Literature review on EDI barriers to postgraduate research relevant to funding

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Introduction

UKRI commissioned Advance HE to undertake an Equality Impact Assessment (EIA) on UKRI's standard Terms and Conditions (T&Cs) of training grant and training grant guidance (available here).The aim was to understand how they impact Equality, Diversity and Inclusion (EDI) for UKRI research students. As part of this EIA, a literature review of current barriers to postgraduate research studies was conducted. This was the first step in identifying areas that might adversely affect the participation and experience of students from various protected groups. The Equality Act 2010 was used as a guiding principle for this literature review, to include evidence related to all nine protected characteristics. These are age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, and sexual orientation.

This literature review brings together evidence of barriers to access and participation in postgraduate research. It uses secondary data analysis and relevant sources, including reports, policy documents and focused research studies on the topic. Its aim is to highlight existing issues across a variety of EDI characteristics, highlighting best practice examples, where possible. In addition to covering all the protected characteristics under the Equality Act 2010, it also provides evidence on some additional characteristics that are widely acknowledged as impacting access and participation in postgraduate research studies (e.g. socio-economic background and caring responsibilities). Ultimately, this literature review will be used as a foundation for the EIA on UKRI's standard T&Cs of training grants and training grant guidance. The EIA will merge evidence from the literature with current practices to provide guidance on how UKRI can be further equipped to become more inclusive as a postgraduate research funder. For this purpose, this report mostly focuses on barriers that are relevant to UKRI as a funder as opposed to barriers that might be more relevant for institutions to address (e.g. student experience).

The EIA will put UKRI in an informed position to take steps to improve EDI through its T&Cs of training grants and associated guidance, where necessary. This will support UKRI's work to enact the government's commitment to a New Deal for Postgraduate Research. This commitment was initially set out in the UK Research and Development (R&D) Roadmap and subsequently in the R&D People and Culture Strategy. It aims to create a 'new deal' that works for everyone, ensuring that postgraduate research in the UK remains sustainable, open and attractive to a wide range of candidates (from the UK and internationally). It is therefore important that UKRI can identify areas in its T&Cs of training grants and associated guidance that might adversely affect the participation and experience of students from protected groups. As a result, it will be well-equipped to take steps to improve this where possible.

Methodology

Overview

The methodology for this literature review consisted of data collection via three streams. These were:

1. An extensive online search of existing academic and grey literature.[1]

2. A targeted call for relevant sources, addressed to Advance HE experts on EDI issues and UKRI's relevant evidence (e.g. UKRI's call for input on the New Deal for Postgraduate Research).

3. A targeted search for additional relevant resources resulting from sources identified through the two previous methods, following a 'snowballing' format, by which one source led to another through cross-referenced citations.

Data collection process

The search for existing literature was conducted via Google Chrome and Google Scholar and used search terms related to EDI characteristics, doctoral education and access and/or participation. Some examples of search terms used are provided in Table 1 below.

Table 1: Examples of online search terms

(equality OR diversity OR inclusi* OR EDI OR barriers)
AND
(age OR disab OR Sex OR gender OR men OR women OR male OR female OR "gender reassignment" OR trans OR Marriage OR civil partner OR religio* OR belief OR pregnan* OR maternity OR carer OR "caring responsibilit*" OR "sexual orientation" OR LGB* OR ethnic* OR "domicile" OR socio-economic)
AND
("doctoral studies" OR PGR* OR PhD or "postgraduate researcher*")
AND
(access OR participation OR experience* OR funding)

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[1] Grey literature refers to various document types produced on all levels of government, academia, business and industry (e.g. blogs, government documents and reports, working papers, policy statements, organisational research reports, organisational webpages etc.) that are protected by intellectual property rights but not controlled by commercial publishers.

Inclusion criteria and data reduction

To limit the scope of the review and most effectively address the current topic, inclusion criteria were applied to all sources across all strands of data collection. Sources meeting the following criteria were selected for further analysis:

1. Contain at least some evidence/references related to postgraduate research students.

2. Include barriers to postgraduate research relevant to funding.

3. Published by a reputable source (e.g. academic journal, book, governmental or organisational report, online higher education (HE) magazine, institution or organisation website, etc.).

4. Based on the UK context.

5. Available in English.

6. Accessible (i.e. not behind a paywall or in a database that the Advance HE researcher could not access).

After completing the data reduction process, it became clear that, in general, this topic is under researched, especially when compared to the literature that exists on barriers related to access to and participation in undergraduate level studies. Moreover, most of the resources available for postgraduate research students are comprised of grey literature.

Table 2: Sample of academic and grey literature meeting the inclusion criteria.

Source	No of references	Protected characteristic(s) covered
Academic journal articles	17	Ethnicity, socio-economic background, disability, pregnancy, maternity, caring/parental responsibilities, gender reassignment and trans status, religion and belief
Books	2	Pregnancy, maternity, caring/parental responsibilities, religion and belief
Government or organisation report	58	Ethnicity, socio-economic background, domicile/nationality, disability, sex, pregnancy, maternity, caring/parental responsibilities, age, gender reassignment and sexual orientation, religion and belief
HE magazine or blog post	7	Ethnicity, socio-economic background, domicile/nationality, disability, age
Institution or organisation website	15	Mostly covering wider EDI strategies, but some specific mentions to ethnicity, disability and age
Total	99	

