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**DECOLONIZING HIGHER EDUCATION: UNDERREPRESENTATION OF
WOMEN OF COLOUR IN SCIENCE, TECHNOLOGY, ENGINEERING AND
MATHEMATICS (STEM) FIELDS IN BRITISH ACADEMIA**

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Dissertation submitted in part fulfilment of the requirements for the degree of
Master of Science in Education, Public Policy and Equity



24th August 2020

PERMISSION TO CONSULT

I give permission for this dissertation to be made available by the University of Glasgow to anyone who wishes to consult it or knows of its existence.

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ABSTRACT

This study examines the underrepresentation of women of colour in STEM faculties, with a view to decolonizing UK higher education institutions (HEIs). This is against the backdrop that Black, Asian and Minority Ethnic (BAME) women working in STEM fields are considered 'space invaders' and occupying a space that is historically the preserve of white male academics, making them 'invisible' and doubly marginalized by consuming forces of patriarchy and patterns of institutional racism (Wright *et al.*, 2007; Robinson *et al.*, 2016; Mirza, 2018). To explore the full extent of intersectional marginality experienced by women of colour within British HE landscapes, I thematically reviewed literature published between 1 January 2000 and 30 June 2020, wherein the findings of study on BAME female academics, especially those in STEM fields reported inequality gaps. However, the dates for theoretical conceptions and backings does not reflect the aforementioned time range. In the study, I unravel the marginalization, excessive scrutiny and a lack of a sense of belonging faced by STEM women of colour, which have prevented them from participating at parity with their white-male colleagues, and resulted in underrepresentation for them in economic, cultural and political domains (see for example, Beeda *et al.*, 2011; Casad *et al.*, 2019; Collins & Steffen-Fluhr, 2019). Using majorly Said's (1978) *Orientalism* and Fraser's (2005) tripartite model of social injustice as theoretical frameworks, I explain how women of colour in STEM are 'othered' and how colonial ideologies continues to perpetuate inequities of underrepresentation for these women. With both perspectives, I argue for the dismantling of Eurocentric hegemony and true representation for STEM women of colour by means of redistribution, recognition and inclusion (Fraser, 2007a, 2007b, 2007c; Olson, 2008; Power, 2012; Kayaalp, 2017). Subsequently, common themes emerging from the literature is discussed under two broad themes including; marginality and hyper-surveillance as an exclusionary tactics of whiteness and empowerment strategies for true visibility and representation for STEM women of colour. Based on my discussion, I conclude by making the case for deconstructing intersectional categories towards the decolonization of British academia.

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Decolonizing higher education: Underrepresentation of women of colour in science, technology, engineering and mathematics (STEM) fields in British academia

CHAPTER 1: INTRODUCTION

1.1 Background to the study

Although the place of science, technology, engineering and mathematics (STEM hereafter) has been widely acknowledged as crucial to innovative capacity and global competitiveness of nations, women, especially those of colour, are yet largely underrepresented both in STEM jobs and majors in UK higher education institutions (HEIs), despite the fact that women generally constitute nearly half of the academic workforce (Atwater, 2000; Beeda *et al.*, 2011; Johnson, 2011; Main, 2014). This leaves untapped opportunities to expand STEM employment in British academy and perpetuates the prevailing norms which traditionally favour patriarchy and whiteness generally in UK HEIs and specifically in STEM. These privileges manifest themselves in structural forms which seek to govern learning and mark progress in STEM in such ways to marginalized groups that do not reflect the gender conventionally associated with STEM mainstream (Charleston *et al.*, 2014; Xu, 2015; Ong *et al.*, 2018).

Worst still, available evidence reveals ways in which BAME women's quest for knowledge has taken them to STEM fields abroad, where they are rendered 'invisible' and 'doubly silenced' by the monolithic power of whiteness and patriarchy (hooks, 1994; Casey, 2003; Mirza, 2018; Ong *et al.*, 2018). Despite policies of widening participation and several calls for inclusion of women in STEM fields through national and international symposia, reviews of literature, conferences and scholarly critiques, only little progress has been recorded over the years with the majority of gender and diversity inclusion strategies in STEM focused essentially on undergraduate and post-graduate students to the neglect of female academics working in STEM fields (Jackson *et al.*, 2013; McGee & Bentley, 2017; Ong *et al.*, 2018). It is against this backdrop that I explore the challenges of women of colour that threatens their persistence in STEM and British academia and how despite widening participation policies, BAME women have remained underrepresented and underrated.

While substantial evidence suggests that the intentions for attrition between men and women are fairly the same, women in STEM have been identified as having higher likelihood of changing positions within academia due to dissatisfaction with research support, experiences of exclusion and lack of advancement opportunities (Xu, 2008; Beeda *et al.*, 2011; Jackson *et al.*, 2013). To decolonize British HE spaces, I first elucidate the imperative of inclusion for STEM women of colour in British academia, arguing that these women are crucial parts of the workforce responsible for supplying the pipeline for careers in STEM fields. Moreover, creating access for them and allowing their retention in STEM faculties is essential for developing a diverse academic landscape and scientific workforce needed to address national and global issues (Johnson, 2011). Further, I acknowledge the nature of power relations and ways in which gendered and racial boundaries are (re)produced in the experience of women of colour in STEM.

1.2 Aim of the study

In view of the background, the broad aim of this study is to decolonize British HEIs by examining underrepresentation of women of colour in STEM. In the review of literature, I will demonstrate that claims of gender discrimination, stereotyping, racism, patriarchy and imperialism against these women are veritable. As such, this study is designed to specifically:

1. investigate how STEM women of colour in British academia are conceived as ‘space invaders’ and are subsequently marginalized in economic, social and political dimensions.
2. elucidate the inadequacies of equity policies within UK academy to address issues of marginality especially for BAME women.
3. make recommendations towards greater gender and diversity parity for STEM women of colour within British HEIs.

1.3 Significance of the study

While available evidence suggests that there are substantial scholarly works on underrepresentation of women in STEM as well as black and minority ethnic women in UK HEIs, there are few scholarly publications on diversity in STEM (see for example, Johnson, 2011; Main, 2014; Robinson *et al.*, 2016; Collins & Steffen-Fluhr, 2019). This is a gap that this study intends to fill. Hence, this study will extend the frontiers of knowledge on the

subject under review. Additionally, findings, analysis and recommendations of this dissertation will provide a useful guide to other researchers as well as education policy makers towards improving equity for STEM women of colour in British academia.

1.4 Research questions

In line with the aim of decolonizing British academia for STEM women of colour, I raise one overarching research question, from which I delineate three specific research questions, underpinning the advocacy for equity in British higher education spaces. They include; What are the current understandings of underrepresentation of STEM women of colour in British academy and their impacts on the career experiences of this group of women?

- ***Experience:*** *How do gender and racial differences structure the career experiences of STEM women of colour in UK HEIs?*
- ***Outcomes:*** *What impact does gender, and racial marginalization have on the career experience of STEM women of colour in British academia?*
- ***Recommendations:*** *How can policy processes respond to the challenges of facilitating true representation for this group of women and decolonizing UK HEIs?*

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, I first attempt to clarify the concept of underrepresentation for STEM women of colour for the avoidance of ambiguity, while observing that gendered, raced and class-conscious scholarships such as this is often misconstrued as crude, overly simplistic and racist in its own right. Thereafter, I underscore the imperative of inclusion for this group of women as an acceptable indicator of gender and racial equity within British HE spaces as prescribed by global education agendas like the SDG 5, target 8 - aimed at promoting gender equality and empowering women especially in science and technology (United Nations, 2016). Similarly, I emphasize the need for a diverse academic landscape that allows for parity of participation and give equal respect to *all*, irrespective of gender, race/ethnicity or class. Further, I proceed to address the construction of post-colonial women of colour as subject of intersectional marginality. While doing so, I state that it is a complex form of identity and inequality relations that goes beyond conventional analysis of inequality measures to analyze the issue and shape policy interventions for more inclusive advocacy (Wright *et al.*, 2007; Robinson *et al.*, 2016). Lastly, I engaged the theoretical frameworks – mainly Said's (1978) *Orientalism* and Fraser's (2005) three-dimensional model of social injustice to analyze the topic of discourse.

2.2 Conceptual clarifications: Underrepresentation for STEM women of colour in British academy

While the acronym STEM specifically refers to science, technology, engineering and mathematics, it encompasses other fields like computing science and life and physical sciences. Again, apart from academicians in STEM, there are other positions in STEM mainstream such as technicians, healthcare professionals, managers and social scientists. However, the focus of this study includes only BAME (all non-white) female academics, including those in temporary positions with precarious work contracts and those in permanent posts in STEM faculties within British HEIs. This however excludes other professional and technical support occupations in STEM mainstream. Additionally, these women represent erudite scholars in academia who have obtained at least a post-graduate degree (majorly a PhD) in academic STEM-related programs.

Although the concept of gendered, raced and classed underrepresentation for BAME women, especially those in STEM spaces is defined as rooted in the unpleasant realities of institutional racism and gender discrimination, there is no commonly accepted view as to what exactly constitutes it (Ong *et al.*, 2018; Collins & Steffen-Fluhr, 2019). This, in part, is because of the complexities surrounding discourse of racism and narratives of marginalization, oppression and disempowerment of women. In fact, there are a number of publications that have challenged the construction of gendered, raced and classed intersectionality in the discourse of women of colour in male and white dominated spaces like UK STEM faculties, projecting a 'colour-blind' narrative that sees only individuals and not 'colour' engaged in meritocratic competition, while also disputing white-male bodies as perpetrators of inequities in racial and gendered discourses (Gillborn, 2012; Hayes, 2013).

Little wonder, discourses of underrepresentation centered on institutional racism and gender discrimination remains a hotly debated topic within and outside academia. Also, attempts to raise racial or gendered discourse is often deemed as provocative, political and simplistic, based on justifications that such discourse is more complicated than taking an essentialist view and missing the major issue of social class (Hayes, 2013). However, the common misconception, which authors who argue against critical racial discourse fail to understand, is the difference between "whiteness" and the category "white people". As Gillborn (2015, p. 278) aptly puts it, "whiteness is a racial discourse that places the perspectives and interest of white people at the center of what is deemed normal whereas 'white people' is a socially constructed identity based on the colour of skin."

As such, critical race or gender scholarship is not an assault on white people, neither is it on men, but on dominating power, which places white-male norms and interests above everyone and everything (Maisuria, 2012; Teun & Dijk, 2015). Hence, I hold a similar position with intersectionality theorists, who argue that experience of underrepresentation and marginalization for BAME women especially are hidden under the 'vener of normality', with only obvious and crude forms of gender discrimination and racism considered as problematic by many (Gillborn, 2015; Mirza, 2018; Collins & Steffen-Fluhr, 2019). Nonetheless, I am of the opinion that there can be white males who genuinely and actively play roles of deconstructing whiteness and patriarchy, although they are uncommon and stand the risk of being tagged race or gender traitors.

Whilst there is no single all-embracing statement about the core tenets of underrepresentation for STEM women of colour within the context of intersectional discourses, many scholars identify a similar set of characteristics that have been conceptualized as both direct and subtle ways by which certain groups are marginalized, particularly how greater power relations seem to be naturalized in white-male bodies within British academic landscape and how HE policies serve the interest of more of white-male working class (cf. Beeda *et al.*, 2011; Hart, 2016; Robinson *et al.*, 2016; Collins & Steffen-Fluhr, 2019). Arguably, this mechanism births processes which consciously and unconsciously put BAME women in STEM in disadvantaged positions within the academy in economic, cultural and political dimensions. In this regard, patterns of marginalization would involve institutional climate that, though projects appearance of inclusion and diversity, is truly unfriendly towards it and lacks equality.

