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QuantCrit: education, policy, 'Big Data' and principles for a critical race theory of statistics

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ABSTRACT
Quantitative research enjoys heightened esteem among policy-makers, media and the general public. Whereas qualitative research is frequently dismissed as subjective and impressionistic, statistics are often assumed to be objective and factual. We argue that these distinctions are wholly false; quantitative data is no less socially constructed than any other form of research material. The first part of the paper presents a conceptual critique of the field with empirical examples that expose and challenge hidden assumptions that frequently encode racist perspectives beneath the façade of supposed quantitative objectivity. The second part of the paper draws on the tenets of Critical Race Theory (CRT) to set out some principles to guide the future use and analysis of quantitative data. These *'QuantCrit'* ideas concern (1) the centrality of racism as a complex and deeply-rooted aspect of society that is not readily amenable to quantification; (2) numbers are not neutral and should be interrogated for their role in promoting deficit analyses that serve White racial interests; (3) categories are neither 'natural' nor given and so the units and forms of analysis must be critically evaluated; (4) voice and insight are vital: data cannot 'speak for itself' and critical analyses should be informed by the experiential knowledge of marginalized groups; (5) statistical analyses have no inherent value but can play a role in struggles for social justice.

INTRODUCTION

> **1988**
>
> St. George's Hospital Medical School has been found guilty by the Commission for Racial Equality of practising racial and sexual discrimination in its admissions policy … a computer program used in the initial screening of applicants for places at the school unfairly discriminated against women and people with non-European sounding names… By 1988 all initial selection was being done by computer ... Women and those from racial minorities had a reduced chance of being interviewed independent of academic considerations. (Lowry & Macpherson 1988)
>
> **2016**
>
> …judges, police forces and parole officers across the US are now using a computer program to decide whether a criminal defendant is likely to reoffend or not. The basic idea is that an algorithm is likely to be more 'objective' and consistent than the more subjective judgment of human officials ... But guess what? The algorithm is not colour blind. Black defendants who did not reoffend over a two-year period were nearly twice as likely to be misclassified as higher risk compared with their white counterparts; white defendants who reoffended within the next two years had been mistakenly labelled low risk almost twice as often as black reoffenders. (Naughton 2016).

These quotations describe how calculations made by computers, assumed by definition to be objective and free from human bias, not only reflected existing racist stereotypes but then acted upon those stereotypes to create yet further racial injustice. The incidents are separated by an ocean and almost 30 years; the first refers to an English medical school, the second to a program used across the US. But the news coverage generated by the events is strikingly similar. In both cases there was a sense of amazement that computer calculations could make such gross and racially patterned errors. In the US example the reporters who found the problem note that 'even when controlling for prior crimes, future recidivism, age, and gender, black defendants were 77 percent more likely to be assigned higher risk scores than white defendants' (Larson, Mattu, Kirchner & Angwin 2016). A UK news story on the findings was entitled '*Even* algorithms are biased against black men' (Naughton 2016 emphasis added). The surprise that accompanies such findings reflects the central problem that we address in this paper; we argue that, far from being surprised that quantitative calculations can re-produce human bias and racist stereotypes, such patterns are entirely predictable and should lead us to treat quantitative analyses with at least as much caution as when considering qualitative research and its findings. Computer programs, the 'models' that they run, and the calculations that they perform, are all the product of human labour. Simply because the mechanics of an analysis are performed by a machine does not mean that any biases are automatically stripped from the calculations. On the contrary, not only can computer-generated quantitative analyses embody human biases, such as racism, they also represent the *added* danger that their assumed objectivity can give the biases enhanced respectability and persuasiveness. Contrary to popular belief, and the assertions of many quantitative researchers, numbers are neither objective nor color-blind.

Our Position and the Aims of this Paper

We write from a perspective that foregrounds the need to think critically about how race inequity is routinely embedded in the everyday mundane realities that shape society, from the economy, to education, and the academy. The social locations of the authors of this paper differ in some respects and overlap in others. One of us is biracial (in the current dominant language of UK census categories, Black Caribbean/White British); two are White British. All of us are British-born male academics from working-class family backgrounds. As scholars, we have converged around our use of Critical Race Theory (CRT) as a framework for approaching issues of education and social justice. Our commitment to confronting the persistence of racism within the socio-educational formation derives from our own personal experiences of educational inequalities as students in state education and our concerns as educators/activists - particularly our frustration with the 'colour-blindness' that is the default in British education policy (Gillborn 2008; Warmington 2014). This paper is grounded in CRT's understanding that 'race and races are products of social thought and relations' and that racism is non-aberrational (Delgado & Stefancic 2001, 7). In precise terms our position is one of 'race ambivalence' (Leonardo 2011, 675). That is, we understand that while race may be 'unreal' as a scientific category, its 'modes of existence' are real and have innumerable material and social consequences (Leonardo 2005, 409). It is indefensible, therefore, merely to regard race as a technology of other supposedly more 'real' relationships, such as social class.

In this paper we apply a critical race perspective to the guiding questions that shaped this special issue of the journal '*Race Ethnicity and Education'*. In particular, we respond to the editors' provocation to consider how quantitative methods - long critiqued for their inability to capture the nuance of everyday experience - might support and further a critical race agenda in educational research? Our answer is that different methods are appropriate for different aspects of social research and critique. Quantitative methods cannot match qualitative approaches in terms of their suitability for understanding the nuances of the numerous social processes that shape and legitimate race inequity. However, quantitative methods are well placed to chart the wider structures, within which individuals live their everyday experiences, and to highlight the structural barriers and inequalities that differently racialized groups must navigate.

Alongside the possible use of quantitative methods to aid a critical race analysis, we are especially aware that statistics are frequently mobilized to obfuscate, camouflage and even to further legitimate racist inequities. This paper attempts to show how such misuses occur and set out a range of CRT principles that can provide a lens through which to read and critique ostensibly 'neutral', 'objective' numbers and reporting that, in fact, conceal racist assumptions. We present our arguments in two main sections, combining a conceptual critique of the field with empirical examples that expose and challenge the hidden assumptions that frequently pattern quantitative analyses of race inequity.

First, we look at how numbers are used to disguise racism in education and protect the racist status quo, that is, a position of White supremacy where the assumptions, interests, fears and fantasies of White people are placed at the heart of everyday politics and policy-making. We critique the special status that is wrongly accorded to quantitative data and debunk the truth claims associated with statistical research. In particular, we show how numbers have been deployed in recent education policy that claims to address issues of accountability and equity. Many of the most dangerous aspects of quantitative hyperbole coalesce in the emerging field of '*Big Data'*, where advocates argue that 'numbers speak for themselves' (Anderson 2008) and human reasoning (and experience) simply get in the way.

The second part of the paper argues that, with appropriate safeguards and reflexivity, quantitative material has the potential to contribute to a radical project for greater equity in education. We build upon previous relevant research and go further by explicitly drawing on classic work in CRT to set out key principles that might usefully guide the use of quantitative material as part of the wider struggle for racial justice in education.