Setting the scene

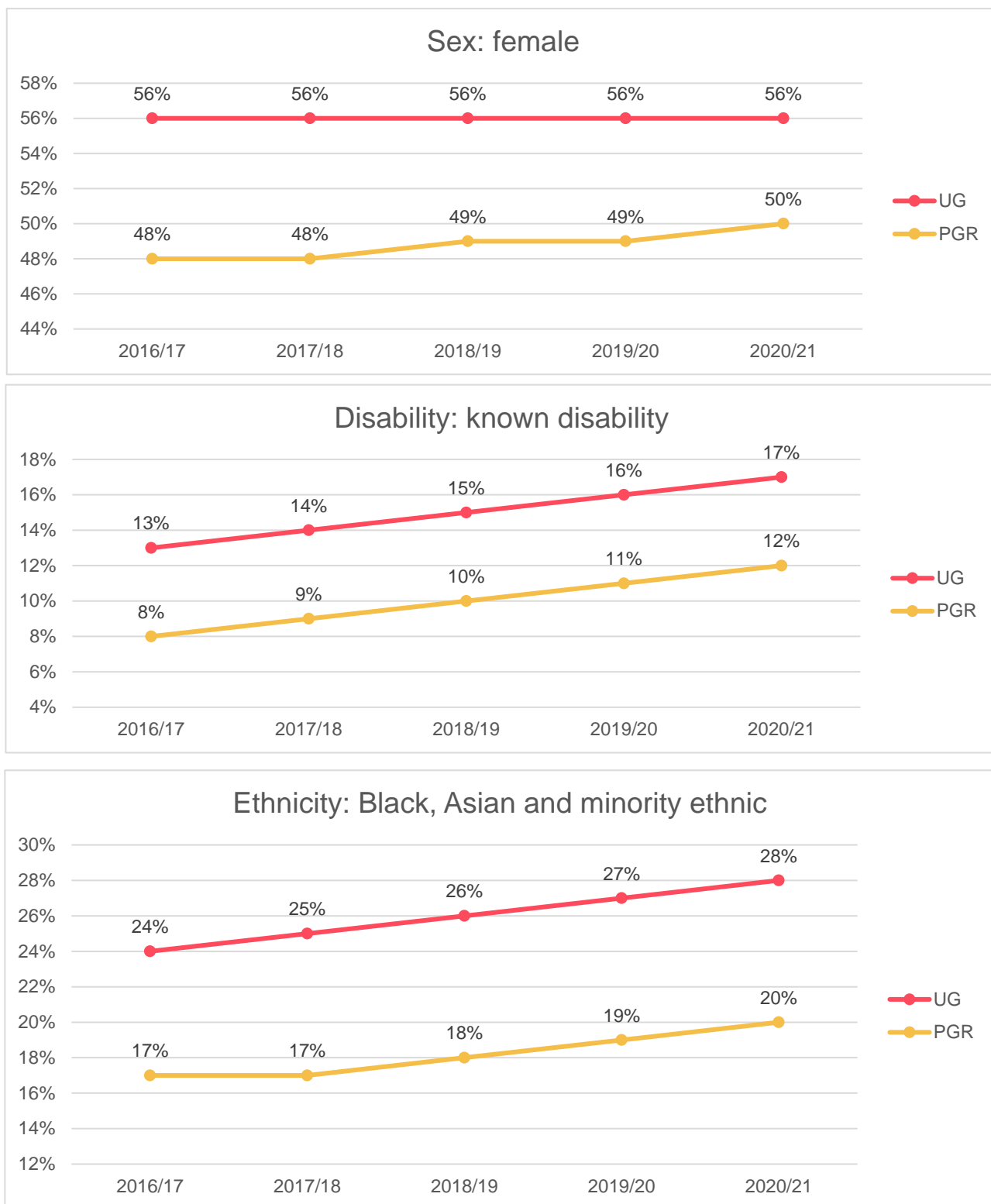## The EDI profile of the PGR population

According to the HESA student record, in 2020/21 there were 114,405 postgraduate research (PGR) students enrolled in UK institutions with Higher Education (HE) provisions. Although this number has been increasing year-on-year since 2016/17, the actual proportion of PGR students out of the total UK student population has decreased from 5% to 4% within the same period. PGR students are at the centre of UK's Research and Development (R&D) with the government's recent R&D People and Culture Strategy committing to invest 2.4% of the country's GDP in research (Department for Business, Energy and Industrial Strategy, 2021). This is estimated to equate to an additional 25,000 postgraduate research funded posts being created over the next seven years (House, 2020).

The Strategy acknowledges that the attraction, development and retention of a diverse workforce within the UK research and innovation system is vital to build on existing strengths and successfully meet current and future global challenges (Department for Business, Energy and Industrial Strategy, 2021). For this reason, the Strategy sets out guidelines on how to develop the research workforce needed, ensuring that careers in research and innovation are open to people from all backgrounds, working within environments that nurture and get the best out of them. PGR students in UK HE are an important part of the future R&D workforce in the Strategy and also elsewhere in the literature (e.g. UKGE, 2021; Duncan, 2022). Consequently, special attention needs to be paid to how these students are representative of the wider UK population as well as supported and developed both practically and financially (Department for Business, Energy and Industrial Strategy, 2021).

Looking further into the composition of the PGR population, inequities related to protected characteristics become apparent, with certain groups of PGR students being underrepresented in this population. Figure 1 below summarises key EDI differences noted between the UK undergraduate (UG) and PGR population for the past five academic years.

As the figures show, compared to their representation at the UG level, female, disabled and Black, Asian and minority ethnic students are underrepresented at the PGR level. As such inequities are also recognised in both the R&D Roadmap (Department for Business, Energy and Industrial Strategy, 2020) and the People and Culture Strategy (Department for Business, Energy and Industrial Strategy, 2021), the need to make the PGR offer more accessible and relevant to people from all backgrounds has been recently re-centred. Initiatives, such as UKRI's commitment to a New Deal for Postgraduate Research (UKRI, forthcoming) and Research England and Office for Students' funding of research projects exploring how to improve Black, Asian and minority ethnic students' access and participation in postgraduate research (UKRI, 2021a), show how this renewed focused on widening participation and access in PGR studies has materialised. This renewed focus is particularly important as it addresses concerns around how access and widening participation at the PGR level has been less researched compared to the UG level (Mellors-Bourne et al, 2014; Lindner, 2020).

Figure 1: HE student enrolments by protected characteristic as a percentage of the total UG and PGR student populations.[2]

Sex: female

Year	UG	PGR
2016/17	56%	48%
2017/18	56%	48%
2018/19	56%	49%
2019/20	56%	49%
2020/21	56%	50%

Disability: known disability

Year	UG	PGR
2016/17	13%	8%
2017/18	14%	9%
2018/19	15%	10%
2019/20	16%	11%
2020/21	17%	12%

Ethnicity: Black, Asian and minority ethnic

Year	UG	PGR
2016/17	24%	17%
2017/18	25%	17%
2018/19	26%	18%
2019/20	27%	19%
2020/21	28%	20%

Source: Higher Education Student Statistics: UK, 2020/21 - Student numbers and characteristics

[2]For ethnicity, percentages are calculated based on the total UK-domiciled student population.

The UKRI context

UKRI currently funds around 20% of PGR students in the UK (UKRI, 2022a). As a public funder, UKRI is accountable for these funds being well spent and distributed equitably (Department of Business, Energy and Industrial Strategy, 2018). For this reason, UKRI has a long-standing commitment to EDI issues in relation to postgraduate funding. EDI has been an organisational priority for UKRI since it was formed and current actions build on the work of the research councils that preceded UKRI's formation (UKRI, 2022b). Relevant actions include the development of designated T&Cs for its training grants, which make special mentions of EDI considerations (UKRI, 2022c), as well as public statements of specific actions used to address underrepresentation and active participation (UKRI, 2022d). These include collecting and publishing diversity data for funding results with a commitment to do so on an annual basis. All these actions culminate in the publication of an organisation-wide EDI Strategy (UKRI, 2022b), actions relevant to PGR funding and the publication of the New Deal for Postgraduate Researchers (UKRI, forthcoming).

With regards to the collection and publication of diversity results for UKRI funding data, this so far covers the years 2014/15 to 2019/20 (UKRI, 2021b). The relevant annual report presents data on age, disability, ethnicity and gender for those starting a UKRI studentship, as these are the protected characteristics that UKRI currently collects (UKRI, 2021b). However, in this report, it is mentioned that the new funding service currently under development will collect information on additional protected characteristics (UKRI, 2021b).

Disability data is so far provided at the top-level of 'no known disability', 'known disability', 'unknown' and 'not disclosed', which hinders the development of further insights, for example, into the most frequent types of impairments experienced by UKRI-funded PGR students. Previous literature has recommended that funders should systematically collect and publish detailed data "on the number of disabled applicants and awardees they have, as well as information on the number and quality of adjustments offered and taken up by applicants and awardees" (Careers Research and Advisory Centre, 2020, 4). Although UKRI currently collects and publishes high-level disability data about its studentship starters, it does not publish data on disability type or on the number and quality of adjustments offered and taken up by its applicants and awardees. This makes it difficult to identify the most common impairment types disclosed by UKRI-funded PGRs, as well as the support required and claimed. With regards to specific impairments, this data is collected by UKRI but sample sizes restrict the analysis and interpretation of the data in a reliable way. However, the report references the development of dedicated work on disability within UKRI, which might lead to the decision to collect more detailed disability data (UKRI, 2021b).

In terms of UKRI studentship starters' data by ethnicity, a separate detailed report presenting disaggregated data for all ethnic groups comprising the Black, Asian and minority ethnic category is published annually, although it is acknowledged that around 30% of the UKRI-funded PGR starters do not disclose this information (UKRI, 2021c).

Finally, gender data currently mostly reflects sex, as only 'female', 'male' or 'not disclosed' are available as answer options by the system through which student responses are collected (UKRI, 2021b). This is recognised as a shortcoming with a relevant comment suggesting that additional response options will be considered as a new funding service system is developed,

to reflect that "gender and sex terminology is more nuanced and highly personal" (UKRI, 2021b, 16).