Additionally, there is the hegemony that STEM spaces are that of men and men alone, which results in what Wright *et al* (2007) describe as “routine practices” that prevents parity of participation for women, especially those of colour. All these are made manifest through the provision or should I say the discriminatory provision of services to this group of women, including inequitable employment practices, non-inclusive occupational culture, inadequate research support and their disproportionate representation in STEM faculties across UK HEIs (Johnson, 2011; Main, 2014; Xu, 2015). These issues will be discussed extensively in subsequent sub-sections of this review.

2.3 The imperative of inclusion for STEM women of colour in UK HEIs

Over the past two decades, there have been several calls for gender and racial parity in STEM fields particularly in British academia, as gender equity and racial diversity is increasingly an indicator of development and global acceptance in network of higher education (Jackson *et al.*, 2013; UCU, 2013; Charleston *et al.*, 2014). Unfortunately, it appears that the situation has not changed much, despite the significant benefits of STEM in maximizing individuals’ opportunity and the UK’s innovative capacity. Invariably, STEM spaces in British HEIs continue to betray a gender bias and privilege whiteness. For example, records have it that as of 2019, women in STEM constitute only 13 percent of UK STEM workforce (UNESCO, 2019, p. 2). This statistic brings to fore the huge gender

disparity between men and women exploring STEM careers. Yet, available evidence suggests that women particularly those working in STEM fields have unequal access to resources, decision-making power and participation in UK HEIs, which undermines parity of participation in two major ways.

First, women of colour are not able to participate at parity with men in STEM and exercise their rights when they barely have the same access to opportunities. Secondly, this group of women have different working experience from men due to gender stereotyping, exclusionary practices and intense surveillance amongst others. The drivers of these systemic inequalities in STEM have informed policy making and global agendas like the sustainable development goal 5, target 8 - which aims to “promote gender equality in all spheres and seeks to empower women and girls in science and technology specifically by 2030 and beyond” (United Nations, 2016). However, it is disheartening to note that much remains to be done towards this goal in British academia, as STEM fields are still male and white spaces and women are hardly involved in developing STEM policies (Charleston *et al.*, 2014; Ong *et al.*, 2018).

This underscores the need for inclusion for women of colour, since their presence, visibility and voices in white and male-dominated spaces like STEM are requisite for dynamic participation in British academy (Atwater, 2000; Main, 2014). Although there have been minimal changes in terms of the presence of BAME women in STEM in recent times, progress towards gender parity for true visibility and position of power has stalled, making leadership in STEM fields exclusively dominated by ‘white male bodies’ (Jackson *et al.*, 2013; Van den Brink & Benschop, 2014; McGee & Bentley, 2017). The overarching gender and diversity imbalances in senior positions within British academia is unacceptable. Thus, it is not only necessary for women of colour in STEM to be adequately represented in UK HEIs but also given the deserving recognition and support to favourably compete with their male and female white counterparts. This mitigates the effects of failure, which Bourdieu (1999, p. 424) describes as a “permanently flayed or mutilated self-image that can last a lifetime on people’s identity.”

Generally, BAME women have been historically marginalized in economic, social and political domains in British academia such that racial stereotyping and microaggression persists to points where these women are ostracized by colleagues during official meetings and social functions and hardly have female colleagues like themselves to share the burden of alienation (Croxford, 2018; Rollock, 2019). Hence, parity of participation is elusive especially for women of colour in STEM fields, although the UK Equality Act of 2010 provides the legal framework against all forms of discrimination in workplaces based on gender, class or race (GOV. UK, 2013). Thus, like Walker (2012, p. 385) opines, it is imperative to consider the issue of underrepresentation of STEM women of colour in UK academy “...not just because widening participation for *all* (equity) is a contemporary agenda of global education goals but also to reflect a diverse academic landscape that provides a level-playing field for *all*, with equal respect and dignity.”

2.4 Post-colonial bodies: Women of colour as subjects of intersectional inequities in British academia

The age-long inequities of underrepresentation for women of colour in white and male-dominated spaces like STEM in UK HEIs have been debated as a complex intersection of gender, race, class and colonize/colonizer realities (hooks, 1994; Casey, 2003; Gopal, 2019). Intersectionality provides a useful ontology of how several forms of inequalities and identities inter-relate and how marginality is systematically lived out in the everyday experience of BAME women as a result of the interconnectedness of multiple embodiments and identities (Crenshaw, 1995; Mirza, 2018). Also, it signals a move towards a more realistic approach than the double or triple jeopardy models of never-ending listings of identities and social positions, capable of shattering the coherence of scholarships of inequality such as this (Collins, 2008; Gillborn, 2015).

This is so because the concept of intersectional marginalization is complex, as people can belong to many groups simultaneously, with complex identities shaping the unique ways marginality is experienced. Males and females, for instance, often encounter racism differently, just as women of different race experience gendered racism and sexism differently. Thus, as Gillborn (2015, p. 279) cautions, care must be taken not to engage in continuous sub-division of experience of marginality into increasing identity categories, else “...we stand the risk of paralyzing progressive thoughts.” This is because we cannot

possibly exhaust the list of identities and social positions, even if we choose to engage in never-ending banter of academic claims and counter-claims.

Nevertheless, the term “embodied intersectionality” as scholars have conceptualized it provides a sense that the “othered” woman’s narrative and symbolic struggle within the academic landscape in Britain supersede the materiality of her educational experience (Crenshaw, 1995; Mohanty, 2003; Mirza, 2018). Moreover, available evidence suggests ways in which regulatory discourse of power and privilege have been storied, such that it is impossible for post-colonial women of colour to escape their embodied construction as ‘feminine coloured other’ (Wright *et al.*, 2007; Rollock, 2019). Thus, in the next section, I draw on Edward Said’s (1978) *Orientalism*, a postcolonial perspective to delineate how women of colour in STEM are ‘constructed’ as gendered and raced subjects in British academia.

2.5 Theoretical frameworks and analysis

2.5.1 Said’s Orientalism: A postcolonial perspective to under-representation of STEM women of colour

According to Said (1978, p. 10), “*Orientalism* is an ideological style of thought based on ontological and epistemological distinctions between the East and West which he calls the ‘Orient’ and ‘Occident’ respectively.” Simply put, it is a power relationship between the Orient and Occident with varying degree of complex hegemony, whose dynamics erroneously portray a relatively greater strength of the Occident and suggesting that Western society is developed, rational and superior while the East is essentialized as static, inferior and underdeveloped (Robbins *et al.*, 1994; Owen, 2012; Kayaalp, 2017). Said however argues that the Orient is a constellation of ideas and not just mere crude entities created and ‘Orientalized’ (neutralized of cultural identity and modernized), although the contrast suggests that ‘western bodies’ constitute the dominant subject and possess superior knowledge; thus, silencing the knowledge and voices of the ‘lesser others’ (Spivak, 1988; Santos *et al.*, 2007; Gopal, 2019).

For post-colonial women of colour, entering STEM fields in the very heart of whiteness and male dominance is not only a courageous move but also an institutional symbol of diversity and inclusion. However, many women of colour recount their career experience in British academia as emotional and a professional burden (Spivak 1988; hooks 1994; Mirza, 2018). Nonetheless, as Spivak (1988, p. 274) cautions, “care must be taken not to label women of colour in British academia as ‘victims’ for such storying in themselves do not eliminate the negative stereotypes and invisibility entrenched in our thoughts.” On the other hand, recognizing and embracing their difference is not good enough as Mohanty (2003) puts it. Instead, “women of colour in higher education must be vigilant of their embodied construction as pseudo-multicultural others” (Hall, 1996, p. 10).

While sharing her struggles for space in UK higher education, Simmonds (1997, p. 232) claims “she cannot escape the thought of being looked upon as a black woman and perceived as ‘the other’ although she is British by nationality.” After two decades, these claims remain true as Mirza (2018) asserts that BAME women working within British academia are preconceived as “oriental” who are identifiable but ‘invisible’ and ‘voiceless’. The desire for colonized bodies as ‘spectacles’ – embodied objects only to be seen but not heard or respected as knowledgeable, Said (1978) maintains is an extension of the western machination of dominance. Yet, Mohanty (2003) states that feminist scholarships inadvertently validate western women as the only lawful subjects of struggle, such that some white female academics within STEM faculties contribute to excluding their BAME counterparts, despite expressing commitment to gender equality.

Rollock’s (2019, p. 5) study shows how white females subscribe to the views of white male academics while ignoring the invaluable contributions of BAME women. Such denial in the discourse of women of colour is a form of “epistemic murder” – an Eurocentric hegemony that seeks to undermine and exclude the knowledge of marginalized people or ‘lesser others’ (Spivak, 1988; Santos *et al.*, 2007; Santos, 2014). Additionally, research contained in a recent report titled; *Staying Power* for UK’s University and College Union shows that there are only 25 BAME female professors out of the 85 BAME professors in UK HEIs (Rollock, 2019, p. 6). This data is consistent with statistics from Advance HE (2018) which reveals that less than 1 percent of UK professoriate are black females compared to 11.2 percent of

white individuals who occupy this position. Invariably, white academics are over 11 times more likely to be professors than black females (*The Guardian*, 2020).

The figures are even starker for women in STEM disciplines in British academia, such that the very few feel isolated, marginalized, undermined and have their competences challenged (Atwater, 2000; Johnson, 2011; Rollock, 2019). This again supports Mirza's (2018) assertion that British academy is still a hideously 'white space' rarely open to change. Again, in an article in the *Times Higher Education* (2014), the under-representation of black academics is further highlighted, with particular reference to the ranks of BAME female academics in senior positions. Available evidence from the article shows that apex positions in UK HEIs like that of Vice and Pro-vice chancellors typically remains a white preserve. At professorial level, there are only 0.02 percent of BAME female academics while white male staff are more likely to be senior lecturers by 17.8 percent compared to 9.3 percent for BAME female staff. This institutionalized pattern of inequity is yet discernible within the staff distribution according to discipline in British HEIs from recent data of Higher Education Statistics Agency (2019, p. 18), which reveals that "...out of the 25 BAME female professors, only 5 are in medicine and 4 in science and technology fields." The remaining are accounted for in the humanities and social science disciplines.

Yet, the situation is no better with regards to research support. In another article by Baker (2020, p. 2), available evidence suggests that research grants success rate for BAME researchers, particularly women, is acutely low compared to that of their male and white colleagues. The figures reveal that as of 2018/19, white male researchers have a success rate of 10 percent (27 percent) higher than female BAME colleagues (17 percent), despite the increasing proportion of applicants in recent years. Further, a gap remains in grant success rates for research depending on the race/ethnicity of co-researchers. Evidence shows that research co-investigated with white academics have a success rate of 27 percent, 5 percent more than that of BAME academics, which is 22 percent (UK Research and Innovation, 2020). Whilst there is increase in the success rate of research grants for women and BAME academics in recent times, there is continued gender and ethnicity gaps in grant awards.

Moreover, regarding job permanency, it is a fact that relatively fewer white academics are on short-term, insecure and casualized contracts (Wright *et al.*, 2007; Read & Leathwood, 2020). Records show that 49 percent of academics in UK universities are on insecure contracts, with women especially those of minority ethnic origins more likely to have casualized contracts than their white-male counterparts (University and College Union, 2016, p. 4). Again, these statistics prove the low numbers of BAME female academics within British academia and the tendency of very few of them to occupy senior positions, with high likelihood for many of these women to have fixed-term working contracts. Little wonder, increasing numbers of study major on the experiences of this group of academics and the impact of such phenomenon on their dependable income, professional identity and self-esteem (Ylijoki, 2010; Casad *et al.*, 2019; Leathwood & Read, 2020).