MAGIC NUMBERS?
CHALLENGING THE SPECIAL STATUS ACCORDED TO QUANTITATIVE DATA

Numbers and Truth Claims

Policy-makers, the media and many academics treat quantitative material as if it is fundamentally different and *superior* to qualitative data. Numbers are assumed to report '*the facts'*; they are seen as authoritative, neutral, dispassionate and objective. Indeed, governments do not use numbers merely to *describe* the world, they increasingly use statistics as an essential part of the technology by which they seek to re/shape educational systems. In this way, numbers play a key role in how inequality is shaped, legitimized and protected. This has been called 'policy as numbers' (Rose 1999; Ozga & Lingard 2007; Rizvi & Lingard 2010):

> neo-liberalism has enhanced the significance of numbers and statistics as technologies of governance, as central to what Power (1997) calls the rise of the 'audit society' and what Neave (1998) has called 'the evaluative state'. (Lingard 2011, 359) [[1]]

Numbers are increasingly used to justify policy priorities and to label teachers, schools, districts, and even entire countries, as educational successes and failures. National testing programs, such as the No Child Left Behind (NCLB) reforms in the US and the use of school performance tables in England, have popularized the idea that numbers can be used to expose (and change) failing schools (Barber 2012; Darling-Hammond, 2007; Gillborn & Youdell 2000). For example, across the globe politicians and pressure-groups frequently try to make their case by quoting results from PISA (Program of International Student Assessment) – which is run by the Organisation for Economic Co-operation and Development (OECD). Prominent examples exist in the States, the UK and Australia (see Lingard, Creagh & Vass 2012). Countries' positions in the PISA tables are often cited as if they unambiguously and accurately represent the relative quality of schooling in different nations (despite their very different populations and education systems). And yet the commentaries rarely include any detail about the relatively small samples (less than 200 schools in all but one of the US returns since 2000)(NCES nd); the selective curricular coverage of the tests (in reading, math and science); nor the fact that students in different countries sometimes take different assessments or miss certain assessments altogether (Stewart 2013). Despite these severe limitations, the UK government frequently cites PISA results as evidence of the need for change (cf. DfE 2015, 8) and has stated that it will 'measure the increased performance of the school system as a whole by reference to international tables of student attainment, such as PISA' (quoted in Scott 2016). Compare the confident use of PISA (below), by the then-Secretary of State for Education Michael Gove, and the more circumspect view offered by an academic critic:

> Since the 1990s our performance in these league tables has been at best, stagnant, at worst declining. In the latest results we are 21st amongst 65 participants in the world for science, 23rd for reading and 26th for mathematics. For all the well-intentioned efforts of past

> governments we are still falling further behind the best-performing school systems in the world. (Gove 2013)

> 'There are very few things you can summarise with a number and yet Pisa claims to be able to capture a country's entire education system in just three of them. It can't be possible.' Dr Hugh Morrison, Queen's University Belfast (quoted in Stewart 2013).

Numbers and Accountability

On both sides of the Atlantic, policy-makers have argued that statistics will allow greater 'accountability' in education. But the thinking behind such claims is flawed in numerous ways. As Linda Darling-Hammond (2007) has noted, for example, under NCLB the numerous wider structural inequities that shape educational outcomes are ignored by focusing attention at the school level:

> …the wealthiest US public schools spend at least 10 times more than the poorest schools … Although the Act orders schools to ensure that 100% of students test at levels identified as 'proficient' … the small per-pupil dollar allocation the law makes to schools serving low-income students is well under 10% of schools' total spending, far too little to correct these conditions (247-8)

Additionally, the use of quantitative measures as a form of accountability assumes that the measures are *valid*, that is, that the recorded data bear some relevance to the issue/s that lie behind the targets. But there is often scope for cheating and some high-profile cases have emerged. In England, for example, documented cases include teachers altering students' work and a school that removed low-attaining students from its official roll in advance of high-stakes testing, thereby artificially raising the proportion of students deemed 'successful' (Harding 2015). In the US, David Hursh notes that gaming the system can produce considerable rewards:

> Rodney Paige, as superintendent of the Houston Independent School District (and later chosen to be President [GW] Bush's first Secretary of Education) … [ordered] principals to not list a student as dropping out but as having left for another school or some reason other than dropping out. Such creative book-keeping resulted in the district claiming a greatly reduced dropout rate of 1.5% in 2001–02 and winning a national award for excellence (Hursh 2007, 302)

Numbers and Equity

In the UK, government policy puts numbers at the heart of its proclaimed strategy to create a fairer society. The Conservative Party, which formed the dominant partner in the Coalition Government

(2010-2015), went into the 2010 general election with arguments about ‘transparency’ threaded throughout their Party Manifesto. This included the promise, emphasized as a bold sub-heading, to *‘Publish data so the public can hold government to account’* (Conservative Party 2010, 69). Subsequently the rhetoric was translated into a policy that envisaged ‘the public’ using statistics to understand, challenge and then change the behaviour of public authorities, including the Government itself:

> ‘Our proposals,’ the Government Equalities Office (GEO) has said, ‘use the power of transparency to help public bodies to fulfil the aims of the Equality Duty to eliminate discrimination, advance equality of opportunity and foster good relations between different groups. This means that public bodies will be judged by citizens on the basis of clear information about the equality results they achieve… Public authorities will have flexibility in deciding what information to publish, and will be held to account by the people they serve.’ (quoted by Instead Consultancy 2011)

This approach embodies a series of assumptions that imbue numbers with an almost magical status and power. First, it is assumed that relevant and useful data will be made available (despite the selection being in the gift of the very authorities that ‘the public’ are expected to challenge). Second, this model of transparent data and active citizenship assumes that the citizenry have the time, resources and expertise to access the data and then analyse it. Finally, the approach takes for granted that public bodies will automatically change their behaviour if the data reveal poor ‘equality results’. Unfortunately, in the real world, *none* of these assumptions is true.

Statistics do not simply lie around waiting for interested citizens to pick them up and use them. *Numbers are no more obvious, neutral and factual than any other form of data*. Statistics are socially constructed in exactly the same way that interview data and survey returns are constructed, i.e. through a design process that includes, for example, decisions about which issues should (and should not) be researched, what kinds of question should be asked, how information is to be analysed, and which findings should be shared publicly. Even given the very best intentions (and notwithstanding the opportunity for game-playing and ‘creative book-keeping’ of the sort already documented above) at every stage there is the possibility for decisions to be taken that obscure or misrepresent issues that *could* be vital to those concerned with social justice. In view of the limits of space, a single – but important – example will suffice. It concerns racial justice and the question of access to, and achievement in, UK higher education.