These publications have so far shown that, although there has been some progress, in terms of PGR studentships the proportion of female starters remains below the national figure provided by the HESA student records.[3] Specifically, 45% of studentship starters were recorded as female in 2019/20 for UKRI compared to 50% of PGR students who identified as female in the 2019/20 HESA student record. However, it is worth noting that the proportion of studentship starters recorded as female has shown an increasing trend for all councils between 2014/15 and 2019/20 and that, for most councils, the proportion of female starters exceeds the proportion of the female PGR population for the corresponding disciplines (UKRI, 2021b).

Similarly, based on the latest UKRI studentship starters data (UKRI, 2021b), although the proportion of those disclosing a disability has risen from 5% to 8% of the total between 2014/15 and 2019/20, this remains below the proportion of disabled students represented in the 2019/20 HESA student record (11%) as well as among PGR students in STEM subjects (9.7%) (Advance HE, 2021a). This underrepresentation of disabled PhD students funded by UKRI seems to be consistent across its constituent councils (UKRI, 2021b).

Finally, in terms of ethnicity, almost 29% of UKRI studentship starters did not disclose this information in 2019/20, and of those that did disclose, 10% were from a Black, Asian and minority ethnic background, which is considerably lower than the proportion of UK-domiciled Black, Asian and minority ethnic PGR students in the 2019/20 HESA student record (18%).[4] Moreover, this pattern of underrepresentation compared with the national figures was consistent across UKRI starters from Asian, Black and mixed ethnic backgrounds (UKRI, 2021c). Figure 2 on the following page illustrates this point, providing a comparison between the proportion of minority ethnic group representation among the UKRI studentship starters and the general PGR population for 2019/20.

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[3] HESA's PGR category includes doctorates (incorporating New Route PhDs), master's degrees and postgraduate diplomas or certificates studied primarily through research. As a result, the national diversity data for the PGR population is not fully comparable to UKRI studentship starts.

[4] Although it is important to acknowledge the importance of differences in representation across the disciplines, UKRI councils cover a variety of disciplinary areas; using the total HESA PGR population should be a useful benchmark.

Figure 2: UKRI studentship starters by minority ethnic group compared with the PGR population in the 2019/20 HESA student record
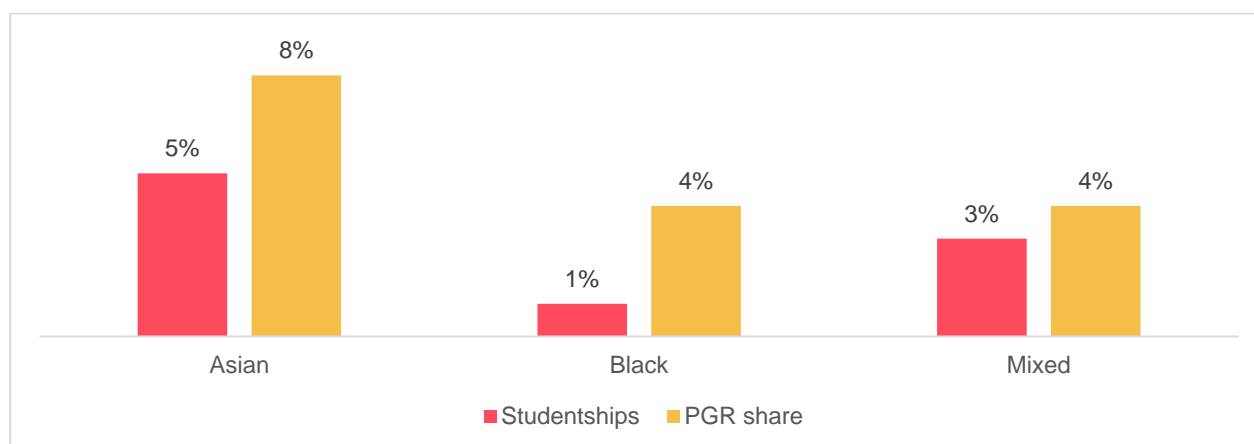
Source: UKRI, 2021c, 11

Notably, among both UKRI starters and PGR students at the national level, students from a Black ethnic background were the least represented. It is worth noting that annual fluctuations in the proportion of studentship starts recorded as ethnic minorities were noted when disaggregating data by councils.[5] However, in the Biotechnology and Biological Sciences Research Council (BBSRC), considerable increase in the percentage of studentships awarded to minority ethnic students was noted in 2019/20 (from 6% in 2018/19 to 12%), which could be linked to specific policy actions taken to increase ethnicity disclosure rates, such as BBSRC's representatives speaking regularly with the managers and administrators of Doctoral Training Programmes (DTPs) and Collaborative Training Partnerships, who are responsible for inputting this information (UKRI, 2021b).

Although the above EDI data on UKRI studentship starters is published annually, this is not the case for data on studentship applications and awards. Although such data is collected through an annual report submitted by the DTPs, it is not done in a consistent way across the councils, which makes publication difficult. As pointed out in a recent independent review of UKRI, such inconsistencies across the councils "remain due to legacy systems and uncoordinated processes", with UKRI acknowledging them as challenges and working to resolve them (Grant, 2022). Literature highlights that the publication of such data is important, as it would allow for the creation of a clear picture of who applies for UKRI grants and who actually obtains them, which will in turn allow for inequities to be further observed and actioned upon (Wakeling and Mateos-González, 2021; Hunsicker et al, 2022). Gill (2022) and Tazzyman et al (2021) reiterate the importance of standardised EDI data collection, covering both protected and other characteristics (e.g. ethnicity and social class) linked with underrepresented groups in PGR studies as a decisive factor for justifying potential positive actions, such as ring-fenced funding.

Recently, particular concerns have been raised by sector organisations and groups of academic staff members about how the way research organisations manage the application

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[5] EDI funding differences across UKRI Councils can be explored here.

and decision-making process for UKRI PGR funding awards perpetuates inequities (Inge, 2020; UKCGE, 2021). In particular, more than 100 academics wrote an open letter to UKRI expressing their concerns that UKRI PhD schemes' criteria "discriminate against students from underrepresented and marginalised groups" (Inge, 2020, np). They argued that this represents a barrier to creating diverse cohorts in the Centres for Doctoral Training (CDTs) and DTPs, as it rewards access to opportunity and prior achievements, instead of mainly considering ability, drive and future potential (Inge, 2020; Lindner, 2020).

In addition to UG degree award class, other criteria seen as being linked to privilege included rank in cohort, previous research experience, conference attendance, publications, awards, and institution graduated from (Williams et al, 2019; Inge, 2020; Lindner, 2020). Privilege in these instances can either be related to access to opportunity (e.g. opportunity to focus on studies and achieve top-class grades as a result of not having caring, parental or work responsibilities) or financial privilege (e.g. being able to afford unpaid internships that provide research experience before embarking on a PGR degree) (Williams et al, 2019; Inge, 2020; Lindner, 2020).

However, previous literature (Sørensen, 2016) has pointed out that what characterises successful PhD students in terms of participation and completion is not their prior attainment, but:

+ their interest and motivations in pursuing a PhD
+ a clear understanding of what a research programme constitutes
+ personal integrity and interpersonal skills.

Moreover, CDTs and DTPs, through which 85% of UKRI doctoral studentships are funded, have received criticism as mechanisms that may create EDI barriers (UKCGE, 2021). Specifically, these multi-institutional consortia might contribute towards EDI inequities through inconsistent application processes and by excluding institutions who fall outside the consortia, but have significant experience with the recruitment and successful support of underrepresented PGRs (UKCGE, 2021; Lindner, 2020).

The latter point was identified as an area to be addressed by a recent review of the PhD experience in the social sciences commissioned by ESRC (Tazzyman et al, 2021). As a result, ESRC committed that it will "require all DTPs to provide an EDI strategy, incorporating their evaluation approach, as an assessed part of their bid for funding", when it will recommission its network of DTPs in 2022 to 2023 (ESRC, 2021). Bids will need to set out how they will widen participation and provide an inclusive and supportive environment for all, encouraging considerations for ring-fenced funding to underrepresented groups (ESRC, 2021). Further research will be required to assess their effectiveness in improving the inclusivity of DTPs.