While it is important to examine the statistics, like Said (1978), I am by no means advocating for just numbers or meritless preferential treatments for BAME women in British academia as the ultimate, for such conjecture will signify the mere presence of women of colour as the attainment of equality and diversity. This is what Hall (1996, p. 5) describes as “a multicultural drift – an appearance of diversity but a lack of true equality”. The issue of underrepresentation in STEM is not only an advocacy for numbers or physical space for post-colonial women of colour. It transcends to the right to occupy a historical space. This is what Said (1993a) means when he clarifies that:

“...the Orientals’ critique of history involves not only coming to terms with absences and strategies of distancing and aestheticizing the metropolitan split... but also in ways in which they are made visible when chosen to be seen... which demands the poetry of decolonization and resistance - an alternative way of conceiving human history...” (p. 216)

The foregoing argument, coupled with the quote above highlights the failure of British HE spaces to address the issue of institutional racism head-on, as evidenced by the disproportionate representation of BAME female academics in the lower academic cadres and their consequent dearth within senior or professorial ranks in British academia. Again, Said (1993a) specifically challenges the acclaimed ‘visibility’ for STEM women of colour, which can be interpreted as increased surveillance for this group of academics. To have a full grasp of the plight of BAME female academics, particularly those in STEM, I turn to race and cultural theoretical conceptualisations in the next sub-section to provide useful insight to the experiences of STEM women of colour working in white academic enclaves.

2.5.2 The politics of containment for women of colour in UK HEIs: A bane to gender and racial parity in STEM

Previously, segregation of women of colour was a whiteness tactic to keep these women from places of position and privilege. However, in recent times, intense surveillance is employed as a 'tool' to check BAME women entering 'white spaces,' making them more 'visible' in previously homogeneous spaces such as STEM in terms of race and gender (Casey, 2003; Collins, 2008; Mirza, 2018). This shift has birthed a reconfigured system of institutionalized colonialism, which Said (1993a, p. 109) terms the "microphysics of imperialism" described by Robbins *et al.* (1994) as the "politics of containment". This suggests that BAME female academics are under constant surveillance to ensure that they remain racially neutral and are 'absorbed' into white supremacy. While being integrated is a necessity to make the 'white other' feel empowered, it is also a ploy to set itself against the Orient by trying to neutralise and subjugate 'them' of their ethnic identity - a result of the marking of distinctions and the exclusion of internal differences, rather than a symbol of naturally-constituted unity in diversity (Ahmed, 2009; Gopal, 2019; Newsinger, 2019).

Notwithstanding Western colonial agendas, Said (1994) argues that attempting to neutralise intellectuals is futile. In his words, "intellectuals cannot be reconfigured into neutral entities, standing above all and pontifying" (p. 3). This is so, for what Said (1978) repeatedly referred to as 'contrapuntal reading', which I understand as a kind of reading that takes back and forth across the 'activated knowledge divide' – the distinction between the knowledge of developing and developed nations, which allows for comparison and seek expressions of resistance, where dominance is found (Owen, 2012; Kayaalp, 2017). With regards to decolonizing British academies, the crux of Said's argument is that the legacy of supremacy (representing 'white male bodies') and its 'binary other' (comprising BAME women in STEM) are reinforcing each other in such a way that one cannot read one without the other. Although Said (1993a, p. 60) observes that the 'Western other' has deliberately structured the imperial narrative to "mysteriously exempt from analysis, the causes, benefits and evils of dominance where discussed."

Further, Said (1978) posits that to be 'unabsorbed' as an Orient into the world of the Occident, which is considered superior, is accompanied by high-level surveillance which can be distressing for women of colour. By high-level surveillance, he means not just held accountable but also increasingly search-lighted. For instance, while recounting her experience as a Black female professor, Mirza (2018) notes that although her appointment in the early 1990s was met with fame and diversity labels, she was compelled to account to three line managers while constantly pressurized to write reports on how to deliver race equality at University College London within the first three months of her appointment, without concrete academic research support. Consistent with Mirza's claims, national surveys on ethnic minority in UK HEIs show that women of colour, than any other group, are more likely to suffer discrimination at work in form of bullying, intense scrutiny and sexual harassment (Equality Challenge Unit, 2011; UCU, 2013; Bhopal *et al.*, 2015).

Increased visibility for women of colour in white-male dominated spaces such as STEM also comes with other psychological and emotional costs, which Spivak (1988, p. 274) captures when she talks about the daily trauma experienced by women of colour. She claims that BAME students are more likely to drop out of HEIs before completing their course for a number of reasons, including but not limited to; feelings of isolation and hostility. This worrying development indicates that this group of 'other' students live in spaces where they feel like what Bourdieu & Wacquant (1992, pp. 127-128) describe as "fishes in water that do not feel the weight of the water... because the world around them produces the category of thought they fit into." This implies that BAME women working in STEM spaces are compelled to fit into 'small boxes' for acceptance.

The situation is not any better for ethnic minorities of working class, who face discrimination when attempting to join HEIs. For this reason, scholars infer that 'coloured bodies' primarily self-exclude themselves from 'white spaces', where they are most likely to be excluded (Bourdieu & Wacquant, 1992; Reay *et al.*, 2005). Baxter (2020) is an example of a BAME woman who left STEM mainstream because of a lack of inclusion and equal respect. In her very recent article, she revealed how being a professor in HE is considered a privilege. According to Baxter (2020, p. 4), "...when people see that a person of colour has this privilege, they immediately become suspicious... Being a female makes it

even worse, as this privilege is thought to be misplaced altogether, when it is with a BAME female academic." This feeling of being 'boxed' and not considered as being worthy to be an academic in STEM, is a major factor that contributes to women, especially those of BAME origins, to leave STEM (Beeda *et al.*, 2011; Seron *et al.*, 2018; Ong *et al.*, 2018).

Further, the high culture within STEM spaces as evidenced by studies does not permit women, particularly those of colour to be unapologetically themselves (Johnson 2011; Casad *et al.*, 2019). This concern is captured in Robinson *et al.* (2016, p. 32) words, when they implied that "...as a woman in STEM space, you are not allowed to be goofy, especially if you are black or of minority origin, else you will not be taken seriously". Invariably, this force many of these women to maintain a false identity within STEM faculties to survive (Kaminski & Geisler, 2012). Moreover, Collins & Steffen-Fluhr (2019, p. 270) report the deliberate exclusion of STEM women of colour in forms of their white counterparts having very brief impersonal interactions with them or outrightly avoiding them during faculty meetings or events. All of which, I opine, stems from the construction of these women as 'tokens' who are incapable of doing the job they are hired for, even when their qualifications and credentials prove otherwise.

Drawing on Foucault's discourse on *Discipline and Punish*, Said (1978, p. 11) recognizes that, as a result of Orientalism, the Orient, who in this case are STEM women of colour in British academia, "have not and will not be subjects of free thoughts and actions." Nevertheless, he clarifies that Orientalism does not arbitrarily decide what the Orient will be, although it is the sum of interest brought to bear when it concerns the Orient. As such, Said (1993a) recommends that marginalized groups should theorize their experiences from disadvantaged positions to eliminate colonized/colonizer categorizations. This is in accordance with Gopal's (2019) stance that BAME women's theorization of their experiences from 'places of pain' creates a sense of consciousness and common struggle against all types of oppression, including class inequality, sexism, patriarchy, racism and colonialism.

Resistance culture, a dominant theme in most parts of Said's scholarship, indicates a progressive approach in defining the main instruments of cultural decolonization, reconstruction of marginalized groups, and self-conscious repossession of culture (Owen, 2012; Kayaalp, 2017). Said's *Orientalism* and subsequent *Culture and Imperialism* both emphasize the need for BAME women to reclaim and rename the academic landscape in UK HEIs, re-inhabiting it through storying frequently told from non-canonical genres of resistance (Said, 1978; 1993a). In view of this, Robbins *et al.* (1994, p. 15) opine that Said's approach is "a rather revolutionary strategy of deconstructing categorizations and dismantling Eurocentric hegemony, which reduces women of colour to their mere embodied 'otherness' based on white supremacy and patriarchy." Although as they rightly point out, women of colour in British academia, especially those in STEM do not automatically experience decolonization by the implementation of anti-segregation rules but through the conscious 'fight for freedom'. Now, I turn to Fraser's threefold analytical model of social injustice.

2.5.3 Fraser's theorizing of social injustice: Underrepresentation of BAME women in STEM

For Fraser (2005, p. 73), social inequality manifest itself in three-dimensional forms including; maldistribution, misrecognition and misrepresentation, which she claims are prohibitions to participatory parity for marginalized groups. Like other scholars, Fraser (2007b) argues in her later model, titled; *Abnormal Justice*, that while education is paradoxically a major factor in reproducing and legitimizing current inequalities, it is equally a mechanism for resolving them (Freire, 1970; Bourdieu & Wacquant, 1992). According to her, the 'politics of education' lies at the very heart of keeping society equal, while also stating that problems like underrepresentation of women of colour in STEM is a nuanced intersection of gender, class and race.

Thus, Fraser (2005) maintains that redistribution, recognition, and representation are essential for participatory parity for disadvantaged groups. Collaborating Fraser's argument, Rawls (2009, pp. 14-15) asserts that "inequalities are only just if they result to the allocation of benefits for all, particularly the least advantaged members of society."

Therefore, Fraser (2005) adopts a heuristic approach in disentangling and analysing the three domains of injustices as economic, cultural and political by stating that:

“...whether the issue is distribution or recognition, disputes that used to focus exclusively on the question of what is owed as a matter of justice to community members now turn quickly into disputes about who should count as a member and which is the relevant community. Not just the ‘what’ but also the ‘who’ is up for grabs.” (p. 72)

This quote from Fraser broadens the scope of debate from what constitutes justice to who should matter in justice. Further, she raises concerns about economic inequalities like; how much economic inequality does justice allow? How much redistribution is required and under which distributive justice principle? (Fraser, 2005, p. 73). Search for answers unearth shocking revelations, indicating that BAME female academics are deprived of deserving placement with regards to salaries, benefits and workspaces. For example, an article in the *BBC News* by Croxford (2018) reveals that BAME academics earn 26 percent less than white colleagues at top UK universities. Further revelation in the article shows that in 22 out of all 24 UK universities within the Russell Group, the average annual salaries for white academics are £52,000, £38,000 for black academics and £37,000 for Arabian academics.

Female academics fair much worse, with gender-pay disparity on top of ethnic-pay gap. The figures show that the gender pay gap for ethnic minority women is more pronounced, with BAME female academics earning 39 percent less than white academics. According to Fraser (2005), these injustices can be resolved by the politics of redistribution; removing financial barriers and reallocating resources to address deficits. Again, towards greater parity of participation for BAME women in STEM, Fraser (2007c, p. 76) recommends that mainstream discourses on economic equality should transcend UK HEIs to appropriate authorities for remuneration through advocacy challenging the status quo for equitable remuneration structures. Though she cautions that 'surface resource redistribution' will only create further group distinctions and stigmatization especially for marginalized people, making them objects of 'special attention' in public spaces (Fraser, 1997).

Nonetheless, Fraser (1994, p. 84) observes that “public counter-spaces are domains where women of colour can galvanize support for the invention and circulation of discourses that forms opposing views of their interests, identities and needs.” This brings me to cultural

injustice which entails a lack of equal respect and recognition for the status and agency of BAME female academics in STEM. According to Fraser (2005, p. 72), these strategies are designed to subject 'others' to conform to communication patterns and behaviours alien to theirs. They include efforts to exclude, censor, homogenize, silence and render invisible women of colour in STEM through communicative and interpretative praxes (Power, 2012). To address the question of what constitutes equal respect, Fraser (2007c) acknowledges that non-recognition for marginalized groups is at the intersection of structure, culture and agency. As such, she opines that this form of injustice require recognition, which demands affirmation strategies that allow misrecognized individuals to up their low status and reclaim their 'despised' identity as full partners in participation (Fraser, 2010).