> It is a scandal that ethnic minority kids are more likely to go to university than poor white ones

The Telegraph (Kirkup 2015)

White British pupils least likely to go to university, says research
The Guardian (Khomami 2015)

White British pupils fall behind ethnic groups in race for university: All minorities now more likely to go into higher education
Daily Mail (Doughty 2015)

These headlines appeared in the British daily press in November 2015 when an economic think tank (the Institute for Fiscal Studies - IFS) publicized a review of government figures showing the proportion of young people going into university from different ethnic groups (Crawford & Greaves 2015). First, as we might expect when applying a CRT perspective that is sensitive to the positioning of White people at the heart of contemporary politics, it is striking that the relatively low rate for White students is the angle highlighted by *all* news outlets regardless of their political positioning. Including, for example, the most left-wing (*Guardian*) and right-wing (*Telegraph* and *Mail*) parts of the mainstream British media.

A second important aspect to this story, that may surprise some readers, is that there is nothing new in the fact that White students are less likely to enter British universities than their peers in most minoritized groups. This pattern was already known 18 years before these headlines: 'relative to their share in the population … ethnic minorities overall are now *better represented in HE than whites'* (Coffield & Vignoles 1997 original emphasis).

From the perspective of this paper, focusing on the mis/uses of numbers in race analyses, perhaps the most important aspect of the IFS report, and the associated newspaper headlines, is that a focus on access statistics in isolation gives an extremely partial, indeed biased, view of race and Higher Education in Britain. Simply looking at who *goes* to university ignores long-standing and significant race inequities in the status of the universities attended and the level of final degree achievement.

Figure 1 about here

Figure 1 shows the likelihood of attending an elite research-intensive university in the UK (the so-called 'Russell Group' of universities).[2] White and minoritized students appear to have roughly similar chances of attending elite universities if all minoritized students are lumped together in a single 'non-White' group, usually referred to as BME in the UK (Black and Minority Ethnic). However, if the minoritized students are disaggregated into smaller and more meaningful groups, some important differences emerge. Figure 2 compares the proportion of White young people entering Russell Group universities against the rate for the most- and least-likely minority ethnic groups, Indian and Black Caribbean students respectively.[3] White British students are almost *five times* more likely to gain access to elite research-intensive universities than their peers of Black Caribbean background. This is a sizeable inequality of opportunity but is invisible in calculations that simply aggregate all minoritized students (such as Figure 1) or which look at access to all universities regardless of their standing (such as the national headlines quoted above).

Figure 2 about here

The inflammatory headlines that proclaimed the 'scandal' of White rates of *access* to university (above) draw attention away from a further facet of race inequity in the system, i.e. differing levels of *achievement* between ethnic groups. Table 1 shows the proportions of students in each main ethnic group attaining the different classes of degree available at the end of their undergraduate studies; ranging from the very best result (a first class degree) through to a 'third' or 'pass' degree classification. White students are more likely to gain a 'First' than any other group (22.4%); Black students are the least likely to be awarded first class degrees (8.7% of Black students overall). This means that the odds of White undergraduates achieving the highest degree classification are around three times higher than their Black peers.[4] This is a significant ethnic inequality but, perhaps because the beneficiaries are White, it goes entirely unremarked in the press furore about the overall access statistics (above).

Table 1 about here

It is clear, therefore, that there is nothing obvious, neutral nor simple about education statistics and race. In this section, we have reviewed official data that describe differences in university access and achievement in relation to the ethnic origin of undergraduates in British universities. The government, an economic think tank and the mainstream media all chose to highlight the apparent under-representation of White students (when looking at access across the entire system). This played into the ongoing high-profile political and media narrative that paints White people as race-victims in contemporary Britain (see Gillborn 2008 & 2010b; Sveinsson 2009 for critical commentaries). But a very different picture emerges if the data are questioned in relation to a critical understanding of past race inequities in education. Such a perspective prompts us to explore differences in the status of institutions and the levels of achievement at the end of higher education. In both cases, White students appear to do rather well and, in terms of achievement, better than every other group. Indeed, there is perhaps scope for further headlines questioning what is happening in British higher education when the ethnic group that is *least* likely to go to university nevertheless enjoys the *best* chance of achieving the top grade. Were this a minoritized group there might be headlines about 'scandals' and shocks but, since the group in question is *White*, their high attainment fits with the basic expectations of a White supremacist media and polity and so the pattern goes entirely unremarked.

Big Data: big trouble?

> The world's capacity to store, broadcast and compute information is growing exponentially. The numbers involved have already passed well beyond the scales we are used to in our everyday lives. Counting across all forms of storage, from mobile phone memory to DVD, Blu-Ray and hard disks, we estimate that the world's installed capacity to store information will reach around 2.5 zettabytes this year … If we stored all this data on DVDs and piled them up, the stack of discs would stretch one-and-a-half times the distance from the earth to the moon. What's more, this figure is growing by over 50% year-on-year. (Yiu 2012, 10)

'Big data' is an increasingly popular phrase used to describe sets of numeric data that are, according to its advocates, simply *too huge* for traditional forms of human analysis. Big Data has become big business. A recent google search for the phrase produced almost 300,000,000 hits[5] and governments on both sides of the Atlantic are investing heavily in the technology and talking up its transformative powers:

> *Big Data is a Big Deal* … Today, the Obama Administration is announcing the "Big Data Research and Development Initiative." By improving our ability to extract knowledge and insights from large and complex collections of digital data, the initiative promises to help accelerate the pace of discovery in science and engineering, strengthen our national security, and transform teaching and learning. (WhiteHouse.gov 2012)

> It is estimated that the big data market will benefit the UK economy by £216 billion and create 58,000 new jobs before 2017 … Universities and Science Minister David Willetts said: "Big data is 1 of the 8 great technologies of the future and a priority for government. It has the potential to transform public and private sector organisations, drive research and development, increase productivity and innovation, and enable market-changing products and services." (Department for Business, Innovation & Skills 2014)

Big Data advocates promote a hard sell about the fabulous powers of Big Data. They describe a world where new possibilities are revealed by an analysis entirely driven by machines and where, most significantly, theories and human reasoning are rendered obsolete because the 'numbers speak for themselves': the following extract is from an article in *Wired* magazine, entitled 'The End of Theory', which did much to popularize the idea:

> This is a world where massive amounts of data and applied mathematics replace every other tool that might be brought to bear. Out with every theory of human behavior, from linguistics to sociology. Forget taxonomy, ontology, and psychology. Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves. (Anderson 2008)

The argument that numbers can now 'speak for themselves' is a popular refrain in Big Data discussions. Speaking on BBC radio in 2013, for example, author Kenneth Cukier stated:

> 'We have to let the data speak for itself. (…) When we trust the data – look at the data – it is a little bit less biased - in some respects, not in all respects - than we are. And therefore it can find correlations that we simply, as human beings, can't because we have limited capacity (…) the vast amount of data has expanded, we now have to give it to the machine to do what it does best, and that is parse through it to come up with insights.'[6]

Cukier's emphasis on correlations echoes part of Anderson's argument from *Wired*:

> "Correlation is enough." We can stop looking for models. We can analyze the data without hypotheses about what it might show. (Anderson 2008)

This is a deliberate and self-conscious rejection of the traditional warning that *correlation* should not be mistaken for *causation*. When Big Data advocates ask us to 'trust the data' they paint a picture of analysis as an almost mystical process that takes place inside machines and is too complex for human beings to comprehend: 'We can throw the numbers into the biggest computing clusters the world has ever seen and let statistical algorithms find patterns where science cannot' (Anderson 2008). As we noted at the very start of this paper, however, algorithms are *not* free from bias: 'Even algorithms are biased against black men' (Naughton 2016; see also Larson et al. 2016). And the reason that algorithms can be racist is that they are created and interpreted by human beings, many of whom share commonly held racist stereotypes.

