

ECER

The study of STEM has attracted a high level of interest from researchers, educators and policy makers alike because of the crucial role they play in the world at present and their predicted role in the future (Mokyr, 2018). Yet there is a disparity of access to study science to the levels leading to careers in science or from different gender, ethnicity and socio-economic group (Royal Society, 2008). For instance, Black African-Caribbeans are underrepresented in STEM occupations; Black British make up 2.2% of the employment population; only 1.6% are represented in STEM occupations (Royal Society, 2014). According to Cannady et al. (2014) a 'leakage' of potential students who could contribute towards the creation of a diverse pool of scientists - this pipeline metaphor illuminating the seepage from minoritized communities. Furthermore, an increasingly popular concept that has been used to explain the lower representation of BME people in the study of STEM subjects at university that could lead to careers either in science or from science is 'science capital' (Archer et al. 2013; Wong, 2015), a derivative of Bourdieu's social capital (Bourdieu, 1977). Higher levels of science capital, it is argued, makes it more likely to lead to science careers.

Whilst a considerable amount of work has been undertaken with pupils (Wellcome, 2017) less is known about how minoritized parents' guide and support their children with regard to STEM. An exception to this is the small-scale study on parental views of science and science careers by Archer, Dewitt and Osborne (2014) who argue that for many BME pupils, STEM does not constitute a "thinkable" career option and, that there is a need to support BME families in developing knowledge and confidence in science. The increased exposure to science, they argue enables minoritized families to see its relevance and this, in turn, may lead to more BME students developing and sustaining science aspirations.

This research aims to explore the community cultural wealth of BME pupils and how it may advance or restrict their aspirations in science. Integral to the study is the role of parents and their involvement in decisions about their child's subject choices in STEM and the strategies they deploy in guiding and supporting their children. A community cultural wealth approach recognises both the agency and capitals of parents. In the case of the latter this acknowledges that capital may not always be informed by financial or economic circumstances but that this may also be drawn from 'funds of knowledge' (Moll, 1992). We draw on Vincent's (2001) study on social class and parental agency to explore the complex intersections of race/ethnicity, gender and social class as this enables us to examine parental circumstances and views across a range of school contexts.

Yosso (2005) problematizes Bourdieu's (Bourdieu & Passeron, 1977) concept of cultural capital. She advocates a broader view than that argued by social and by implication science capital (Archer et al, 2013). Drawing on Critical Race Theory (CRT) Yosso's community cultural wealth framework (2005j) recognises forms of capital, or funds of knowledge, located within individuals and communities but which are not necessarily considered of equal status. Moreover, a CRT lens, challenges the deficit thinking behind explanations which highlight a deficiency in the community and in turn, illuminates structural and/or institutional barriers and by focussing on parents we aim to capture the resourcefulness, perseverance and tenacity of parents in creating and maintaining science possibilities and futures for their children, which are currently unseen and unacknowledged.

The study sets out to address the following main research questions:

1. What types of community cultural wealth do BME pupils rely on through their KS4 and KS5 science courses?
2. How do different types of capital contribute to student persistence in science?
3. Do differences emerge amongst pupils from ethnic minority groups?
4. What differences emerge at the intersection of race/ethnicity and gender?

5. Do parents have a preference for specific types of science careers so guide their children accordingly?
6. What factors influence parents career aspirations for their children?

Methodology and data collection

This study follows a grounded theory approach (Glaser and Strauss, 1965) as it operates inductively; we seek to construct theories and understanding via methodical gathering and analysis of data collected. Anecdotal evidence suggests that some BME parents are navigating limited school choice to ensure that their children gain greater academic opportunities to higher education despite their social class position. It is important therefore, to select schools of various types.

Ten secondary schools, classified as funded state Comprehensive, Academy or Grammar schools and Public schools situated in England took have been recruited to take part in this study. Schools identified include both a low and high density of BME students (<20% or > 70%), access to schools is either selective or nonselective and schools are either graded by Ofsted as Good or Outstanding.

Online questionnaires (constructed using UCL Opinio) will be offered to all students in Year 9 (KS4) studying science at GCSE and IGCSE (estimate n= 1,500) and Year 13 (KS5) studying A level sciences (estimate n= 500); also, to science teachers and senior leaders in schools (estimate n=120) as well as parents (estimate n= 1, 500).

Stratified sampling (Cohen, Manion and Morrison, 2017) will be employed to undertake random sampling of subpopulations (gender, ethnicity, class) from students, teachers and parents who will consent to be interviewed further via focus interview groups (Year 9 estimate n=120; Year 13 estimate n= 100; teachers estimate n= 60; parents estimate n=120). For all sample groups, we aim to ensure the sample size is representative of the given population.

All semi-structured focus group interviews will take place in schools and will enable the researchers to analyse relationships or differences between sub groups (Cohen, Manion and Morrison, 2017) focussing on the types of community cultural wealth students deploy in relation to their aspirations for, and success in, science.

The study hopes to illuminate the types of capital BME students employ to navigate their way to the study of Science post 16 and at degree level. Using thematic analysis, we hope to highlight the ways in which social positioning impacts the operationalisation of capital. In so doing, to inform debates on BME access, participation and success in STEM and provide an important counter-narrative to show how BME students succeed against the odds whilst also speaking to the involvement of parents.