2.5.4 Deconstructing categories within British academics

While stressing the need to deconstruct categories that underpin class and status differentiations between groups, Fraser (2005, p. 73) maintains that such categorisations are responsible for the misrecognition of marginalized groups. Therefore, she proposes reallocating respect to stigmatized identities (women of colour) by according equal recognition to the qualifications, competences and agency of these women. By this, they are made visible and the negative stereotypes pervading every aspect of their academic career is challenged (Fraser, 2005; 2007c; 2009). This is against the backdrop that 'white-male bodies' are labelled as natural fit for STEM academic roles while 'others' are marked as 'trespassers' (Robinson *et al.*, 2016). With strategies of affirmative action and the deconstruction of labels, attention is drawn to peculiarities within HEIs regarding the social, cultural and political histories of BAME women in STEM (Fraser, 2007a).

Again, while several authors dispute claims that women of colour in British academia are 'space invaders', with second-class expertise, they argue that these group of women come with wealth of ideas, with subaltern perspectives coexisting and rivalling Western perspectives (Spivak 1988; Santos, 2014; Mirza 2018; Gopal, 2019). Olson's (2008) analyses of Fraser's theorization of cultural inequality indicates that many white male academics assume that ethnic minorities, especially 'black bodies', hold inferior qualifications and competences, and are desperate to enter 'white academic world'. Fraser

(2007a) argues that these aspersions are affronts to the intellectual capabilities of people of colour, and a misrecognition of their embodied identities. Therefore, in what she terms 'counter-hegemonic spaces' (both virtual and physical spaces where minority ethnic individuals can challenge the tripartite forms of injustice), Fraser (1994) suggests that BAME women should be assertive in their independent personas in fighting the hostilities and domination of higher education in white and male-dominated spaces like STEM.

Like Said (1978), Fraser (1994, p. 84) argues that counter-hegemonic spaces are vantage positions for women of colour to create discourses to reframe their identities and interests. Through quiet but subversive actions, she contends that BAME women in British academia with their 'other knowledge' can reclaim opportunities for themselves by means of transformative pedagogy, which is subtle on the surface but intentional towards inclusion and equity. This is in view of Freire's (1988, p. 19) claim that there is no such thing as neutral education, because "...education either supports or opposes the dominant philosophies of certain political class." Fraser (2009) therefore argues that women of colour can develop, on this margin, a sense of collective space through strategic self-actualization and redefinition process.

While spaces can open up for women of colour to counter gendered racism, Fraser (2005, p. 74) notes that the post-Westphalian frame (a perspective suggesting that national boundaries are blurred, making it difficult to determine who should be recognised and represented) continues to complicate the 'what' and 'who' of justice, which is concerned with finding answers to questions like; what constitutes justice and who are the relevant subjects entitled to fair distribution or equal recognition? Fraser (2005) maintains that, in a globalizing age, these two dimensions of justice alone are insufficient to resolve the tripartite problematics of justice. Thus, she calls for the politics of representation to tackle the problem of 'how of justice', which she explains as ways institutions structure contestation to exclude BAME individuals from participating at parity (Power, 2012). This is in view that "the distribution of fundamental rights and powers by institutions determine the division of advantages which individuals are entitled to" (Rawls, 2009, p. 7).

This contributes to misrepresentation for marginalized groups and further strengthens the 'sheer weight of whiteness' – the resolute structures of white supremacy, which is blatant and almost impenetrable in prestigious UK academies like Oxbridge (Mirza, 2018, p. 7). In pursuit of parity, particularly in the political domain, Fraser (2007b) emphasizes the need to eliminate institutionalized barriers that prevent disadvantaged groups from participating at parity with 'others'. Besides, representation politics recognises, though not entirely, the rights of individuals by seeking to eliminate obstacles through the empowerment of human rights and increasing representation for marginalized people. Olson (2008) clarifies that this dimension of participatory parity can be achieved by legitimizing the rights of ethnic minorities, such as STEM women of colour in British HEIs, and by putting in place mechanisms that allow these women to participate equally.

2.5.5 Decolonizing UK higher education spaces

Said's (1978) *Orientalism* provides a historic lens towards addressing the issue of underrepresentation of STEM women of colour in British academia. Using this theoretical lens, I reveal how regulatory discourse of power and privilege are constructed and performed to the detriment of BAME women, who are categorized as Orientals by means of binary othering, while male white academics attempt to 'Orientalize' them (Said, 1978; Robbins *et al.*, 1994; Owen, 2012). By theorizing their experience through non-canonical genres of resistance, Said argues that BAME women in white and male-dominated spaces can cross the "activated knowledge divide" and counter the imperial referent of the West, denying metropolitan texts and excluding from history the contributions of women of colour working within British academia (Said, 1993a; Robbins *et al.*, 1994; Kayaalp, 2017).

In view of further decolonization, Said (1978) emphasizes the importance of reading the present inequities particularly against people of colour retrospectively to have a full grasp of the powers and affiliations which informs and enables them. This he maintains is at the very heart of 'contrapuntal reading' and requisite for the construction of decolonization texts which create counter-arguments to the unrelenting and ethnocentric visions of the West. According to Gopal (2019, p. 3), "decolonization is not a proceed of the benevolence of imperial initiative, where paternalist policymakers simply bestow rights and privileges on marginalized groups." Thus, Said (1993a) argues for a rather radical strategies towards

the recovery of equal presence, right and respect for women of colour in British academia, although the ideological perspectives of binary othering of East and West stand the risk of superficial analysis and rhetorical measures towards true representation for this group of women.

Fraser's (2005) perspective on social justice on the other hand shows how inclusion policies within UK HEIs can sequentially attempt to address injustices in economic, cultural and political domains, with marginalized groups playing key roles towards change from places of marginality. Central to Fraser's concept of participatory parity is the idea that justice for *all* is only possible when the political economy reflects an equitable distribution of wealth; when equity is reflected in patterns of cultural recognition and when the political space ensures equitable representation (Fraser, 2005, 2007a, 2007b, 2007c). Additionally, her theoretical construct of the post-Westphalian frame facilitates comparisons beyond national contexts, where specific political traditions interfere (Power, 2012).

Notwithstanding Fraser's (2005) observation that political traditions are specific to national context, she argues that social injustices are more universal as they contribute globally to marginality within HEIs. Approaching underrepresentation of STEM women of colour according to categories of institutionalized barriers permits one to draw comparisons at specific levels sufficient to produce meaningful changes in UK HE policies of equality and diversity. I thus contend that Fraser's model is a realistic framework for two major reasons. First, it considers the details in line with the overall goal of decolonizing British academia. Secondly, unlike Said's *Orientalism*, it avoids the overly ideological perspectives of addressing marginality in ways that transcends creating binary distinctions of East and West.

Although, Fraser's analysis of 'who should count' under the post-Westphalian frame reveals in-depth discourses of change and continuity, which are highly contentious and can be misconstrued as reframed dominance for 'white male bodies' in British academia (Fraser, 2010; Olson, 2008; Power, 2012). Nonetheless, taking a critical view of the different aspects of social injustices, Fraser's (2005) tripartite model shows the different domains of injustice that need to be addressed and expresses the difficulty in building socially just

HEIs in the UK, with respect to women of colour in STEM. This informs Gopal's (2019, p. 56) remark that the age-long marginality of women of colour within British academy is all but novel, as white male bodies have always possessed an inequitable monopoly of the academic landscape. As such, the discourse of decolonization is neither a storying of a new history nor an unearthing of an entirely new archives. This is what Said (1978, p. 27) means when he states that his project "...has been to describe a particular system of ideas, not by any means to displace the system of ideas with a new one."

Nevertheless, post-colonial and social justice theorizations as conceptualized by both Said and Fraser seek to challenge patriarchy and racism in fields like STEM in British academia. They are rooted in anti-colonialism, encompassing 'fights' against slavery, apartheid, discrimination, prejudice, marginality and even xenophobia. In recent times, anti-colonial approaches have critiqued both theoretical perspectives for dwelling more on discourses and narratives of decolonization, which may seem just 'words' insufficient to bring about the desired equity of race and gender (Owen, 2012; Gopal, 2019). For instance, in Kayaalp's (2017) critique of *Orientalism*, he faults the theory on the basis of its advocacy for "new departures" without practical attempts to address the issue of racism, other than give instances and allude to domination and marginalization of minority groups like STEM women of colour in British academy.

However, I would argue that although discourse may appear to be words and not a physical fight or war, they can play pivotal roles in dismantling the (re)production of contemporary racism and patriarchy (Teun & Dijk, 2015). This is particularly true in the case of STEM women of colour, who face intersectional marginality amidst scholarly elite control. Again, in the 'fight' for equal recognition, respect and participatory parity, discourse could be a veritable tool for countering all forms of discriminatory social practices directed against BAME women like microaggression at faculty levels and full-blown marginalization at system levels (Robinson *et al.*, 2016; Casad *et al.*, 2019). Moreover, discourse of decolonization supported by Said's *Orientalism* and Fraser's tripartite model of social justice is useful in marginality issues, wherein BAME women are reduced to mere embodied others. Thus, contrary to opinions held by anti-colonial theorists, I surmise that discourse lies at the heart of addressing institutional racism and patriarchy in 21st century higher education spaces.

CHAPTER 3: METHODOLOGY

3.1 Introduction

In this chapter, I present the methodology adopted in the study and the rationale behind my chosen procedures in addressing the research questions and realizing the aims of this study. This will provide my readers the ability to critically evaluate the study's overall validity and reliability. Thus, this chapter encompasses the methodology, ethical considerations, limitations of the study and my position in this dissertation.

3.2 Methodology

For this study, I thematically reviewed literature on the topic of discourse. I chose a thematic literature review (TLR) as opposed to a primary data research methodology, given the COVID-19 pandemic and the resulting lockdown in UK and many countries around the world. This made it impossible to conduct a survey, wherein data is collected primarily. More so, the Ethics Committee of the University of Glasgow recommended that all students should conduct a secondary data analysis for their dissertation due to the prevailing global health crises that forced restrictions on movement. Under the circumstance, a thematic review of literature was the most convenient option of exploring the views of scholars on underrepresentation of STEM women of colour in UK HEIs. Nevertheless, the TLR proved to be a rather useful methodology in organizing my data sources into themes and sub-themes in order of similarity and relevance.

Rather than organizing literature chronologically (according to dates of publication), the TLR helped me to conduct a thorough investigation and present a logical and comprehensive argument based on current state of knowledge, theories and concepts related to the topic under review (Snyder, 2019). In the words of Bryman (2016, p. 103), the thematic literature review is particularly a useful methodology in social research like this because it provides “an excellent way of synthesizing the findings of previous studies to reveal evidence on a meta-level and to highlight areas that require more research.” Invariably, it validates the claims of studies and forms a firm foundation for advancing knowledge. However, it has been critiqued for a degree of subjectivity in the review process and a lack of focus on concerns of education practitioners – implying that it does not necessarily lead to better evidence-based practice (Hammersley, 2001; Snyder, 2019).

However, to fully explore the topic of underrepresentation for STEM women of colour in British academy, I thematically reviewed literature published between 1 January 2000 and 30 June 2020, wherein the findings of study on BAME female academics, especially those in STEM fields reported inequality gaps and experience of marginalization in economic, cultural and political dimensions. I sourced these literature using majorly manual search engines and electronic databases like Goggle Scholar, Social Science Citation Index (SSCI) and Social Science Research Network (SSRN). A few literature were also sourced from the University of Glasgow library online, while I also included some literature based on the recommendation of my dissertation supervisor. Keywords like; underrepresentation, decolonization, British academia, women in STEM, women in HE and STEM diversity were indexed to search the title, abstracts and references of publications.