As we have argued above, *all data is manufactured* and *all analysis is driven by human decisions*. Although 'Big Data' advocates proclaim its insight and authority with almost evangelical fervour, the limits of the approach can be found lurking in the small print. For example, in a book whose sub-title proclaims Big Data as a 'revolution that will transform how we live, work and think', Cukier and his co-author accept (contrary to Anderson's proclamation of the 'end of theory') that:

> '… *big-data analysis is based on theories, we can't escape them*. They shape both our methods and our results. It begins with how we select the data. Our decisions may be driven by convenience: Is the data readily available? Or by economics: Can the data be captured cheaply? Our choices are influenced by theories. What we choose influences what we find… (Mayer-Schonberger & Cukier 2013, 72 emphasis added).

This echoes our key argument that *all* data gathering and analysis is shaped by theories and beliefs that are susceptible to racial bias. In the next part of the paper we set out some ideas for how the analysis of quantitative data might usefully be informed by the principles of Critical Race Theory (CRT).

QuantCrit: TOWARDS A CRITICAL RACE THEORY OF STATISTICS

> We [have] defined 'White logic' as 'the epistemological arm of White supremacy'. Rather than leading to a science of objectivity, White logic has fostered an ethnocentric orientation. Most researchers have embraced the assumptions of White supremacy. (Zuberi & Bonilla-Silva 2008, 332)

Critical race-conscious scholars have long questioned the assumptions that shape the accepted 'mainstream' definitions of science and rationality. Indeed, 'challenging claims of neutrality' and 'objectivity' was highlighted as a defining characteristic of CRT in educational studies from the very start (Ladson-Billings & Tate 1995, 56). In this section of our paper we wish to build upon these previous studies in order to identify some principles that are explicitly derived from CRT to guide the interpretation and use of quantitative data.

Critical Race Theory has enjoyed a huge growth in awareness and popularity over the last decade or so. There is no space (nor need) to recap on the detail of the movement here, suffice it to say that CRT is now recognized as one of the most important approaches globally for scholars researching, and opposing, race inequity. CRT has grown rapidly since its early development as an insurgent movement among US legal scholars of color in the 1970s and 1980s (Bell 1980a & 1980b; Crenshaw 2002; Delgado 1995; Delgado & Stefancic 2001; Matsuda, Lawrence, Delgado & Crenshaw 1993). CRT has spread into numerous disciplines and now enjoys a global reach, especially in the field of education (Dixson & Rousseau 2006; Gillborn 2005; Ladson-Billings 1998; Ladson-Billings & Tate

1995; Lynn & Dixson 2013; Parker 1998; Solórzano & Yosso 2002; Taylor 2000; Warmington 2012). One of the most exciting aspects in the growth of CRT has been the development of off-shoot movements that apply the principles of CRT to the particular experience of one or more monoritized group, such as Latino CRT (LatCrit)(Montoya & Valdes 2009; Solórzano & Delgado Bernal 2001). A particularly important recent development has been the move by critical disability scholars to consciously apply CRT principles in an attempt to generate new insights through a combination of approaches that they term *Disability Critical Race Theory (DisCrit)*(Annamma, Connor & Ferri 2013; Connor, Ferri & Annamma 2016). DisCrit was consciously shaped through the development of a series of tenets that would provide a starting point for scholars seeking to advance intersectional research on racism and disability (Annamma et al. 2013, 11). We believe that a similar approach offers a sound basis for developing key principles to help guide the use of statistics using the insights of CRT.

Of course, we are not the first to apply CRT to quantitative data and analyses; here we seek to build on and extend previous approaches. For example, Earnestyne Sullivan and colleagues have used the term 'CritQuant' to describe an approach to quantitative policy analyses that seeks to embody two 'CRT tenets', namely the 'permanence of racism and critique of liberalism' (Sullivan 2007; Sullivan, Larke & Webb-Hasan 2010, 77). This is a useful start but we see potential in going beyond just two tenets and, like the proponents of DisCrit, wish to build a series of sensitizing concepts and principles that embody a more holistic view of CRT. In order to distinguish our approach, therefore, we have reversed the elements of Sullivan's label and directly echo the formulation adopted by Annamma and colleagues, by adopting *'QuantCrit'* as a shorthand for our approach.

QuantCrit seeks to extend some of the earlier criticisms of quantitative research on race and education, made by one of us (Gillborn 2010a), and shares key aspirations with the framework for 'Critical Race Quantitative Intersectionality' (CRQI) outlined by Alejandro Covarrubias and Verónica Vélez (2013). Like them, we seek to generate 'a framework guided by CRT' (2013, 275) not a new theory in its own right. In particular, we wish to emphasize that we do *not* view this as in any way an off-shoot movement of CRT; we see the following QuantCrit principles as a kind of toolkit that embodies the need to apply CRT understandings and insights *whenever* quantitative data is used in research and/or encountered in policy and practice. Our approach shares many core assumptions with Covarrubias & Vélez's critique including, for example, the view that numbers do not 'speak for themselves' (2013, 278). However, unlike CRQI, we remain fundamentally sceptical about the possibility that numbers can *ever* fully capture the 'material impact' of intersectional racism or 'grant us greater opportunities to effect change at the policy level' (2013, 282). History suggests that progress toward race equity occurs when White interests are thought to align with greater social justice (Bell 1980b; Delgado 2006; Donnor, J. 2016) rather than following from the style and persuasiveness of data that are provided in service of the argument (Covarrubias & Vélez 2013, 271). This is because, as we have noted above and detail further below, numbers have no objective reality beyond the frameworks of meaning and politics that create them.

In the rest of this section we outline some first principles for QuantCrit, which can be summarized as follows:

1. the centrality of racism
2. numbers are not neutral
3. categories are neither 'natural' nor given: for 'race' read 'racism'
4. voice and insight: data cannot 'speak for itself'
5. using numbers for social justice

1. The Centrality of Racism: *QuantCrit recognizes that racism is a complex, fluid and changing characteristic of society that is not automatically nor obviously amenable to statistical inquiry. In the absence of a critical race-conscious perspective, quantitative analyses will tend to remake and legitimate existing race inequities.*

At the heart of our approach is an understanding that 'race' is 'more than just a variable' (Dixson & Lynn 2013, 3). This is more than a methodological statement, it is also a political statement that is integral to CRT's model of the social. Social relationships are not readily amenable to quantification; statistical significance is an arbitrary measure, proving nothing, that is entirely different to social/ historical significance (Ziliak & McCloskey 2008). Of central importance here is the realization that 'race' is only ever a social construct - a dynamic of power (history, culture, economics, representation):

> Placing race at the center is less easy than one might expect, for one must do this with due recognition of its complexity. Race is not a stable category ... 'It' is not a thing, a reified object that can be measured as if it were a simple biological entity. Race is a *construction*, a set of fully social *relationships*.' (Apple 2001, 204 original emphasis)

It follows that every attempt to 'measure' the social in relation to 'race' can only offer a crude approximation that risks fundamentally misunderstanding and misrepresenting the true nature of the social dynamics that are at play. We noted earlier that quantitative data are frequently assumed to be more trustworthy and robust than qualitative evidence; but this is turned on its head when we take seriously the *social* character of 'race'. Even the most basic numbers in relation to race equality are open to multiple and profound threats to their meaning and use. In view of these problems (and the societal dominance of perspectives that are shaped by the interests, perceptions and assumptions of White people) a sensible starting point in any quantitative analysis is to interrogate the collection, analysis and representation of statistical material for likely bias in favour of the racial status quo.