Barriers to PGR funding: evidence from the literature

In a recent survey conducted by the University and College Union, financial difficulties presented one of the most challenging obstacles to accessing doctoral education (UCU, 2022) but there are also other factors which have an important influence on access, participation and completion of a PhD (Lindner, 2020). These include:

+ the UG awarding gap as an early barrier to progression into PGR studies

+ awareness of the research environment

+ a visible lack of role models

+ access to mentorship

+ sufficient and appropriate support mechanisms and resources.

Additional barriers to successful participation in doctoral education relate to the current research culture. In three separate reports (Wellcome Trust, 2020; Royal Society, 2018; Tazzyman et al, 2021) researchers highlighted how the existing research culture, which is characterised by a high workload, an ever-increasing pace and an unequal distribution of credit to members contributing to research and innovation, promotes inequities and encourages feelings of exclusion. This culture was also seen to contribute to poor mental health and described as making the UK HE sector an unsustainable and uninviting environment (Wellcome Trust, 2020; Royal Society, 2018; Tazzyman et al, 2021).

Finally, the duration of PhD funding has also been identified as a barrier to postgraduate studies. For example, currently, many students receive three years of funding, a timeframe that has been labelled as unrealistic by PGR students (Tazzyman et al, 2021; Ptikin, 2021; UCU, 2022; UKRI, 2022e) and founded on a culture that expects an unfunded 'writing-up year' (Tazzyman et al, 2021).

Financial security, levels of awareness of career prospects and the overall research environment, as well as feelings of institutional inclusion, have been identified as significant factors for successful participation in doctoral education (OfS, 2018; Arday, 2018; Williams et al, 2019; Lindner, 2020; UCU, 2022). These factors might impact any student. However, they disproportionately impact students from underrepresented and marginalised communities (Lindner, 2020).

The following sections of this literature review outline evidence of the barriers to accessing funding for doctoral research on the basis of the protected characteristics of the Equality Act 2010. The purpose of this division is to aid understanding on each protected group's specific challenges, although it needs to be acknowledged that most protected characteristics interact to create intersectional inequalities. As described by Lindner (2020, 15), the experiences of students who face "more than one factor of systemic disadvantage, discrimination or differential need" are even more complex and difficult to disentangle. Moreover, reflecting the limitations of the data available on postgraduate researchers, evidence is scarcer on some protected characteristics than others and, for this reason, some of them will be presented in

combination (e.g. gender reassignment and sexual orientation). Finally, apart from the information presented in relation to the nine protected characteristics under the Equality Act 2010, evidence will be provided for some characteristics, which although are not protected under the Equality Act, are widely acknowledged as influencing access and participation in doctoral studies (e.g. socio-economic background and caring responsibilities).

Ethnicity

The literature highlights a few key issues that disadvantage the access and participation of students from a minority ethnic background to doctoral funding. These are applicable to all ethnic categories, but, in many cases, are particularly relevant to Black students (Williams et al, 2019; UCU, 2022).

Across the literature sources identified in this review, there were five main barriers to PGR funding that disproportionately impacted students from Black, Asian and minority ethnic backgrounds:

+ students from Black, Asian and minority ethnic backgrounds were more likely to be studying part-time, which limited their eligibility for funding opportunities

+ a higher proportion of Black, Asian and minority ethnic students were self-funded/did not receive a financial award

+ a degree awarding gap related to ethnicity at both the UG and PhD level

+ fewer Black, Asian and minority ethnic students applying from high-tariff institutions

+ unfamiliarity with the application process and access to fewer role models for guidance.

Studying part-time and limited eligibility for funding opportunities. Based on the 2019/20 HESA student record, 44% of Black doctoral students were enrolled part-time (the largest proportion across all ethnic groups), a study mode that is associated with being self-funded (Williams et al, 2019). In addition, according to a UKCGE briefing, almost half of all Black, Asian and minority ethnic PGR students received no award or financial backing for their tuition fees in 2018/19, compared with roughly one third of White PGR students (UKCGE, 2020).

Further disaggregated data has shown that PGR students from minority ethnic backgrounds received fewer awards or less financial support for their tuition fees compared to their White peers. More specifically, 60% of students from an Other Black background (i.e. non-African and non-Carribean) received no award or financial support compared to 33% of their White peers (UKGCE, 2020). In contrast, the support received by students from mixed-ethnic backgrounds was more similar to that of White students, with 35% of mixed-ethnic students receiving some form of financial award or support (UKCGE, 2020).

Degree awarding gap. Although data on submission rates by ethnicity is not available, data on PhD qualifiers has revealed an ethnicity awarding gap at the PGR level, with 19% of White PhD students qualifying in 2018/19 compared to 13% of Black British African PhDs (UKCGE, 2020). Although mode of study was considered a contributing factor in this disparity (with more Black, Asian and minority ethnic students studying part-time), the gap was also a potential outcome of unequal access to support during write-up and/or success rates (UKCGE, 2020).

A number of sources indicated that the emphasis on previous attainment in funding application awards automatically disadvantages applicants from a minority ethnic background within this highly competitive terrain (Cramer, 2021; Williams et al, 2019; Lindner, 2020; OfS, 2021a). This is because these students were less likely to achieve a good UG degree award (i.e. First or 2:1) than their White peers, even when additional background characteristics, such as GCSE scores and socio-economic factors, are taken into account (Stevenson et al, 2019; Universities UK, 2019; OfS, 2021a; Codiroli Mcmaster, 2021).

Low representation of Black, Asian and minority ethnic students at UG level in high-tariff institutions. Compounding the disadvantages related to the awarding gap, Black, Asian and minority ethnic students have been found to be less likely to attend high-tariff institutions at an UG level (Boliver, 2016; Bhopal, 2020; Arday et al, 2022). In turn, this impacts on access to research funding as applicants from research-intensive institutions are favoured when it comes to studentship awarding (Williams et al, 2019).

Unfamiliarity with the application process and access to fewer role models. Reduced awareness about how to successfully navigate the PhD application process and funding system has also been raised as an issue disadvantaging Black, Asian and minority ethnic students from continuing in postgraduate research roles (Williams et al, 2019; Lindner, 2020; Sanderson and Spacey, 2021). In addition, other research has found that students from ethnically diverse backgrounds tend to access university support services less (Akinbosede, 2019) and that there is a dearth of Black, Asian and minority ethnic academic role models and mentors (Lindner, 2020). The lack of ethnic diversity at the staff level is in itself linked to the underrepresentation of ethnically diverse students at the doctoral level, as this is tied to students' reduced feelings of belonging, engagement and progression to postgraduate study (Universities UK, 2019; Arday, 2018; Arday et al, 2022).

To help minimise the impact of this reduced awareness of the PhD application process, and where to look for postgraduate research programmes and funding, the literature highlighted the importance of pre-doctoral training programmes, such as postgraduate summer schools (Wakeling and Mateos-González, 2021) or informational workshops and other outreach activities (Lindner, 2020). These normally provide information about how to find programmes, prepare applications and identify relevant PGR funding opportunities. Moreover, some include mentoring and networking elements, offering participants the opportunity to connect with people from similar backgrounds that have experienced a PhD course and have progressed since; for example UCL's London Interdisciplinary Biosciences Consortium free one-day event 'Pathway to PhD' for potential PhD students identifying as Black, Asian or minority ethnic (London Interdisciplinary Doctoral Programme, 2022) or the London Intercollegiate DTP's applicant workshop (London School of Hygiene and Tropical Medicine, 2022).