To mitigate bias in publication selection, the pool of eligible literature resulting from the searches were eventually trimmed to include those wherein reported data correlates with inequality criteria of earning gaps, cultural misrecognition and disproportionate representation (Nowell *et al.*, 2017). The potential literature were further subjected to selection to include studies directly related to my research questions. Subsequently, I produced a thematic literature grid for my ease of reference (see literature grid in Appendix 1, p. 55). For quality assurance, studies included in the review consists of majorly peer-reviewed articles sourced from journals of higher education and gender studies. A few books, grey literature and relevant news articles were also included in this study. Resulting literature from the selection process produced scholarly works rich in volume and content quality. While analyzing data, I observed similar threads running through many of the literature regarding the underrepresentation of women of colour, particularly those relating to marginalization and the paradox of (in)visibility.

Subsequently, I adopt majorly Said's (1978) post-colonial and Fraser's (2005) social justice theoretical lenses influenced by a poststructuralist perspective to explore the topic under review, while other scholarly conceptualisations were used to support the analysis. Although the theoretic frameworks and backings do not reflect the same time range as the reviewed literature, they proved essential in the contemporary discourse of marginality, as they help to shed light on the traditional power relations between white male academic

and their coloured female counterparts working in STEM spaces. This in part helped to refute enduring notions of privilege and power, particularly the assumption that all academics are privileged, equally recognized and secured (Seron *et al.*, 2018; Collins & Steffen-Fluhr, 2019). The fluidity of the post-structuralist perspective I adopt in this study provided a sound analytical framework for accomplishing the broad aim of this dissertation – which is to decolonize British academies by exploring underrepresentation of women of colour in STEM.

After a rigorous analytic synthesis, I generated 2 major themes from the reviewed literatures to explicate the multi-dimensional nature of underrepresentation faced by STEM women of colour in British academia. They include; 1. Marginality and hyper-surveillance as an exclusionary tactics of whiteness 2. Empowerment strategies for true visibility and representation for STEM women of colour. For the discussion of the findings of the review, I adopt a thematic method of analytic presentation, with sub-themes discussed schematically under the broad themes. While themes and sub-themes serve as heuristic devices to meaningfully organize the content of the discussion for my readers, I note that there are overlaps and continuity in the issues described in each of them. To buttress the discussion, I include accounts of marginality experienced by STEM women of colour contained in the findings of selected studies in my review.

3.3 Ethical Considerations

This dissertation is carried out in line with the University of Glasgow's ethical guidelines on conduct of research. While the review utilized mainly secondary data, I ensured that all literature collected and analyzed for this dissertation was used solely for research purpose. Excerpts of autobiographies and transcribed interviews from studies is treated with anonymity. To err on the side of caution, certain texts of excerpts have been edited and replaced with more appropriate terminologies without altering the meanings of the quote. Where word(s) have be removed to facilitate succinctness and coherence, they have been indicated by three full stops within quotations. Further, in accordance with the University of Glasgow's prescribed method of citation, I have referenced all academic sources using the Harvard referencing style. While I reiterate that this work is an objective reflection of the trends of marginalization experienced by STEM women of colour in British HE spaces, I

will also like to disclaim that it is not an attack on white people, neither is it an affront on white male academics or British higher education institutions.

3.4 Limitations of Study

In this study, I faced some limitations during the review especially. Chief among these limitations include my inability to find surplus amount of literature on diversity in STEM. Many of my searches (both manual and electronic) generated articles on underrepresentation of women in STEM as well as the disproportionate number of BAME female academics in British HE spaces. Closely related to the aforementioned challenge, is the lack of proper workspace, since I had to work only from my small accommodation. This made me feel unmotivated many times and slowed down the pace of my work. These limitations are partly due to COVID-19 lockdown, which prevented me from accessing physical library space, materials and support. Again, having to work while carrying out the study also formed a part encumbrance to this dissertation. This meant that I had to prioritize my non-work days to utilize them effectively for study. Nonetheless, with the assistance of my supervisor and my tenacity, I carried out an extensive review on the topic, which I believe adds to the existing body of knowledge on STEM diversity.

3.5 My storying – I am *not* a feminist but an advocate of equality in STEM

I realize this caption may sound somewhat contradictory and that my position in this dissertation may come as a surprise to my readers, especially when it is coming from a male student of African origin. In this study, I take the position that, I am *not* a feminist but an advocate of equality in STEM, irrespective of race, gender, class or other forms of embodiments. However, this is not to say that I am embarrassed by the label – feminist, for I believe in the fluidity of positions and I am of the opinion that feminist movements should neither be reduced to labels nor negatively criticized for its image. Moreover, my use of the phrase – “I am not a feminist...” stems from the association of feminism with the advocacy for policies of affirmative action which seeks preferential treatment for women just on the basis of gender, which I believe undermines individual achievements and a commitment to merit.

As such, I use the caption to express opposition to policies that places the interest of women, especially those of colour, above others in STEM faculties without consideration for merit. Instead, I am making a case for true visibility and representation for women of colour in STEM spaces within British academia, who have gotten where they are not because of their gender or racial/ethnic identities but through their own hard work. With that noted, I provide a brief background that informed my decision to undertake this study. Between the year 2012 and 2016, I studied for a bachelor's degree in integrated science education at the University of Abuja, Nigeria. During this period, I observed a relatively lower proportion of female to male students on the course. In fact, of the 38 students who enrolled on the course in the 2012/13 academic session, only 8 were females, with 2 of them dropping out in the second year of study.

From informal conversations on reasons why female students do not enroll for science related courses, chief among the responses echo the idea that “science fields are men’s spaces”, where females could hardly thrive. Further, I noticed similar patterns of disproportionate representation for female staff-lecturers in the Department of Science and Environmental Education at the University of Abuja. This was one of the initial motivating factors of taking up the education public policy and equity course at the University of Glasgow. On my journey to Glasgow, I fortunately met a female Zambian student [name withheld] in Manchester. During our layover, we got talking and she mentioned that she was coming to the University of Glasgow to study bioinformatics at master’s level. I immediately got fascinated by her story and applauded her courage for taking up a science course abroad. Since our arrival, I have kept in touch with her and from our discussions, she confirmed that there were only 4 female students on her programme out of 15 students, with only 2 of them being of BAME origin. She also stated that she has had no female tutor for her taught courses, with similar patterns occurring for a friend undertaking computing science at the University also.

These realities got me interested in the subject of diversity in STEM particularly in British academy, because I observed that marginality for colour women within these spaces is not just an intersection of gender and class alone but that of race and ethnicity too. So, I did a preliminary review on the subject and I was shocked by the gross underrepresentation for

women of colour in STEM spaces, so much that I found limited numbers of literature on the topic (see for example, Johnson *et al.*, 2011; Robinson *et al.*, 2016; Ong *et al.*, 2018; Collins & Steffen-Fluhr, 2019). The situation is even worse with visibility and equal respect for these women, such that the few of them do not have the motivation to remain in STEM spaces. In the words of Raven Baxter (2020, p. 2), the Director of Collegiate STEM Initiative and an assistant professor of biology, “I am pained to be part of the numbers of BAME women who leave STEM mainstream, not because we cannot do the work, but because we are not included enough to remain.” It is against this backdrop that I decided to research underrepresentation of women of colour in STEM in UK HEIs, with a view to decolonizing British academy. While I consider the underrepresentation for these women in terms of numbers, research support and contracts of employments, I equally highlight the ‘invisibility’, which is manifested through hyper- surveillance, exclusionary tactics and epistemic violence for this group of academics.

CHAPTER 4: DISCUSSION AND CONCLUSION

4.1 Introduction

In line with my review of literature, I discuss the findings of studies, backed by autobiographies and diary entries which depict the underrepresentation of BAME women in British academia, especially those in STEM. In this chapter, I demonstrate the slow pace of change within STEM spaces in UK HEIs, with regards to gender parity and race diversity. I thus present the discussion under two major themes emerging from my review of literature. They include marginality and hyper-surveillance as an exclusionary tactics of whiteness and empowerment strategies for true visibility and representation for STEM women of colour. Based on my discussion, I conclude by making policy recommendations for deconstructing intersectional categories toward the decolonization of British academia.

4.2 Marginality and hyper-surveillance: Exclusionary tactics of whiteness

Within the context of neoliberal discourse of equality, HE spaces, including British academia is expected to uphold the culture of openness, fairness, objectivity and rationality, not only in theory but also in praxis (Wright *et al.*, 2007). This implies that everyone should be treated alike, regardless of race, gender, class or other forms of embodiment. However, my review has proven otherwise as evidenced by the literature, depicting exclusionary institutional practices, both in subtle and overt ways, resulting in excessive scrutiny in the career experience of women of colour, particularly those in STEM (Johnson, 2011; Robinson *et al.*, 2016; Casad *et al.*, 2019). Like Mirza (2018, p. 6), I reckon that this group of women are “endangered species” for they are very few in STEM with a high likelihood of attrition because of two major antagonistic forces which I shall discuss under the following sub-themes.

4.2.1 Excluding power of whiteness

While STEM faculties in British academia is labelled as a place not for many women, especially ‘coloured bodies’, few BAME women have yet entered these spaces with their qualifications and competences, indicating a sense of being on the inside. However, drawing on Wright *et al.*’s (2007, p. 153) scholarship, I would argue that these women are ‘outsiders-within’ because remaining within the STEM field is all about what they must give

up of themselves to belong. Findings of study by Casad *et al.* (2019) shed light on the experiences of exclusion faced by ethnic minority women in STEM spaces. According to them, some of these women “...have mastered the art of navigating the hostilities of HE by consciously integrating dominant dispositions of middle-class academic into their own working culture” (p. 472). This is exactly what Kaminski & Geisler, (2012) term “survival strategy” for faculty retention of BAME women in STEM.

Yet, women of colour in STEM faculties have been reported to have the feeling of being out of place despite adopting these survival strategies. The study of Robinson *et al.* (2016, p. 34) confirms this, when an interviewed respondent was quoted to say that; “on my arrival in the faculty, fellow white colleagues assume that I won’t do well... often they ignore my contributions and even go as far as casting aspersions on my views during meetings and interactions.” This account of exclusion continues to validate my ongoing argument that women of colour within STEM spaces lack a sense of belonging to their community of practice due to their construction as ‘imposters’. Again, this revelation indicates that BAME women by default are represented by all things poor and inferior within these spaces.

While scholars like Seron *et al.* (2018) observe that exclusionary practices can serve as a motivation for BAME female academics to achieve, it is extremely difficult to ignore how gendered and racialized experiences have made these women feel out of place. The sense of marginality shared by STEM women of colour leads me to allude to institutional and structural barriers in forms of whiteness and patriarchy, which foster the widely acknowledged phenomenon of ‘imposter syndrome’. This phenomenon has left many BAME women within STEM spaces with physical and mental health conditions, including but not limited to increased stress, fatigue, insomnia, panic attacks, anxiety, self-doubt and low self-esteem (O’Brien *et al.*, 2016; Robinson *et al.*, 2016).

Although evidence from reviewed literature shows that these women may experience varying degree of systemic patterns of racism and gender discrimination, many of these experiences of marginality is manifested through overt actions and more of micro-aggressions (Xu, 2008; Casad *et al.*, 2019). As a participant from the study of Wright *et al.* (2007, p. 151) puts it:

"...I have limited experiences of overt racism and stereotyping as a female person of colour, what I have experienced is more of tacit and indirect racism and sexism... one that is almost apologetic... Often, this is the structural pattern that is utilized to exclude one from certain privileges as opposed to blatant racism or sexism."

This account establishes that encounters of marginal positioning are more latent than blatant and notably expressed through particular embodied academics, which are most often white-male bodies. Additionally, participants in Jackson *et al.*'s (2013, p. 71) study report overhearing white academics passing unpleasant remarks on how people of colour do not belong and can *never* be fully accepted within STEM faculties. In my opinion, overt racialized experiences like these are easier to process than the many forms of microaggression, even though neither of them is acceptable. The subtle nature of these microaggressions have become normalized, so much that the marginalized group have difficulty in recognizing and processing them. Like a respondent from the scholarly work of Ong *et al.* (2018, p. 215) recounted, "... a times, days go by before I realize experiences of latent discrimination... sometimes I have to ask myself or a friend if the action was racist or sexist".