2. Numbers are not neutral: *QuantCrit exposes how quantitative data is often gathered and analyzed in ways that reflect the interests, assumptions and perceptions of White elites. One of the tasks of QuantCrit is to challenge the past and current ways in which quantitative research has served White Supremacy, e.g. by lending support to deficit theories without acknowledging alternative critical and radical interpretations; by removing racism from discussion by using tools, models and techniques that fail to take account of racism as a central factor in daily life; and by lending supposedly 'objective' support to Eurocentric and White Supremacist ideas.*

In the same way that CRT rejects ideologies of neutrality and meritocracy as 'camouflages' for racist interests (Tate 1997, 235), QuantCrit prompts researchers to examine behind the numbers in order to understand how findings have been generated and identify the racist logics that may have shaped conclusions. For example, there is a tendency in some quantitative analyses to disguise and even *normalize* race inequity. Alice Bradbury (2011) has shown how an expectation of lower achievement by Black Caribbean students is built into the fabric of quantitative systems by which English schools are judged. In order to be 'fair' to schools, when calculating the amount of progress that their students made ('growth' in US terms), the notion of 'Contextual Value Added' (CVA) was developed. This system calculated the amount of progress that students would usually be expected to make in view of certain 'factors' known to be associated with different rates of attainment, including social disadvantage and ethnic origin. Schools suffered no penalty if their Black Caribbean students failed to match the attainment of White British students because the system expected such a pattern and 'corrected' for it. As Bradbury notes, 'whatever the pattern of the coefficients the principle that is legitimised by CVA is the same: that ethnicity affects how much progress you should be expected to make' (2011, 238). This system takes an existing inequity (the lower attainment of previous generations of Black students) and uses it to 'predict' a future where such inequity is normal.

This normalization of lower racialized attainment is not restricted to official analyses; the same kind of thinking can be found in academic treatments. Stephen Gorard & Emma Smith, for example, have followed Thorndike (1963, 19) in arguing that 'under-achievement' should be defined as 'achievement falling below *what would be forecast* from our most informed and accurate prediction, based on a team of predictor variables' (2008, 708, emphasis added). In this way, statisticians would re-define certain levels of achievement inequity as unproblematic; if Black students do as badly as they are predicted (based on previous cohorts) then they would no longer be 'under-achieving'. As Power & Frandji (2010) have noted, these sorts of calculation may sometimes spring from good intentions, e.g. to recognize the relative achievements of traditionally disadvantaged groups, or to avoid schools being ranked as failures based on raw attainment data that ignores the multiple and severe challenges facing some communities. Regardless of intent, however, such moves threaten to enshrine the lower average achievements of some groups as normal, even inevitable:

> To some extent, the attempt to valorise the relative successes of disadvantaged schools and disadvantaged children is to accept their educational inferiority as inevitable and insurmountable …Rather than insist on the need to level the playing field, we change the definition of success. And setting different criteria of success for different kinds of pupils inscribes their failure as 'normal' and 'natural'. Through 'correcting' schools' unequal attainments in this way, the new politics of recognition introduces a disempowering fatalism into the education system. (Power & Frandji 2010, 393)

These problems amount to *the colonisation of interpretation*, i.e. by mobilizing statistics in these ways commentators (including governments and independent academics) act to redefine the facts of educational achievement and equity. By presenting numbers as a neutral technology (free from political interference and sentimentality) statisticians sometimes act to assert that their view is the only *true* or *legitimate* understanding of the world, a view where inequitable educational achievement by some minoritized groups is taken for granted, normalized, and consequently erased from the agenda.

3. Categories/Groups are neither 'natural' nor given: for 'race' read 'racism'*. QuantCrit interrogates the nature and consequences of the categories that are used within quantitative research. In particular, we must always remain sensitive for possibilities of 'categorical alignment' (Artiles 2011, Epstein 2007) where complex, historically situated and contested terms (like race and dis/ability) are normalized and mobilized as labeling, organizing and controlling devices in research and measurement. Where 'race' is associated with an unequal outcome it is likely to indicate the operation of racism but mainstream interpretations may erroneously impute 'race' as a cause in its own right, as if the minoritized group is inherently deficient somehow.*

Even the most basic decisions in research design can have fundamental consequences for the re/presentation of race inequity. Many studies do not include race/ethnicity as a variable at all; the absence of race 'findings' may then be taken by readers to mean that race/racism is unimportant whereas it was simply not considered. If 'race' *is* to be included, we have already shown (above) some of the numerous ways in which the complex and fluid operation of racist labels can come to be treated as if these social constructs (which change between time and place) represent real 'things' – facts of biology and/or fate.

If race and/or ethnicity are to be included in a study then *how* these ideas are operationalized will shape the findings. For example, we have noted above, in relation to access to elite British universities, that White students appear to be disadvantaged when compared with a crude BME composite group (that lumps together all minoritized students); and yet the same White students emerge as relatively privileged when compared with their Black Caribbean peers (see Figures 1 & 2). We have frequently encountered White analysts who proclaim that race was not a factor when, in fact, they have simply compared White students against *everyone else* (in a crude non-white composite). Critical race scholars instantly recognize the meaninglessness of such a binary comparison but trying to be more sensitive to race complexities is no easy matter. If using too *few* ethnic categories is one way to produce meaningless results, then using too *many* categories can be almost as bad. For example, we once worked with a school that claimed to conduct rigorous ethnic monitoring and found no significant differences between ethnic groups' attainment; on closer inspection we discovered that the school used a list of more than 70 separate ethnic categories, meaning that few of the cell sizes contained enough students to have any confidence in the results.