The impact of socio-economic background

In general, the challenges faced by minority ethnic students have some similarities with those of students from lower socio-economic backgrounds and are often exacerbated by the high degree of overlap between these two characteristics. In particular, the barriers described for ethnicity that have also been found to limit access to funding for applicants from a lower socio-economic background include:

+ previous institution

+ financial concerns

+ risk of unemployment post-PhD.

Previous institution. Williams and collaborators highlighted that minority ethnic students and those from low socio-economic backgrounds tended to attend post-92 universities more than their White and socio-economically advantaged peers, placing them in a disadvantaged position when it comes to PhD studies, as applicants who have attended Russell Group and research-intensive universities were more likely to get PhD funding (Williams et al, 2019). A recent Research on Research Institute report highlighted how sex, ethnicity and socio-economic background interacted in creating inequalities in access to postgraduate studies (Hancock, Wakeling and Chubb, 2019). The report states that, in the UK, "graduates who are female, of Black African, Black Caribbean, Indian, Pakistani, or Bangladeshi ethnicity, or are from lower socio-economic backgrounds, have low or exceptionally low rates of progression to doctoral level study" (Hancock, Wakeling and Chubb, 2019,10).

Wakeling and Mateos-González (2021) unpack barriers to postgraduate study, paying particular attention to socio-economic background. Their evidence showed that graduates from less privileged backgrounds are less likely to progress in postgraduate studies when compared to their better-off counterparts. This report explored a variety of socio-economic indicators, such as parental education, occupation, classification of local area based on HE participation rate or type of school attended prior to HE, and concluded that relevant differences in progress remained, even after controlling for previous attainment and the institution in which the UG degree was gained.

Wakeling and Mateos-González (2021) also found inequities related to socio-economic background when looking at those who had been awarded a PGR place, particularly in terms of those who had managed to get into Russell Group institutions across the UK. Specifically, the authors argued that these inequalities were mostly driven by graduates' financial concerns, as the country's most prestigious institutions tended to be more expensive both in terms of tuition fees and living costs.

Financial concerns. Despite postgraduate doctoral loans (introduced in 2018/19) being a measure adopted to address financial considerations related to pursuing PGR studies, they currently do not cover the full maintenance costs and fees of all of the PGR programmes (see also House, 2020; UCU, 2022 and Smith McGloin and Wynne, 2022).

Indeed, the data available indicates that prospective PhD students think that a doctoral loan or a studentship is not adequate on its own to fully fund a PhD (House, 2020; Bennett, 2020). Several actions have been taken to tackle this issue of inadequate PhD funding. For example, Sheffield Hallam University has responded by increasing the minimum stipend for PhD students to the equivalent rate of the Real Living Wage and has committed to do so on a yearly basis, to ensure that their provisions at least meet the cost of living (Sheffield Hallam University, 2022). The same institution, as well as some of the UKRI councils, have already moved or are planning to move towards a standard minimum of three and a half years for PhD award funding, as well (Sheffield Hallam University, 2022; ESRC, 2021). In general, it is important that PGRs should be provided "with remuneration that is both reflective of their value

and the work they do, and which does not require supplementing through additional work" (UCU, 2022, 4).

Moreover, financial considerations related to the accumulation of previous debt from UG and/or PGR taught loans act as further deterrents to undertaking PGR studies for students from lower socio-economic backgrounds (Lindner, 2020; House, 2020; see also Department for Education, 2017 for women and minoritised groups). Lindner (2020) argues that funding schemes supporting high-potential underrepresented students to complete a funded taught degree first could provide a more accessible pathway to PGR studies, as a bridge from UG level to PhD enrolment.

Career prospects post-PhD. Given the current saturated academic job market, students from lower socio-economic backgrounds are more averse to the idea of postgraduate study as the risk of not finding a well-paid job at the end of one's PGR degree is too high compared with the amount the degree would cost to undertake (Pásztor and Wakeling, 2018; UCU, 2022; UKRI, 2022e).

Raising awareness and demonstrating the financial and non-financial benefits of PGR students' time and cost investment is key to attracting more students from lower socio-economic backgrounds (Pásztor and Wakeling, 2018; UCU, 2022). Relevant initiatives could include access to academic roles post-PhD completion, as well as clear communication and facilitation of the potential for successful and prosperous career pathways beyond academia (Vitae, 2019; Wellcome Trust, 2020). Results from the most recent PGR experience survey showed that PhD students would like more connections with industry and relevant career support for pathways beyond academia (Pitkin, 2021).

Based on all the above, collecting information related to socio-economic background from doctoral applicants, students and graduates could offer invaluable insights into the effect of funding sources on student outcomes (Wakeling and Mateos-González, 2021; Guyan and Douglas Oloyede, 2019; Gill, 2022). Such data would also begin to unpack whether or not inequalities in funding decisions underpin inequities in access to and success in doctoral studies. Moreover, informational workshops and preparatory courses for prospective PhD students from lower socio-economic backgrounds, such as the ones suggested above for students from a minority ethnic background, have been suggested as helpful ways to raise awareness about what to expect from and how to best prepare for a PhD (Lindner, 2020; UCU, 2022).

Domicile/nationality

The barriers experienced by students from a minority ethnic background need to be further disaggregated by nationality to be fully understood. Most of the benchmarking data, but also most of the data available related to postgraduate researchers, is based on UK domiciled students (OfS, 2022), a practice which leaves international students outside of the picture. International students have distinct needs and face unique challenges compared to their UK domiciled counterparts, which have been exacerbated during the pandemic (OfS, 2022; UCU, 2022). International students face issues related to taking leave of absence or being able to

work from home within the current remote/hybrid mode of working, as this can put them at risk of losing their student visas (UCU, 2022; UKRI, 2022e).

Recognising and addressing the barriers that international students face in accessing doctoral education in the UK is vital, as they currently represent almost 50% of all PGR students in the UK (OfS, 2022; Westphal, 2022). The UK has been one of the traditional focal points in terms of attracting international doctoral students, even though recent data shows that it is losing traction within the last few years (Westphal and Ilieva, 2022). Some of the factors contributing to this declining trend in international student numbers are:

+ the increased fees for students since the EU exit (OfS, 2022; Westphal and Ilieva, 2022)

+ changes to student visas (OfS, 2022)

+ a decline in the funding opportunities available to international students (Westphal and Ilieva, 2022; UCU, 2022)

+ limitations surrounding international students' employability post-degree (HEPI and Kaplan, 2021).

Disability

The main barriers to access and participation experienced by disabled PGR students include:

+ reduced access to, or understanding of, the Disabled Students' Allowances (DSAs)

+ fear of disclosing as disabled and the impact this may have on being awarded funding

+ a lack of understanding of the provisions available, inappropriate support provided and delays in the implementation of reasonable adjustments

+ a lack of flexibility with regards to leave and access to support and maintenance while on leave

+ difficulties surrounding mental health in particular.

Reduced access to* or understanding of *DSAs. Sector-wide data showed that only 23.7% of disabled PGR students with a known DSAs status received DSA funds, which is 12 percentage points lower compared to the proportion of UG students who received DSAs (Advance HE, 2021a). An explanation for this could be provided by a recent evaluation report of the DSAs (Johnson et al, 2019). According to the report, there was a lower percentage of awareness of DSA among postgraduate students compared to undergraduate students. 38% of postgraduate students that took part in the evaluation had never heard of DSAs compared to 19% of their undergraduate peers. The report also found that a higher share of PGRs found the application process difficult, compared to undergraduate applicants (39% compared to 31%).

Fear of disclosure. The underrepresentation of disabled students among the PGR population has been related to students not declaring their disability during their application process (Careers Research and Advisory Centre, 2020; DSC, 2021; Joice and Tetlow, 2021). Specifically, these reports suggested that postgraduate students might choose to not disclose

their disability because they are worried that this would influence the outcome of their application, their future employment prospects or because they themselves do not view their impairment as a disability. Disclosure has been found more likely to take place with a line manager rather than through more formal reporting processes, as there has been little faith in the benefit of going through what seems to be the onerous task of formal disclosure (Careers Research and Advisory Centre, 2020).