Another participant in the study of Charleston *et al.* (2014, p. 22) shares similar thoughts when she recounts her experience of covert racism and sexism. She said:

"...apart from being mistaken as an admin staff and students not being sure if I am really the lecturer, I usually get asked a lot when I go to meetings – 'where did you study?' Initially, I thought it was a harmless question but then I realized that they were more interested in my qualifications and my pedigree to 'put me in my place'..."

Such accounts of marginality based on latent gendered racism have structured the career experiences of people of colour in STEM fields, particularly women, that the very few within these spaces have had to take on false identities in order to fit into small boxes for acceptance. Again, the articulated account from these women portray a cultural climate

that is hostile towards people of colour occupying spaces which are historically the preserve of white males. Besides, the marginal exclusionary positioning I discuss here, is not limited to the space they occupy alone, but also extended to their specialism in STEM. Paradoxically, this explains why the field of scholarships for these women bothering on diversity and equality is accepted on the one hand, but on the other hand, regarded as personal or vested interests rather than taken for the objective academic endeavors that they are (Seron *et al.*, 2018). In fact, the high culture within STEM faculties fosters the false ideal that STEM fields are pure and objective spaces which should not be 'mixed up' with social justice concerns like inclusion and diversity (McGee & Bentley, 2017).

Clearly, this is not the case when the same scholarly work is pursued by white academics. As a diary entry from the study of Seron *et al.* (2018, p. 142) reveals, "for many of us, our work is not taken seriously especially when it has to do with equality and diversity ...while it is considered as high profile for few white scholars that undertake it. In our case, it is classed as a hobby ...there is an assumption that being of colour does not match with being an academic." This gives the impression that BAME scholars are not as academic as white lecturers. Little wonder, many scholarly works by white intellectuals show a lack of diversity in their citations and reference lists (Holman *et al.*, 2018). As a matter of fact, Rollock (2019, p. 12) observes that the lack of inclusion of publications from varied ethnic backgrounds is a form of underrepresentation for people of colour.

These micro and macro experiences of exclusionary patterns of racism, sexism and patriarchy foregrounds the high attrition rate for women in STEM spaces, especially those of colour (Xu, 2008). Evidently, while British academia is 'uncomfortable' with women of colour being in academic roles, particularly in STEM, it is committed towards establishing an atmosphere of pseudo multiculturalism and gender equality by accommodating these women (Ong *et al.*, 2018). Moreover, in-depth analysis from studies like that of Seron *et al.* (2018, p. 133) suggest that spaces being earmarked for BAME female academics are not based on merit but on grounds of diversity and equality which is not truly pursued. This explains why I argue against preferential affirmative action that seeks to include women of colour only based on gender inclusion and appearance of diversity because this suggests that their qualifications, experiences and skills falls short of objective standards of merit and individual achievement.

Thus, I infer that STEM women of colour in British HE spaces are not only occupying spaces that they have been historically, socially and politically excluded from, they are also being 'offered lesser spaces' through the exclusionary positioning of whiteness and patriarchy. By offering them lesser spaces, I mean that research has shown how working culture within STEM faculties reproduces gender bias and race inequalities through theory and practices that suggest and encourage men to take on practical and technologically challenging roles while often relegating women, especially those of colour, to non-technical and peripheral tasks (Seron *et al.*, 2018).

4.2.2 Hyper-visibility/scrutiny

Across many of the reviewed literature, I observed concerns regarding the feelings of self-doubt for women of colour working within British HEIs, especially those in STEM. These feelings I deduce stem from the fact that these women are not considered as 'natural bodies' within the spaces they find themselves, making them subjects of intense scrutiny. For example, a respondent from the work of McGee & Bentley (2017, p. 273) said, "...you're constantly being watched.... in every meeting you attend, whether with students or fellow colleagues, you have to prove yourself because you're not expected to be any good... under this circumstance, it is impossible not to doubt yourself a lot." This account of hyper-surveillance resonates with Said's (1978, p. 11) assertion that these women "...have not and will not be subject of free thoughts and actions because external surveillance engineers self-monitoring on the part of the individual being watched."

Other participants in the studies reviewed also illustrate how authority is perceived to be misplaced when it is with BAME female academics. While commenting on her encounter, a participant in Hart's (2016, p. 620) study states that, "... I have never had to work so hard in my life... somebody is always there to point out that you have not met deadlines... while I am trying to prioritize my tasks, my line manager feels that I am not capable of handling them, especially when I have not done certain aspects of the assignment... he keeps asking whether or not I have performed my tasks in manner that suggest I cannot do them." For me, I would argue that such narrative goes beyond routine supervision to being 'policed' around, which I maintain originates from a lack of trust. This further buttress my point

that, although these women have been recruited or appointed, there is little or no confidence in their ability to perform their duties. Additionally, I consider this to be a 'race' issue because it suggests that white academics particularly males deem themselves to be naturally better at the job than 'others'. But what happens when the reverse is the case? Obviously, mechanisms are put in place to check these women.

This is the genesis of fault-finding, which in my opinion is a 'tool' employed to 'break' these women or force them out of STEM spaces. Further, as Wright *et al.* (2007, p. 153) point out, there are claims of intense scrutiny on the performance of women of colour within British academics, especially those in STEM. They note that this takes the form of academic subject review and research assessment exercises, which place immense pressures on individuals to perform. For BAME women, the situation is dire as they are subjects of intense scrutiny borne out of aspersions on their credentials and pedigree as well as how their presence is perceived as a threat in spaces that are historically the enclave of white males (Van den Brink & Benschop, 2014). Whether the actions and inactions of white academics and students alike are intentional or not towards gender bias and racial inequalities for women of colour in STEM spaces, it is obvious that the negative cumulative impact on the career experiences of these women is so enormous as to form a theme in this study. Certainly, the unintentional nature of most of the actions allude to the false idea that white academics are naturally better in their academic role than people of colour, especially women, as exemplified by my foregoing discussion.

4.3 Empowerment strategies for true visibility and representation for STEM women of colour

So far, I have explored the paradox of '(in)visibility' for BAME women - explaining how these women are conspicuously identifiable in STEM faculties, yet their status as academics within these fields is often rendered invisible and contested through overt and covert actions of marginality. Again, I have highlighted the tenuous positioning faced by women of colour as academics, especially in STEM spaces, which are manifested in ways including; being 'othered', lacking a sense of belonging, taken for granted, denied of collegiate support amongst others. All of which I argue contribute to increased faculty attrition for these women or worst still, force them to devise survivalist strategies to withstand and counter experiences of racism and patriarchy. While these acts of gendered and racial inequalities

have been identified as negatively impacting the everyday experience of these women in multifaceted ways, it also directly hinders their ambitions for progression (Wright *et al.*, 2007; Rollock, 2019).

Despite being overlooked, marginalized and undervalued, there is consensus across the literature I reviewed, expressing optimism about the crucial place of BAME women in STEM spaces. I find this rather shocking, given the accounts of marginality described by women of colour in the studies reviewed and considering the attendant difficulty in attracting and encouraging contemporaries to remain in such unfriendly environment. However, as Kaminski & Geisler (2012) observe, these women take their presence in STEM spaces as rights and thus employ a range of tactics, which draw on their agency to cope with the intense scrutiny in marginal spaces carved out for them within white patriarchal academia.

4.3.1 Accessing institutional capitals

A considerable part of Said's (1978) *Orientalism* explicates how the East and West is 'othered' and how cultural distinctions define the positionality of individuals with respect to privilege and power. Within the context of Said's scholarships, my advocacy here is for the dismantling of Eurocentric hegemony which treats STEM women of colour as inferior in all ramifications and prevents them from accessing the capitals that is due to them. Capitals as theorized by Bourdieu (1986, P. 243), are forms of power (including property rights, qualifications, pedigree and social connections) possessed by individuals within the space they occupy, which he called 'field'. This suggests that institutional capitals refer to systems and practices in British HEIs like available resources, support, networks and patronage. All of which I consider crucial for the career progression of women of colour in STEM.

Said (1993b), drawing on Bourdieu, argues that education can serve as a social mechanism to dismantle societal class structures through the poetry of resistance and decolonization. This theorization seems to be true because the prevailing situation depict that institutional capitals have been 'cornered' by middle and working-class white academics, leaving people of colour especially women to 'fight' their way for cultural acceptance, recognition, economic benefits and political representation. In addition, for true recognition of the

presence and visibility of BAME women working in STEM faculties, the politics of representation can be achieved by encouraging increased participation for these women in appropriate tasks (Power, 2012, p. 486). I say this because findings from reviewed studies highlight element of work experience for these women as overloaded with mundane tasks.

This is another strategy for keeping them busy to ensure that they have little or no time for personal development, which is necessary for their career progression. For instance, while commenting on her workload, a respondent from the study of Collins & Steffen-Fluhr (2019, p. 273) said, "I know I am being kept busy... my workload is never on even keel with others... on top, I have to do all the odd stuff like admissions and placement visits...this gives me very little time for my independent work." The need to be up to task with faculty assigned responsibilities is also detrimental in many ways to work-life balance and well-being of STEM women of colour, which has an inhibiting impact on their ability to access institutional capitals. For example, another respondent in Rollock's (2019, p. 12) study describes how she missed the target for her publications during a Research Excellence Framework (REF) exercise. She said: "I work a lot even on weekends... I did not have sufficient time to put in the required effort for my publications... so, I missed the faculty target by one point.... the bad part is that I was not given any constructive feedback or guidance on how to improve... I was eventually excluded from the REF exercise."

While these testimonies draw attention to issues regarding workload for these women and how they are compelled to work more and harder than their white counterparts, findings from studies reviewed also show that some of these women have had completely opposite experience of low allocation of responsibility. Ironically, a participant from the study of Ong *et al.* (2018, p. 240) notes that, while being paid on an hourly rate, she was assigned fewer teaching responsibilities, putting her at a disadvantage. She recounts: "... I was given the least teaching responsibilities, lower levels to teach and the least challenging work." Whether over burden by workload or underemployed, it is evident from these accounts, that workload management for women of colour in STEM spaces reflect uneven treatment with their 'other' colleagues.

Either way, these arrangements are not in the best interest of these women (Wright *et al.*, 2007). For those 'kept busy', the volume of work took its toll on their work-life balance, opportunity and time for professional development while for those underemployed, it served as an exclusionary tactics, preventing these women from attaining cultural capitals like additional qualifications and experiences needed for their career advancement. To access institutional capitals, Collins & Steffen-Fluhr (2019) opine that while resistant culture against the 'colonization' of STEM faculties is crucial, women of colour within these spaces should equally channel their energies towards attaining excellence in their academic careers. The latter tactics can serve as a veritable tool for making these women undeniably recognizable. This strategy is captured in the revelation of a participant in the study of Ong *et al.* (2018, p. 236), who states that, "... even though I know many of the actions against me are gendered and racists, I simply consider them as intolerable... I don't dwell so much on them so that I don't have to expend much time and energy which I would have funneled towards more productive activities."

For me, I consider this an effective strategy that can give BAME female academics edge over others and make them forces to be reckon with. Also, having a strong sense of cultural identity serve as a foundation for confidence, determination and affirmation in the face of inequality. This point is aptly expressed in the words of Rollock (2019, p. 29), who notes that "there will always be discriminatory or racist tendencies and behaviors towards people of colour, but do not let anyone push you down." This suggests that STEM women of colour must be conversant with their rights and utilize existing structures and systems like university policies and processes bothering on equality to fight against all forms of oppression, with or without the support of trade unions.