A particular problem in quantitative research on race is that 'race' is frequently interpreted as if it signals a *pre-existing* fixed quality (or lack of it). In particular, Black groups in the UK and African American and Latinex students in the US, are often viewed through a deficit lens by politicians, teachers and academics alike. This means that research which may have been intended to expose and challenge a race inequity becomes yet more fodder for racist practices and beliefs. Imagine, for example, that a project finds that 'race was significantly correlated with lower achievement'. A critical race theorist will likely interpret the sentence to mean that *racism* is a significant factor that affects the chances of achieving. But uncritical White observers, practitioners and policy-makers may take away the message that some races are less *able* to achieve. One way of prompting ourselves to question such thinking is to automatically replace terms like 'race' and 'ethnic origin' with the couplet '*race/racism'*. The idea of 'race' always carries the inherent threat of racist assumptions and actions (Leonardo 2013; Omi & Winant 1993) and so the move is conceptually legitimate *and* useful in the practical sense of prompting the reader to view race critically as a social construct that historically separates and oppresses particular groups.

Unfortunately, academic research and education policy is replete with examples where race is treated as having *a priori* existence that explains inequality by reference to assumed deficits on the part of minoritized groups. The following example is from the first education policy statement issued by a newly elected British government in 2010:

> We must also address serious issues of inequality – both black boys and pupils receiving free school meals are three times more likely to be excluded than average. Giving teachers the power to intervene early and firmly to tackle disruptive behaviour can get these children's lives back on track. (DfE 2010, para 3.5)

It is sobering that disproportionate expulsion from school is highlighted as a 'serious' issue of 'inequality' and yet the proposed solution is to give teachers more powers to penalize 'disruptive behavior.' Clearly the government assumed that the exclusion problem lay in the behavior of Black students and not the racialised disciplinary regimes that historically over-exclude Black students from British schools (see Blair 2001; Gillborn 2008). As usual, good-intentions are no protection against slipping into the erroneous belief in race as a fixed identity and a causal factor in its own right. Under the heading 'equality areas', for example, a report seeking to identify inequalities in British higher education offered the following definition:

> *Black and minority ethnic*
> This definition is widely recognised and used to identify patterns of marginalisation and segregation caused by an individual's ethnicity. (Equality Challenge Unit 2014, 5).

Racist patterns of inequality (in access, graduation and achievement) are *associated* with ethnic origin; a critical scholar would look to identify ways in which *racism* has shaped these outcomes; but such 'patterns' are in no way '*caused* by an individual's ethnicity'. Adopting our suggested technique of using a 'race/racism' couplet (above) helps to disrupt such thinking; the sentence would now read:

> This definition is widely recognised and used to identify patterns of marginalisation and segregation caused by race/racism.

4. Voice and Insight: data cannot 'speak for itself'*. QuantCrit recognizes that data is open to numerous (and conflicting) interpretations and, therefore, QuantCrit assigns particular importance to the experiential knowledge of people of color and other 'outsider' groups (including those marginalized by assumptions around class, gender, sexuality, and dis/ability) and seeks to foreground their insights, knowledge and understandings to inform research, analyses, and critique.*

As we have already noted (see above in relation to Big Data), numbers are social constructs and likely to embody the dominant (racist) assumptions that shape contemporary society. At every stage in the production of statistics there is the opportunity for racialized assumptions to come into play. Consequently, in many cases, numbers speak for White racial interests; their presentation, as objective and factual, merely adds to the danger of racist stereotyping where uncritical taken-for-granted understandings lay at the heart of analyses.

Quantitative analyses that claim to control for the separate influence of different factors are especially prone to misunderstanding and misrepresentation. Such '*regression'* analyses rely on statistical models that are complex and often only partially explained in published accounts. Nevertheless, the results are frequently reported as if they describe the real world rather than being an artifact of statistical manipulations. Regression analyses can turn reality on its head. In an earlier paper, for example, we described a prominent research study in which several minoritized groups were *less* likely to gain access to a higher level of teaching and assessment. However, the researchers performed a regression analysis that claimed to control for the *separate* influence of numerous factors (such as maternal education, socio-economic background and prior attainment); the regression analysis described most of the minority groups as being *over*-represented (the reverse of their representation in the real world) and this was the finding that was reported in the press (Gillborn 2010a, 261-3).

A vital problem lies in the failure of many analysts to realize that racism does not operate separately to factors such as prior attainment, income, and maternal education. Racism operates *through* and *between* many of these factors simultaneously. In a society that is structured by racial domination, the impact of racism will be reflected across many different indicators simultaneously. By trying to disentangle these elements regression analyses imagine that numerous factors (including prior attainment, socio-economic status and parental education) are entirely independent of racist influences. Worse still, they treat inequalities in those indicators as if they are a sign of internal deficit on the part of the minoritized group rather than a socially constituted injustice. The use of 'prior attainment' scores is a particularly important example of this. Quantitative researchers frequently use students' test results at an earlier stage of their education as a way to group students of similar 'ability', comparing 'like-with-like', but this erases racism and blames the students:

> the racism that the kids experience on a daily basis [in ranked teaching groups, with restricted curricula and less-experienced teachers] translates into lower scores … But those scores are then used to gauge "ability" and "prior attainment" …the differences in prior attainment are treated as if they were deficits in the students themselves and nothing to do with their schools (Gillborn 2010a, 266).

5. *Social justice/equity orientation:* *QuantCrit rejects false and self-serving notions of statistical research as value-free and politically neutral. CRT scholarship is oriented to support social justice goals and work to achieve equity, e.g. by critiquing official analyses that trade on deficit assumptions,* *and working with minoritized communities and activist groups to provide more insightful, sensitive and useful research that adds a quantitative dimension to anti-oppressive praxis.*

This does not mean that critical race theorists should dispense with quantitative approaches but that they should adopt a position of principled ambivalence, neither rejecting numbers out of hand nor falling into the trap of imagining that numeric data have any kind of enhanced status, value, or neutrality. This is a stance that anti-racist scholars and activists have long practiced, for example, when they contest supposedly scientific claims about the biological nature of race - sometimes by invoking what science tells us about the unscientific status of race (Warmington 2009). Critical race theorists work simultaneously *with* and *against* race, i.e. we know that race only exists as a social construct, but we recognize the sometimes murderous power of the fiction and seek to engage, resist and ultimately destroy race/racism. Similarly, QuantCrit should work with/against numbers by engaging with statistics as a fully social aspect of how race/racism is constantly made and legitimated in society. Like Covarrubias & Vélez (2013, 271) we see hope in the fact that policy-makers preference for numbers might offer a role for statistics in the radical critique of White supremacy, but we emphasize that this is a deeply misguided preference which has a habit of evaporating when the numbers tell an unwelcome story:

> Humanism's search for an originary, or genetic, human experience is quickly betrayed when, upon deconstruction, human experience appears cultural or racial (usually Eurocentric or White), and not universal. So what initially appears as general becomes a front for the universalization of a particular racialized experience. (Leonardo 2005, 405)

CONCLUSION

> 'The real danger is not that computers will begin to think like men, but that men will begin to think like computers.' Sydney J. Harris (in O'Hagan 2011)

Quantitative data is often used to shut down, silence and belittle equity work. Whenever governments, employers, or educators, are challenged on their poor performance in relation to an under-represented group, they will typically reach for statistics in an effort to show that they are *really* much better than you might think. Such responses usually involve highly selective decisions about which populations to include in the calculations, how recently the data were collected, and which other variables might be used to recalculate the numbers and produce a result more to the liking of the institution that is under fire. Despite all these numerous decisions and manipulations, many people continue to assume that numbers have some form of inherent value – more objective, factual and real than 'mere' testimony or human experience. Such assumptions are not only incorrect, they are dangerous. In this paper we have argued that quantitative data are socially constructed in exactly the same way as other forms of research material (including interviews and ethnographic observations). Numbers' authoritative façade often hides a series of assumptions and practices which mean, more often than not, that statistics will embody the dominant assumptions that shape inequity in society. Radical scholars are right to be suspicious of quantitative material; the data are often generated and analyzed by people with little interest in, or understanding of, social inequality. Qualitative data, exploring people's complex and multifaceted experiences and perspectives, may be inherently better suited to exposing and opposing racist social processes. However, we believe that there is value in trying to use statistics responsibly and toward radical egalitarian ends; we have proposed that a useful way ahead would be to adapt some of the tenets of critical race theory and apply them to the specific issues faced when handling quantitative data.