A lack of understanding of the provisions available, inappropriate support provided and delays in the implementation of reasonable adjustments. Literature has highlighted that PGR students lack a clear understanding of what provisions are available to disabled students (Careers Research and Advisory Centre, 2020; DSC, 2021). PGRs in STEM subjects, in particular, have reported a lack of clarity in the process of requesting and securing reasonable adjustments, and a lack of awareness and understanding when they sought support, particularly from formal sources such as HR (Careers Research and Advisory Centre, 2020). Moreover, a lack of clear understanding and awareness around the types of support available to, and specific examples of, reasonable adjustments that could be made for disabled PGR students has been noted across the HE sector (Johnson et al, 2019; Careers Research and Advisory Centre, 2020). Finally, the literature has also shown that inappropriate support provided (Johnson et al, 2019) and delays in the implementation of reasonable adjustments, especially during the Covid-19 pandemic (Borkin, 2021) are also hindering disabled PGR students' access and participation. Evidence from the Postgraduate Research Experience Survey showed that disabled PGR students reported lower overall satisfaction levels with their studies compared to their peers with no reported disabilities (72% compared to 81% respectively for 2021) (Neves, 2022). Specifically, disabled PGR students rated their satisfaction with regards to the suitability of working space/resources as well as the health and wellbeing support available to them considerably lower than their non-disabled peers (56% compared to 68% and 68% compared to 79% respectively).

Flexibility around leave and maintaining support while on leave. In addition, the DSC guidelines described above encourage students to ask for extensions, pointing out that mitigating/extenuating circumstances might apply to them, explaining what this might entail as follows:

> *"Adjustments and support will be provided by colleges and universities to enable you to complete your postgraduate study in line with the duty to make reasonable adjustments under the disability provisions of the Equality Act 2010. Many of these adjustments are made through inclusive provision for all students. For instance, ensuring the library is accessible, installing assistive software on all student computers and providing records of lectures. However, individual adjustments may also be provided and if implemented at the outset of your postgraduate study can reduce the likelihood of you encountering barriers during your course. Individual adjustments include the provision of equipment or support specific to your requirements." (DSC, 2021, 4)*

Flexibility around leave of absence is particularly important for disabled PhD students. According to UCU (2022) and recent evidence submitted to UKRI (UKRI, 2022e), there are

still PGR students who are not entitled to paid sick leave or unpaid leave. Researchers have highlighted the need to remove the stigma around taking leave and the stripping of PGR benefits while on leave, such as "access to library services and university counselling and wellbeing support" (UCU, 2022, 7; see also UKRI, 2022e). Moreover, information around leave entitlements and relevant processes should be clear and easily accessible, so that students who need time away from studies due to a disability or a long-term health condition do not have to go through heavy administrative procedures (e.g. lengthy evidence requirements) (UCU, 2022).

Difficulties surrounding mental health. According to Levecque and colleagues (2017), one in two PGRs experienced mental health difficulties during their postgraduate studies, while one in three were at risk of depression. Recent literature has highlighted how an antagonistic climate of PGR studies as well as inappropriate support from their supervisors can severely impact PGR students' mental health (Royal Society, 2018; Johnson et al, 2019; Careers Research and Advisory Centre, 2020; Wellcome Trust, 2020; McChesney, 2022) and noted that financial difficulties in particular contribute negatively to the mental health of PhD students (Vitae, 2018).

Insufficient time is also an issue impacting PhD students' mental health, understood both as: (i) being required to take on unmanageable or unsustainable workloads; and (ii) not having enough time to complete the PhD project (Johnson et al, 2019; UCU, 2022). The issue of time is, in principle, one of financial nature, as it is related to the overall length of funding period granted, the maximum period during which PhD completion is permitted or both (UCU, 2022). The current expectation for PhD students to complete within three or three and a half years contrasts with the needs of the PhD population, who have suggested that funding and the minimum completion length be extended to at least four years (UCU, 2022; UKRI, 2022e).

In the most recent national postgraduate research experience survey, issues related to mental health, resulting from uninviting research cultures, financial and time considerations were raised (Pitkin, 2021). Fewer than two thirds of PhD students agreed that the support available to them for their health and wellbeing met their needs (Pitkin, 2021). Moreover, the same survey pointed out that mental or emotional health problems were the most frequently given reason for considering dropping out of a research degree. This was cited by nearly 7% of the respondents. In addition, 23% of research students expressed feeling unconfident that they would complete their degree within their institution's expected timescale.

Postgraduate researchers' open-ended comments in this survey asked for more proactive offerings of counselling and other forms of mental health support as potential solutions to the problems they are facing, while also asking for an end to the current culture that expects and accepts that PhD researchers should be constantly stressed (Pitkin, 2021). Vitae (2022) has developed several suggestions for how PGRs could be supported with their wellbeing, including integrating wellbeing and mental health support into researcher development, but also relevant awareness to be raised among PhD supervisors (UKCGE, 2022) and certain commitments to be made that clearly define manageable workloads and expectations from research students (Vitae, 2018; 2019).

Sex

The main sex-related barriers to access and participation in PGR studies include:

+ lower satisfaction of female PGR students with their course experience compared to their male peers

+ underrepresentation in academic careers, particularly in Science, Technology, Engineering and Mathematics (STEM) disciplines.

There has been significant progress regarding access to postgraduate research for female students in both in the general population and within UKRI specifically. The proportion of female PGR students has risen from 47% to 49% between 2014/15 and 2019/20 based on HESA student records. Similarly, the proportion of UKRI studentship starters has risen from 40% to 45% of the total between 2014-15 and 2019-20 (UKRI, 2021b). Despite this progress, the proportion of female PGR students funded by UKRI in 2019-20 (45%) was still lower than the proportion of female students in the overall PGR student population (49%) (HESA, 2022).

***Lower satisfaction with aspects of the PGR experience compared to their male peers.*** Evidence from the literature has shown that, compared to their male peers, female research students have lower satisfaction with their overall PGR experience as well as with specific aspects of it, such as the quality of supervision, the availability of resources that meet their needs and their experience of research culture (Lindner, 2020). Reports related to STEM research cultures have shown that female researchers are disproportionately affected by bad research cultures (Wellcome Trust, 2020; Royal Society, 2018). Specifically, female researchers reported higher levels of anxiety and more discrimination based on their sex than their male peers (Wellcome Trust, 2020). These experiences were found to be related to issues such as tensions arising between work and family demands, such as the requirement of long working hours and constant productivity (Wellcome Trust, 2020).

Underrepresentation in academic careers, particularly in STEM disciplines. Despite the progress noted in the proportion of female PGR students, both HESA and UKRI funding data suggests that this increase in female representation does not yet translate into equitable representation of females in grant and fellowship applications and funding awards (UKRI, 2021b) as well as in academic staff positions (HESA, 2022). As Figure 3 below shows, the proportion of females diminishes at each step between undergraduate studies and professorships in the UK.

This seems to be even more pronounced when looking at STEM disciplines. According to 2019-20 data (Advance HE, 2021a), female students remained in the minority when it came to STEM subjects at the postgraduate research level (45.6% of the total), with particular disparities noted in engineering and technology (25.9% of the total), computing (28.1% of the total), and mathematical sciences (28.7%). There is great variance in terms of sex representation across the different STEM subjects, with males being severely under-represented in psychology, for example (23.6% of the total). Consequently, to ensure that present inequalities are addressed, attention needs to be given to both male and female representation across STEM subjects. Funding initiatives such as the 'Breaking Barriers Studentship Award' introduced by the University of Surrey (University of Surrey, 2022), where targeted PhD funding opportunities are advertised to tackle sex/gender underrepresentation

within specific STEM subjects, are a good example of positive action as a proportionate means to achieve the legitimate aim of progressing towards sex/gender parity within the various disciplines.