4.3.2 Mentoring and professional development

While there is consensus across the reviewed literature about the marginality experienced by BAME female academics as they maneuver the unspoken requirements and norms within STEM faculties in British academia, attention needs to be drawn also to ways these women engage with structure and people, especially those like them within the spaces they find themselves. This, I maintain, is crucial to their continued presence, growth and advancement within STEM spaces. Experiences of STEM women of colour reported in many

of the studies in my review raise questions about the level of support received by these women, especially when they are assigned responsibilities (see e.g. Jackson *et al.*, 2013; Main, 2014; McGee & Bentley, 2017). While available literature indicate that lower-ranked academics are mentored by senior academics and offered assistance with scholarly works, satisfactorily levels of mentorship to access institutional capitals is not typical for BAME female academics.

For many of these women, my review revealed limited opportunity to progress through administration or research. In cases where this is accomplished, most of them have to put in long years of service or draw on their social capitals to secure opportunities of rapid progression, which is not usually the case (Charleston *et al.*, 2014; Robinson *et al.*, 2016; Seron *et al.*, 2018). To advance to professorial or senior management ranks in academia, it is obvious that one has to develop a career path with the help of others. For STEM women of colour this is not again the case, as they have to create their career path most often by themselves, with little or no support for their academic and professional development. As such, like Fraser (2007c) recommends, these women should be offered the opportunity to develop the full range of their potentials in forms of collegiate mentoring. This is crucial towards their career advancement and mitigating the feelings of frustration borne out of stagnation in position.

4.4 Policy recommendations

These policy recommendations are aimed at majorly Equality Challenge Unit (ECU), University and College Union (UCU), Universities UK and all relevant stakeholders who have the responsibility of regulating cultural norms and furthering equality and diversity for staff in HEIs across the UK. The intention of advancing these recommendations is to create an academic landscape, where policy processes are deployed in a transparent and equitable manner to give equal recognition and respect to *everyone*, especially BAME female academics working in STEM faculties, while enabling them to progress and succeed in their careers. From my review of literature and subsequent discussion, it is evident that particular attention needs to be paid towards increasing awareness on acts of gendered and racial microaggressions by putting measures in place to minimize, if not eradicate, these behaviours at every stage in the career trajectory of these women.

However, the essence of this recommendations will be defeated if policy processes simply introduce sessions of unconscious bias training (UBT) alone. Indeed, evidence on assessment of such trainings by Atewologun *et al.* (2018, p. 6) of the Equality and Human Rights Commission reveals mixed results regarding their efficacy in addressing implicit bias, with potential back-firing effects. Thus, equality and diversity bodies like ECU and UCU within UK HEIs need to actively engage with issues of gender inequality and racial injustice in ways that go beyond dogmatic implementation of policy statements. This requires a profound change in the perception of gender disparity and racial inequality in ways to radically transform the current marginal experiences of STEM women of colour to those reflecting equality in economic, cultural and political dimensions.

In addressing inequalities, whether gendered, racial or classed, these bodies (ECU and UCU) must first recognize how HEIs have potentials for bias towards BAME female academics and how they are subsequently treated unfairly at each stage of their career trajectory (Mirza, 2018). By this I mean that the issue of underrepresentation for STEM women of colour in British academies must be understood as institutional failure to support these women. For the avoidance of vagueness, I now make series of specific recommendations towards the 'decolonization' of STEM spaces, with regards to gender equality and diversity. First, I will like to recommend that the ECU, UCU and Universities UK should work together in disseminating the findings of this study and many others bothering on gendered and racial equality in STEM. Subsequently, these bodies should facilitate roundtable discussions with equality arm of higher education bodies and relevant stakeholders on the policy implications of the study.

With regards to recruitment and remuneration, I draw on Frasers (2005) threefold schema of redistribution, recognition and representation for this group of women. Olson (2008) interprets this as institutions establishing and supporting initiatives that provide adequate career support for STEM women of colour through the stages of their academic career. Additionally, while I recommend that the processes of recruitment into academic positions are reviewed for transparency and fairness across HEIs in the UK, there is equally need for the ECU and UCU to collaborate with other relevant bodies like the Russell Group and Universities UK to ensure equity in salary structure for *all* (Rollock, 2019). Also, adequate support services should be put in place to enable individual negotiate salary increase

effectively. This recommendation is against the backdrop of evidence revealing gender pay gaps on top of ethnicity pay gaps for this category of women.

Further, the ECU and UCU should work closely with HEIs towards establishing clear and transparent criteria for progression for academics working in STEM faculties as well as explicit job descriptions for each position across ranks. In view of this, research should be funded to examine and spell out clear requirements of Heads of Department or line managers for approving applications for promotion, with constructive feedback mechanism on promotion decisions (Wright *et al.*, 2007). This includes specific actions academics should take to improve their applications for resubmission if they fail at first attempt. To ensure compliance with a just system of progression, institutions like Higher Education Statistics Agency should collaborate with ECU and UCU to compel all HEIs to periodically (e.g. annually) publish the outcomes of promotions according to gender and ethnicity. In cases where low numbers of underrepresented groups hinder the disclosure of such statistics, like Rollock (2019, p. 37) recommends, "...universities should state the practical steps they are taking towards addressing the underrepresentation for this group, with periodic progress report on their actions."

In view of the study's findings, which reveals a pervasive culture of microaggression that seeks to undermine and 'other' STEM women of colour, I strongly recommend that the relevant bodies should establish a 'no tolerance to bullying' culture, including both overt and covert forms of microaggressions. This can be achieved by encouraging anonymous whistle-blowing practices that promote anti-bullying culture within British HE spaces. While I have observed that UBTs may not be the most effective measure against explicit and implicit discriminations, yet the ECU and UCU should work with authorities of UK HEIs to introduce periodic and mandatory gender and racial equality trainings for *all* academics, especially those in managerial ranks. Such trainings should be centered on issues of power, privilege and microaggressions.

Towards the furtherance of a more culturally inclusive academic landscape, the ECU, UCU and Universities UK should collaborate with research and funding organisations like UK Research and Innovation (UKRI) to reflect diverse range of research activities including those that are not traditionally considered the 'gold standard' of research excellence

(Rollock, 2019). Additionally, ECU and UCU should consider working with leading STEM initiatives like *STEM Learning* and *STEM Ambassadors* to give deserving recognition to BAME female academics who have performed excellently in their area of specialization. Such awards should eulogize the academic and professional profile of the leading scholars while taking account of their contributions to the body of knowledge.

4.5 Further research

While this study has a variety of policy implications as elucidated in the recommendations section, it has also opened grounds for further research. For instance, further investigation of prejudices and personal biases toward women and racial-ethnic minorities will foster better inclusive STEM environments in British academia, while widening participation for 'others' and ensuring career success for *all* STEM academics, especially women of colour. Again, more research can focus on improving the academic landscape in STEM-related fields, including developing faculty support groups to create safe spaces for women of colour to reflect on negative experiences, develop healthy responses to exclusion, practice self-care and develop a scientific identity that overcomes the negative stereotypes and marginalization resulting from the intersection of gender and race. Like Charleston *et al.* (2014) recommend, such studies can benefit from employing critical race theories and Black feminist constructs – within which marginal intersectionality can be thoroughly examined.

4.6 Conclusion

This dissertation explores how STEM women of colour experience intersectional marginality within British academy despite widening participation policies and the imperative of diversity in STEM towards maximizing individual's opportunity and the UK's innovative capacity. Evidently, these women are confronted with patterns of gendered and institutional racism (both in overt and subtle ways) which force some of them to adapt survivalist strategies to ensure their continued presence within STEM spaces while many others simply exit the faculties for lack of sense of belonging. Using majorly Said's (1978) Orientalism and Fraser's (2005) three-dimensional model of social injustice as theoretical frameworks, I demonstrate how whiteness and patriarchy serve to privilege white male

academics in social and economic ways while furthering Eurocentrism and a white patriarchal hierarchy within STEM spaces.

Discourse of this study highlights amongst others marginalization in economic, cultural and political dimensions as well as exclusionary tactics in forms of intense surveillance for BAME female academics. To continue to profess equality and neutrality is to invariably express support for continued patriarchy and white supremacy, which will further exacerbate inequality of status, class and race. As such, I engaged both theoretical constructs and other social justice conceptualizations to argue for the deconstruction of intersectional categories in STEM spaces towards the 'decolonization' of British academia. For what it is worth, this study is more than just theorizing experiences of marginality for women of colour (especially those in STEM) in British academia, it is about making the necessary and overdue changes.

In view of this, I conclude by stating that it is high time for relevant authorities to work harmoniously with UK HEIs towards addressing institutional patterns of gendered racism, making use of recommendations advanced in this study. Also, latest findings of scholarships centered on anti-oppressive actions against people of colour should be adopted rather than current liberal models based on pseudo-equality and gender and race-blind narratives. Even if British HEIs fail to eliminate all forms of unlawful discrimination and promote true equality of opportunity for all as stipulated in widening participation agendas and Race Relations Amendment Act of 2000, the government should wield its influence on these institutions to make sure their practices is in compliance with the law bothering of gender and racial equality.

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Appendix 1: STEM Literature Grid

S/N	Reference	Sample	Theory & methods	Findings	Tags
1.	Kaminski, D. and Geisler, C., 2012. Survival analysis of faculty retention in science and engineering by gender. <i>science</i> , 335(6070), pp.864-866.	14 universities about when staff are hired and leave	Quantitative survival analysis	Over men and women, departure rates are quicker in first 10 years (specifically yrs4-6). Little difference in length of time needed to move from tenure track to full professor by gender. Significant difference in retention by gender for maths (men=7.33, women=4.45). Conclude hiring women seems to be the problem, not retaining them.	#patterns #professor #careertrajectory #progression #promotion #gender #attrition #academia
2.	Holman, L., Stuart-Fox, D., & Hauser, C. E. (2018). The gender gap in science: How long until women are equally represented? <i>PLoS Biology</i> , 16(4).	1000s of journal articles	Non-linear models (very complex and don't discuss in full detail) Use a logit function based on current rates.	"Worryingly, highly male-biased disciplines tended to show especially slow improvement in the gender ratio with time" "we estimate that men are roughly 1.7-2.1 times more likely than women to be invited to submit papers (see Methods; S4 Table). The gender ratio among authors of invited papers is even more male-biased than the gender ratio of last authors or single authors"	#publication #publicationrates #author #gender #predictivemodel
3	Collins, R. and Steffen-Fluhr, N., 2019. Hidden patterns: Using social network analysis to track career trajectories of women STEM faculty. <i>Equality, Diversity and Inclusion: An International Journal</i> , 38(2), pp.265-282.	Faculty members	Analysis of faculty co-authorship	Significant relationships are found between centrality measures and publishing quantity and promotion. It suggests that co-authoring with many colleagues is beneficial. Promotion rates between men and women are the same but women tend to have done more committee work and received more grants prior to promotion.	#networks #coauthor #collaboration #promotion #gender #academia
4.	Dennehy, T.C. and Dasgupta, N., 2017. Female peer mentors early in college increase women's positive academic experiences and retention in engineering. <i>Proceedings of the National Academy of Sciences</i> , 114(23), pp.5964-5969.	1st year undergraduate (N=150) engineering students	Most studies are not experimental and here we have a control (no mentor) and alternative (male mentor) group. Quantitative – experimental and outcomes measured 1 year later	Findings summarised: "Female (but not male) mentors protected women's belonging in engineering, self-efficacy, motivation, retention in engineering majors, and post-college engineering aspirations. Counter to common assumptions, better engineering grades were not associated with more retention or career aspirations in engineering in the first year of college. Notably, increased belonging and self-efficacy were significantly associated with more retention and career aspirations."	#selfefficacy #gender #mentoring #engineering #undergraduate #aspirations #academia
5.	Casad, B.J., Petzel, Z.W. and Ingalls, E.A., 2019. A model of threatening academic environments predicts women STEM majors' self-esteem and engagement in STEM. <i>Sex Roles</i> , 80(7-8), pp.469-488.	Female STEM majors (n=579)	Questionnaire – identifies questions to measure gender sensitivity Structural Equation Models	Women in male-dominated fields reported more negative campus climate, but women in female-dominated majors reported greater math disengagement. Women of colour may experience stronger social identity threat than White females.	#STEM #climate #threat #discrimination #gendersensitivity #identitythreat #academia #climate
6.	O'Brien, K.R., McAbee, S.T., Hebl, M.R. and Rodgers, J.R., 2016. The impact of interpersonal discrimination and stress on health and performance for early career STEM academicians. <i>Frontiers in psychology</i> , 7, p.615.	Early career researchers (n=210)	Survey and use Structural Equation Models	Interpersonal discrimination is measured using 'Cortina et al's seven item incivility scale'. Job related performance = h-index and a measure of organisational citizenship (commitment to work, OCB). Found the following paths: Discrimination>supervisor support>stress>lower physical health>job performance. Mental health affects performance more than physical health.	#STEM #climate #discrimination #stress #physicalhealth #socialsupport #mentalhealth