We have proposed five principles that might usefully guide early attempts to practice quantitative critical race theory (or 'QuantCrit').

1. the centrality of racism
2. numbers are not neutral
3. categories are neither 'natural' nor given: for 'race' read 'racism'
4. voice and insight: data cannot 'speak for itself'
5. using numbers for social justice

The principles are explicitly modeled on the basic tenets of CRT and we expect that, like CRT itself, QuantCrit will take on new forms as it is practiced by scholars facing a range of challenges in different contexts. To date, quantitative data have not featured significantly in CRT scholarship and, as we have shown, there is good reason for this. Nevertheless, we believe that statistical analyses have the potential to be used in the service of equity goals, not least to expose and delegitimize the racist (and sexist, classist, hetero-normative, and ablest) assumptions, policies and practices that are currently supported by the uncritical use of quantitative data.

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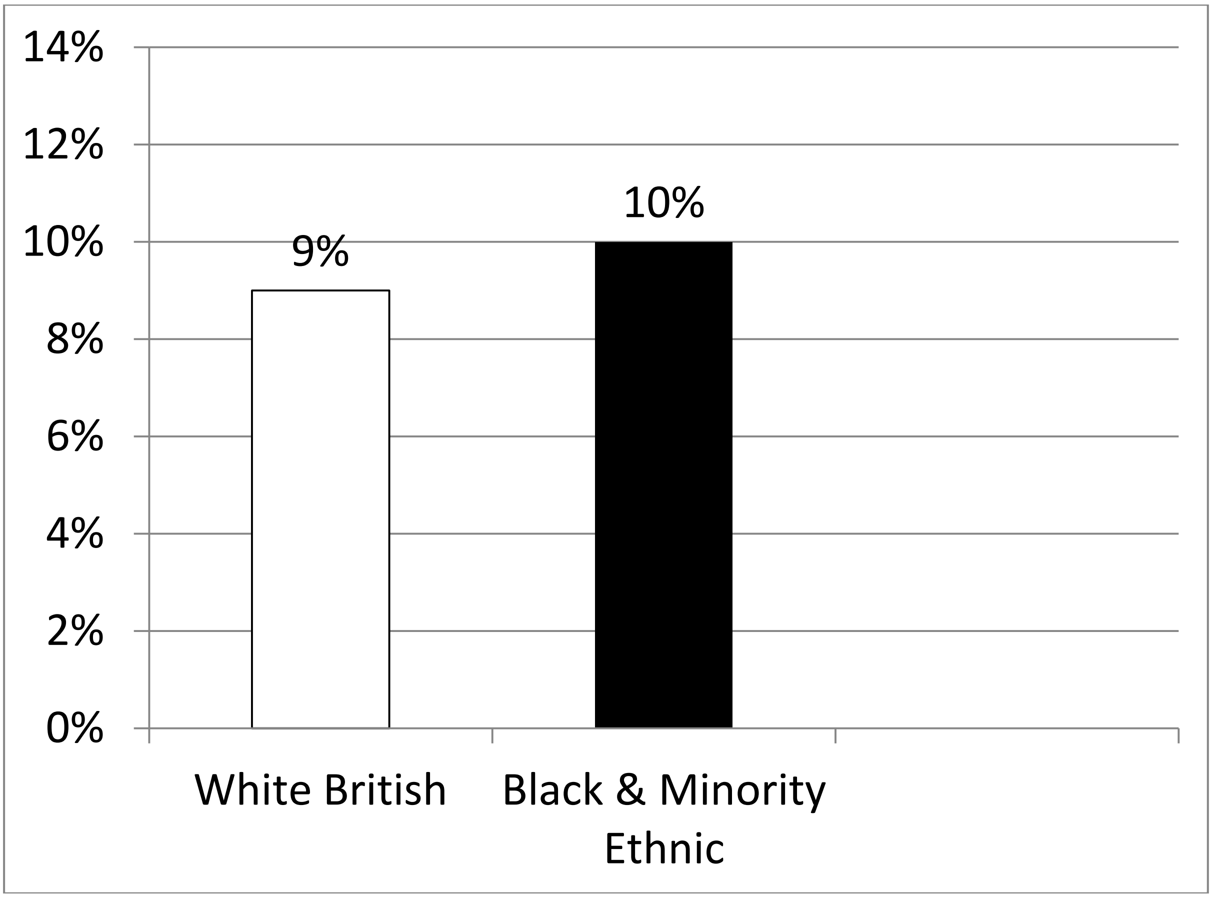
Table 1: Degree attainment by ethnic origin (UK, 2014)