Figure 3: Student/staff pipeline by sex
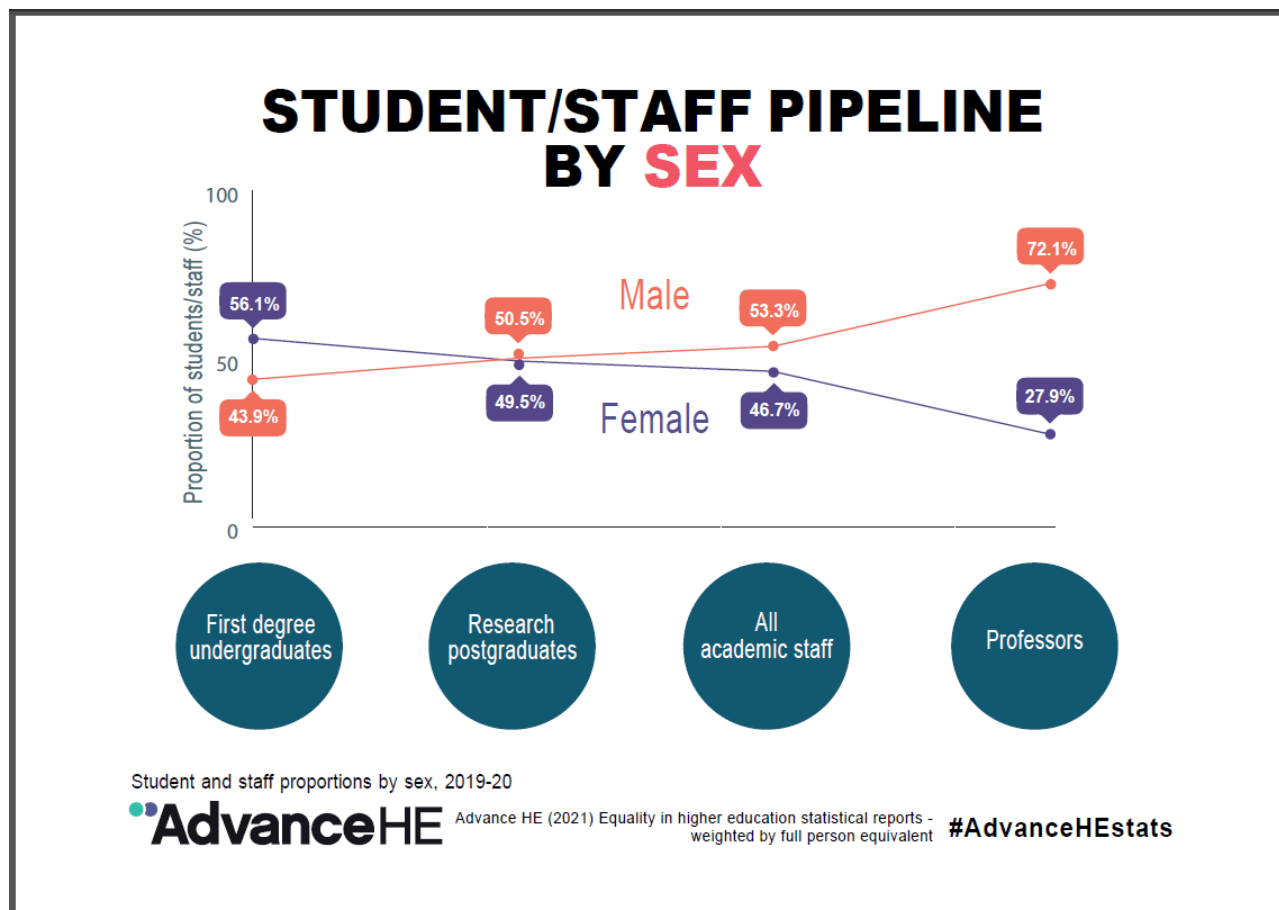
Source: Advance HE, 2021b,10

Pregnancy, maternity, parental and caring responsibilities[6]

Across the literature sources identified in this review, the main barriers to PGR access and participation that disproportionately impact student parents and carers are:

+ navigating the 'student-parent' balance

+ financial concerns

+ inadequate support.

Research on the experiences of student parents and carers has been scarce (Moreau and Kerner, 2012; 2015) especially when it comes to access and participation in doctoral studies (Hook, Moreau and Brooks, 2022). Student parents are often described as an invisible

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[6] Although 'pregnancy and maternity' is the protected characteristics under the Equality Act 2010, this section presents evidence related to parental leave and caring responsibilities in general, as these two characteristics are often interrelated.

population within HE (Marandet and Wainwright, 2010) with caring responsibilities often being ignored or treated merely as a "contextual variable" rather than an important aspect of students' identities (Moreau and Kerner, 2015, 218). Data collection practices at institutional and national level further contribute to the invisibility of the student parent, as HESA and most HE institutions do not collect information on the familial circumstances of the student population (Moreau and Kerner, 2012; 2015; Hook, Moreau and Brooks, 2022). However, estimates provided by targeted reports show that student parents and carers are a sizable population. According to the 2014/15 Student Income and Expenditure Survey (Maher et al, 2019), 9% of UK-domiciled full-time students were parents living with their children, but the proportion was much higher for part-time students, at 36%.

Navigating the 'student-parent' balance and financial concerns. Studies exploring the experiences of student parents highlight how student parents try to navigate the financial difficulties associated with being or becoming a parent, the time-related demands of being a student and a parent while studying and the physical and mental health implications that the balancing act of being a 'good' parent and student brings (Moreu and Kerner, 2012; 2015; Rhoden and Kinchington, 2021). Due to the above, a lot of student parents consider dropping out of their degrees (Smith and Wayman, 2009; Moreu and Kerner, 2012; 2015). This is because they feel like 'outsiders', as university and funding policies (re)produce an environment in which family-related issues need to be addressed away from one's studies so that "students' private lives do not encroach on the traditional views of student life" (Rhoden and Kinchington, 2021, 982).

Lack of knowledge and inadequate support. In 2015 the Carers Trust published a guidance document to help universities formulate their carers policies (Phelps and Warren, 2015), and the Office for Students more recently provided some good-practice examples (OfS, 2020). Similarly, guides were also published to help the sector better support students during pregnancy and maternity (ECU, 2010). As a result, many higher education institutions have adopted parent and carers policies to support relevant students as part of their equality agenda, which also cover student pregnancy and maternity. Such policies aim to allow flexibility for student parents and/or carers and attempt to make sure that students are not disadvantaged.

However, in March 2022, the Carers Trust published a survey (Carers Trust, 2022) on the experiences of young carers and the impact of Covid-19, which showed that:

+ over half of young adult carers (51%) struggled to balance caring with school, college or university work

+ only one in three (36%) of young adult carers agreed that their school, college or university was "always" or "usually" understanding about them being a carer

+ more than half (52%) of young adult carers said that they "never" or "do not often" get help from school, college or university to balance their work.

Relevant negative findings in terms of receiving adequate support were raised in UCU's recent consultation with postgraduate researchers (UCU, 2022) where 45% of respondents who had parental and/or caring responsibilities felt that their needs were adequately met (see also UKRI, 2022e).