7.	Hart, J., 2016. Dissecting a gendered organization: Implications for career trajectories for mid-career faculty women in STEM. <i>The Journal of Higher Education</i> , 87(5), pp.605-634.	25 STEM mid-career female researchers at a university in US	Acker's theory of gendered organisations and subtexts Semi-structured interview & demographic info	Women struggled to build and maintain networks, even in their own departments, because it's the "old boys' club" Promotion process is meant to be gender neutral but not all work is valued equally (i.e. teaching vs service vs research) = gendered subtext The ideal worker is one without caring responsibilities that can work when needed	#promotion #networks #genderedorganisations #acker #gender #US #academia
8.	Robinson, W.H., McGee, E.O., Bentley, L.C., Houston, S.L. and Botchway, P.K., 2016. Addressing negative racial and gendered experiences that discourage academic careers in engineering. <i>Computing in Science & Engineering</i> , 18(2), pp.29-39.	240 Black PhD students and Post-docs	Uses interviews/focus groups with No clear theory	Explicit racism and micro aggressions from staff and peers. Women of colour experience "imposter syndrome", deteriorated physical and mental health associated with this. Uses the term a 'male huddle' Competitive culture of the department has made the male-female divide worse.	#race #ethnicity #engineering #mentoring #microaggressions #impostersyndrome #chillyclimate #academia #mentalhealth #network
9.	Seron, C., Silbey, S., Cech, E., & Rubineau, B. (2018). "I am Not a Feminist, but..": Hegemony of a Meritocratic Ideology and the Limits of Critique Among Women in Engineering. <i>Work and Occupations</i> , 45(2), 131-167.	41 diarists, 28 women engineers	Use diary entries across their 4 year degree.	Find that the women recognise their token status but tend to justify this. The sample all subscribe to the values of objective individualism, exceptionalism and meritocracy, which in a way reproduces inequalities. Findings also revealed that almost all the participants disagree with affirmative action schemes because they are seen to conflict with the engineering ideals of a meritocracy.	#gender #engineering #meritocracy #values #individualism #exceptionalism #token #tokenism
10.	Xu, Y. J., 2008. 'Gender	Sample: maximal	Theory:	Women valued networks for the	#gender #networking

	Disparity in STEM Disciplines: A Study of Faculty Attrition and Turnover Intentions', Research in Higher Education , 49, pp. 607-624.	variation sample to get a range of perspectives from people with differing characteristics - 4 male and 4 female for quals and 718 for surveys.	Organizational Network Theories and focuses on informal professional networks Use t-tests for statistical analysis.	social aspect of work 'synergy and serendipity', social support and also mentioned it being important for giving role models. Men emphasised their role in promotion. Evidence of feeling excluded from IPNs (Informal Prof Networks): "close to 47% of women lack access to some established networks.	#informalnetworks #socialsupport #homophily #STEM #academia
11.	Ong, M. Smith, J. M. & Ko, L. T., 2018. 'Counterspaces for Women of Color in STEM Higher Education: Marginal and Central Spaces for Persistence and Success' . <i>Journal of Research in Science Teaching</i> . 55(2), PP. 206-245.	39 women of colour in STEM faculties within HE	Qualitative study: Use of interviews essentially. Critical race theory and intersectionality theory	Counterspaces for women of color in STEM can be physical settings as well as ideological. Counterspaces were identified both at the margin and centre of STEM faculties	mentoring relationships; national STEM diversity conferences; STEM and non-STEM campus student groups; and STEM departments. mentoring relationships; national STEM diversity conferences; STEM and non-STEM campus student groups; and STEM departments. #STEM diversity #marginalization #academia #mentoring relationship
12.	Xu, Y., 2015. 'Focusing on Women in STEM: A Longitudinal Examination of Gender-Based Earning Gap of College Graduates' , <i>The Journal of Higher Education</i> , 86(4), pp. 489-523,	Post-bachelor graduates with over 10 years work experience in STEM	Baccalaureate and Beyond (B&B) Longitudinal survey. Human capital theory	Findings indicate a significant departure between the earning profiles of men and women within the first ten years of employment. Further, findings indicate that women in STEM occupations experienced multiple earning penalties concurrent with their growing family obligations.	#gender-based salary gap #college graduates #STEM and non-STEM comparison
13.	McGee, E. O. & Bentley, L., 2017. 'The Troubled Success of Black Women in STEM, Cognition and	3 high-achieving Black undergraduate and graduate women in	Phenomenological qualitative research relies heavily on in-depth	Findings reveal that structural racism, sexism, and race-gender bias were salient in the women's STEM settings.	#gender discrimination #systemic racism #colour-blindness #meritocracy

	Instruction. 35(4) , pp. 265-289	STEM.	interviews for data collection	These experiences were sources of strain, which the women dealt with in ways that demonstrate both resilience and trauma.	
14.	Johnson, D. R., 2011. 'Women of Color in Science, technology, Engineering and Mathematics (STEM)' . <i>Special Issue: Attracting and Retaining Women in STEM</i> . 152, pp. 75-85	Women of colour in STEM faculty.	Thematic review of literature	The study found that experiences of women of colour in STEM portray a "double bind" oppression and discrimination based on ethnicity/race and gender, resulting in exclusion, isolation, a lack of faculty support	#underrepresentation #women of colour in STEM #intersectional marginality #universal gender experience #obscurity #racial homogeneity
15.	Jackson, D. L., Starobin, S. S., & Laanan, F. S., 2013. 'The Shared Experiences: Facilitating Successful Transfer of Women and Underrepresented Minorities in STEM Fields' , <i>Special Issue: Collegiate Transfer: Navigating the New Normal</i> , 162, pp. 69-76.	Women and underrepresented minorities (URMs) in STEM fields in the US.	Extended literature review	Findings of the study reveal that identifying as a female, transfer student and ethnic/racial minority present the challenge of marginalization, despite the essentiality of these categories to US workforce.	#underrepresentation #women and URMs #transfer partnership #collegiate support #STEM collaboration
16.	Charleston, L. J., Adeserias, R. P., Lang, N. M. & Jackson, J. F., 2014. 'Intersectionality and STEM: The Role of Race and Gender in the Academic Pursuits of African American Women in STEM' , <i>Journal of Management, Policy & Practice</i> , 2(3), pp. 17-37	15 African-American women in academic computing programs	Qualitative methods: focus group discussion with semi-structure and open-ended questions. Intersectionality theory	The study found identified challenges relating to the computing sciences educational trajectory for African-American women. The study also discuss extensively the shared sense of isolation suffered by these women	#computing science #intersectionality #gender #race #marginalization #STEM #career trajectory
17.	Beede, D. N., Julian, T. A., Langdon, D., McKittrick, G., Khan, B., & Doms, M. E., 2011. Women in STEM: A Gender Gap to Innovation . <i>Economics and Statistics Administration Issue Brief No.</i>	Women in STEM jobs	Regression analysis of the Census Bureau's 2009 American community Survey (ACS)	Findings include: 1. Women hold less than 25 percent of STEM jobs, although they fill close to half of all jobs in the U.S. economy, 2. Women with STEM jobs earned 33 percent more than	#STEM #gender #pay gap #STEM workers #non-STEM workers

	04-11			comparable women in non-STEM.	
18.	Atwater, M. M., 2000. "Females in Science Education: White Is the Norm and Class, Language, Lifestyle, and Religion Are Nonissues." <i>Journal of Research in Science Teaching</i> . 37(4), pp. 386-387	12 female STEM academics	Qualitative data collection and analysis: Use of interviews	Findings include; 1. Increased dropout rate for women than men, especially at the beginning of an academic career 2. Gender disparity in recruitment linked to notions that white-males are better academics and will make successful professors.	#masculinity #scienceeducation #gender discrimination #stereotypes #language #class #religion, #norm
19.	Broadbridge, A. and Tonge, J., 2008. Barriers to networking for women in a UK professional service . <i>Gender in Management: An International Journal</i> .	Sample: 7 UK PR consultancies 15 women and 6 men/ 7 directors, 7 managers & 7 junior executives	Method qualitative - in depth interviews and repertory grids (visual focusing analysis). Little discussion of theoretical framework.	17 barriers identified, 7 barriers for men, 10 barriers for women. They include; Low position, fatigue, boredom, family pressure, lack of collegiate support, discouraging consultancy culture, no sense of belonging, discrimination, lesser task and unequal respect	#barriers #networking #gender #qualitative #networks
20.	Van den Brink, M. and Benschop, Y., 2014. Gender in academic networking: The role of gatekeepers in professorial recruitment . <i>Journal of Management Studies</i> , 51(3), pp.460-492.	7 Dutch Unis (Note gender balance of professors in the Netherlands is particularly bad) 24 women and 40 men. Context - the hiring process is very closed in the Netherlands.	Qualitative study, practice based approach uses document analysis (from recruitment) and in-depth interviews. Concept of mobilizing masculinities.	Networks are used within recruitment process for... "inviting and nominating candidates. Other findings include 1= men hiring men usually unconsciously because they are similar to themselves - link to "the liminal nature of affiliating masculinities" 2= women and men hiring men because they have the traits associated with being a successful professor	#gatekeeper #networks #recruitment #promotion #gender #academia #academicnetworks #professor #europe #homophily

Appendix 2: Study Timeline

Date	Duration	Activities
14/02/2020 to 22/03/2020	5 weeks	<ul style="list-style-type: none"> • Drafting of dissertation proposal • Discussion of topic and scope of dissertation with supervisor • Drafting of dissertation timeline/plan
23/03/2020 to 20/04/2020	4 weeks	<ul style="list-style-type: none"> • Thorough review of literature • Submission of first draft of literature review
21/04/2020 to 18/05/2020	4 weeks	<ul style="list-style-type: none"> • Outlining of research methodology/approach • Delimiting the contribution of the dissertation
19/05/2020 to 15/06/2020	4 weeks	<ul style="list-style-type: none"> • Analysis of thematic literature review • Writing-up findings
16/06/2020 to 13/07/2020	4 weeks	<ul style="list-style-type: none"> • Discussion of findings in relation to literature review • Deriving policy recommendations
14/07/2020 To 04/08/2020	3 weeks	<ul style="list-style-type: none"> • Drafting the introduction and conclusion • Drafting the preliminaries (i.e. title page, acknowledgement, abstract etc.)
05/08/2020 to 24/08/2020	3 weeks	<ul style="list-style-type: none"> • Referencing in line with Harvard conventions • Checking the dissertation against recommended formats, layout and guidelines • Proofreading the dissertation • Obtaining supervisor's final approval • Submission of electronic copy to TURNITIN