our ability to better serve the heterogeneous Latina/o/x community depends on having better data for assessing whether a color line is operating within Latino communities (Hogan 2017; LaVeist 1994; López 2013; Saenz and Morales 2015).
9. Another limitation is that we also excluded the second and third income quartiles, which may also reveal different patterns than those we report. In a future paper, we will examine the same outcomes for students in the second and third income quartiles; however, we expect to find similar patterns as found by limiting our analysis to the bottom and top income quartiles.
10. In a future paper, we will explore race–gender gaps for those with missing data as separate analysis.
11. We realize that a more conceptually rigorous accounting of school resources would go beyond whether they were private, public, or charter schools. For example, two students who theoretically attended the same high school may have in practice little in common in terms of access to college-level preparatory tracks in so far as they may have never had access to the same curriculum in practice.

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