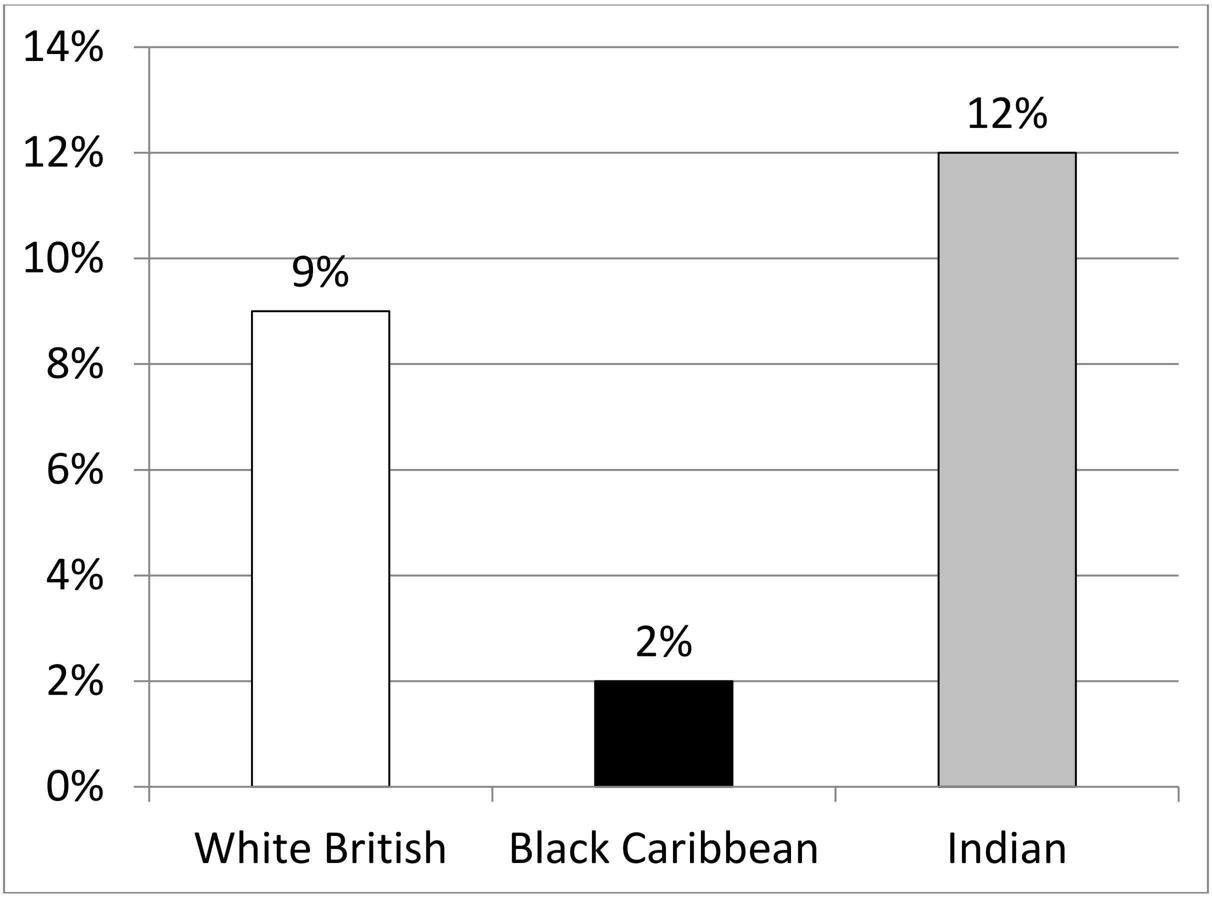
UK-domiciled first degree undergraduate qualifiers by degree class and ethnic group										
	First		**2:1**		**2:2**		**Third/pass**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
White	58,385	22.4	138,990	53.3	53,805	20.6	9,755	3.7	260,935	100.0
BME total	8,690	13.7	29,620	46.7	20,035	31.6	5,105	8.0	63,450	100.0
Black	***1,645***	***8.7***	***7,670***	***40.8***	***7,300***	***38.8***	***2,190***	***11.7***	***18,805***	***100.0***
Black or Black British: Caribbean	*440*	*9.5*	*1,990*	*43.2*	*1,670*	*36.2*	*510*	*11.0*	*4,610*	*100.0*
Black or Black British: African	*1,135*	*8.5*	*5,340*	*40.1*	*5,305*	*39.8*	*1,550*	*11.6*	*13,330*	*100.0*
Other black background	*70*	*8.3*	*335*	*39.0*	*320*	*37.3*	*130*	*15.3*	*865*	*100.0*
Asian	***4,035***	***14.7***	***13,265***	***48.2***	***8,320***	***30.2***	***1,925***	***7.0***	***27,550***	***100.0***
Asian or Asian British: Indian	*1,900*	*16.8*	*5,770*	*51.1*	*2,960*	*26.2*	*655*	*5.8*	*11,285*	*100.0*
Asian or Asian British: Pakistani	*1,020*	*12.6*	*3,705*	*45.9*	*2,720*	*33.7*	*630*	*7.8*	*8,075*	*100.0*
Asian or Asian British: Bangladeshi	*410*	*13.4*	*1,450*	*47.7*	*960*	*31.5*	*225*	*7.4*	*3,045*	*100.0*
Other Asian background	*710*	*13.8*	*2,340*	*45.5*	*1,685*	*32.7*	*415*	*8.1*	*5,145*	*100.0*
Chinese	***545***	***18.6***	***1,380***	***47.3***	***780***	***26.7***	***215***	***7.3***	***2,915***	***100.0***
Mixed	***1,985***	***18.1***	***5,785***	***52.7***	***2,685***	***24.4***	***530***	***4.8***	***10,990***	***100.0***
Other	***480***	***15.0***	***1,515***	***47.5***	***950***	***29.8***	***245***	***7.7***	***3,190***	***100.0***
Arab	*30*	*11.5*	*145*	*52.9*	*80*	*28.1*	*20*	*7.6*	*280*	*100.0*
Other	*445*	*15.3*	*1,370*	*47.0*	*875*	*30.0*	*225*	*7.7*	*2,915*	*100.0*
Total	**67,075**	**20.7**	**168,610**	**52.0**	**73,840**	**22.8**	**14,860**	**4.6**	**324,385**	**100.0**
Percentages based on total number of students minus those whose degree class or ethnic group is unknown **Source**: Table 3.13 in Equality Challenge Unit. 2014. *Equality in higher education: statistical report 2014*. http://www.ecu.ac.uk/wp-content/uploads/2014/11/Equality-in-HE-student-data-2014.xlsx										

Figure 1: Access to Elite UK (Russell Group) Universities: White and BME comparison



Source: Longitudinal Study of Young People in England (LSYPE1). These students entered university in 2008/09 and 2009/10.

Figure 2: Access to Elite UK (Russell Group) Universities: Comparison between White British students and the minoritized groups most- and least-likely to be admitted



Source: Longitudinal Study of Young People in England (LSYPE1). These students entered university in 2008/09 and 2009/10.

Notes

[1] Neo-liberalism refers to the dominant policy lens in contemporary states such as the US and UK. The approach emphasizes an individualized view of the world and assumes that the free market offers the most efficient and fairest means of meeting societal needs (Lauder, Brown, Dillabough, & Halsey 2006). Neoliberalism typically assumes that success reflects individual merit and hard work, and that private provision is inherently superior to public. Neoliberalism often works through colour-blind language that dismisses race-conscious criticism as irrelevant, meaningless and/or inflammatory (see Gillborn 2014).

[2] Data here is taken from the Longitudinal Study of Young People in England (LSYPE1). These students entered university in 2008/09 and 2009/10. For further details on the LSYPE see UCL Institute of Education (no date).

[3] These are the ethnic group categories used in the UK census and, consequently, in most academic research in the UK; the combination of race/colour and national identifiers is far from satisfactory and can be misleading. For example, the majority of children in each of these groups were born in the UK and enjoy full UK citizenship (see Office for National Statistics 2012).

[4] This is based on the 'odds ratio' (also known as 'cross-product ratio') calculated by comparing the odds of success for White students compared with the odds of success for Black students (see Connolly 2007, 107-8).

[5] On 9 August 2016 a google search for the phrase 'big data' returned 'about 296,000,000 results'. A similar search performed three years earlier returned 158,000,000 results.

[6] Verbatim transcription from the podcast 'Start the Week', BBC Radio 4 (2013).