It is worth highlighting that barriers to doctoral funding for parents and carers usually intersect with sex. For example, recent evidence from the 2022 Family Resources Survey showed that about 60% of informal carers identify as female (Department for Work and Pensions, 2022). Bearing in mind that a person cannot receive any parental or carer's allowance if they are in full-time postgraduate research degrees (Moreau and Kerner, 2012; Foley et al, 2022), it is clear how female mothers and carers might be disproportionately affected in terms of access and participation in postgraduate research studies. In most circumstances, it seems like the only support available to postgraduate research parents or carers is to defer or interrupt their studies (Rhoden and Kinchington, 2021), although some institutional hardship funds are also available (particularly relevant to lone parents) (Moreu and Kerner, 2012). However, it is also worth stating that students who are parents and/or carers have been found to not always be aware of the hardship funds and other forms of support available to them, as there seems to be a lack of clearly communicated relevant information (e.g. dedicated webpages for parent carers outlining the support available and how to access it) and assistance to apply for relevant entitlements (OfS, 2020; UCU, 2022). A few examples of what successful support might look like for student parents and carers have been identified in the literature. UCU (2022) advocated for the extension of tax-free childcare entitlement for all PhD students to 30 hours, and access to affordable and appropriate childcare provisions (in and out of campus) (e.g. nursery/childcare facilities, breastfeeding room etc.) has also been raised as beneficial by student parents (Rhoden and Kinchington, 2021). On top of that, UCU also advocated for the introduction of paid (shared) parental and carers leave, based on a number of PGR students who stated that they were not entitled to paid parental leave or even unpaid leave (UCU, 2022).

Age – mature students

Although the Office for Students has already declared improved access and increased participation of mature students in HE as one of its priority areas to achieve equity in HE for all (OfS, 2018), there is currently very little data available exploring the barriers experienced by mature students at the PhD level. UCU (2022) recently highlighted the need for further data and research to understand the challenges faced by this group of PGR students. There is no clear definition of what constitutes a mature PGR student (Hubble and Bolton, 2021) and most universities do not formally recognise this population. Some sources indicated that mature postgraduate students are informally counted as those aged above 25 years (PGMSA, 2022; Postgrad.com, 2022). In the UK, the majority of PGR students are aged between 21-25 years old, although this does shift significantly when looking at the part-time student population, where the majority is between 30-49 years old (HESA, 2022). No matter the exact age definition, what the literature (Hubble and Bolton, 2021; OfS, 2021b) pointed out about mature students is that they form a minority within the wider PGR population and that they are more likely to experience:

+ financial concerns

+ balancing studies with work and caring responsibilities.

Mature students are harder to engage in postgraduate studies because they might be sceptical about getting back into studying in HE after years spent outside this context, but also

because of the inherent difficulties around juggling studies with work and other related commitments (e.g. caring) (OfS, 2021b; Hubble and Bolton, 2021). For a lot of mature students considering postgraduate research degrees, enrolment will more than likely result in a decrease in their income. This is more likely if these students have been working full-time and had an established role within an organisation (Etches, 2021). For many prospective mature PhD applicants, enrolment means a change in their mode of working or, in some cases, even unemployment, to be able to fully engage in their studies. This is because funding support is not available for full-time workers, but also because undertaking a PhD is in itself a full-time job. This is why most mature students are enrolled part-time (Hubble and Bolton, 2021). Due to the interdependency between employment, other existing responsibilities and prospective studies, having a transparent and straight-forward application process in place with clear timelines has been identified as of paramount importance for engaging effectively with mature students (Etches, 2021).

Hubble and Bolton (2021) also identified some other barriers that might disproportionately affect mature PhD applicants in terms of access to funding and participation as follows:

+ non-traditional routes into PGR studies (which most of the time combine educational qualifications with work experience)

+ the existing age awarding gap at undergraduate level, which has repercussions when PhD funding is decided upon these criteria

+ mature students are in general more likely to come from non-traditional backgrounds. For instance, they might be from lower socio-economic and/or minority ethnic backgrounds, have caring responsibilities and be disabled.

Gender reassignment and sexual orientation

There is a major gap in the literature when it comes to considering postgraduate research students' access and participation across gender reassignment and sexual orientation. Most of the available studies focus predominantly on the experience of undergraduate students and tend to explore belonging.

From the literature sources identified in this review, the main barriers to PGR access and participation related to Lesbian, Gay, Bisexual and Trans (LGBT) students seemed to be:

+ financial concerns

+ bullying and harassment

+ lack of relevant data to identify and tackle inequities effectively and fear of disclosure.

Financial concerns and experiences of bullying and harassment. The first comprehensive study exploring the experiences of LGBT staff and students in UK HE was conducted by the Equality Challenge Unit (Valentine, Wood and Plummer, 2009). 18% of respondents to the study were postgraduate students and their responses highlighted issues related to:

+ financial support available to these students by their parents, when the latter did not approve of their sexual orientation and/or gender identity. This lack of funding or fear

of financial consequences faced by family members when coming out formed a major point for consideration for LGBT students when it came to considering funding their studies

+ LGBT students being exposed to bullying and harassment (disproportionately affecting trans students) by fellow students, as well as tutors and university support staff, which seemed to lead LGBT students to take time out of their degrees. Other reports have also highlighted that being victims of bullying and discrimination is the main reason for LGBT students to take time out of their degrees (Formby, 2017; NUS, 2014).

A similar report was published in 2015 (Valentine and Wood, 2015), this time focusing only on sexual orientation and excluding trans staff and students, with almost identical findings to the ECU study (Valentine, Wood and Plummer, 2009) and highlighting the need for appropriate data collection and monitoring in order to be able to come up with targeted solutions. Recent interventions have also shown how homophobia and lack of relevant support and representation are still a threat for LGBT students' (and staff) prospects and wellbeing, particularly in STEM fields (e.g. Royal Society of Chemistry, 2019; STEM Equals, 2020).

Lack of relevant data to identify and tackle inequities effectively and fear of disclosure. Gender reassignment and sexual orientation HESA data returns were optional for students until 2019/20. This has limited the potential to create a robust and representative national picture when it comes to the HE student population with those characteristics (Valentine, Wood and Plummer, 2009; Valentine and Wood, 2015). Thus, the literature has highlighted that particular attention needs to be paid to systematically collecting data around sexual orientation and trans status to be able to better understand the needs of these communities. As Valentine and Wood (2015, 17) put it, if such data is not collected in a systematic manner, it will be impossible to "measure (in)equality in relation to sexual orientation; identify problems that need to be acted on and where these may be arising; and assess the impact of any changes in the sector, such as the delivery of new equality policies or the effectiveness of targeted support or service delivery".

However, the collection of robust and systematic sexual orientation and trans status data has often proved to be challenging, as a lot of members from these communities have been wary of disclosing this information due to the impact this might have on their future career progression and access to opportunities (Valentine, Wood and Plummer, 2009; Valentine and Wood, 2015). However, according to the literature (Valentine, Wood and Plummer, 2009; Valentine and Wood, 2015), it is definitely worth gaining the trust of these communities by clearly communicating the reasons why this information is collected as well as how it is stored, so that targeted initiatives can be more effective and their need can be backed up by robust data. Finally, the literature has shown that highlighting the representation of LGBT staff and students' achievements and clearly outlining the provisions available for these communities could encourage disclosure (Valentine, Wood and Plummer, 2009; Valentine and Wood, 2015; Royal Society of Chemistry, 2019).

Religion and belief

Despite there not being much literature exploring PGR students' access and participation across religion and belief, the main barriers that could be identified were:

+ lack of relevant data to better understand the current picture as well as meet students' needs

+ underrepresentation of Muslim students in Russell Group universities and undergraduate degree awarding gaps

+ intersectional inequities

+ feelings of non-belonging.

Lack of relevant data. There is a major gap in the literature when it comes to considering postgraduate research students' access and participation across religion and belief. This is because most of the studies available focus predominantly on the experience of undergraduate students and tend to explore belonging. Very little is known about the overall student population in terms of religion and belief in general, as relevant HESA data returns were optional until 2017/18. The literature has highlighted the lack of relevant data as a barrier in creating a robust and representative national picture when it comes to the HE student population with those characteristics (Codiroli Mcmaster, 2020).

Underrepresentation of Muslim students in Russell Group universities, undergraduate degree awarding gaps and intersectional inequities. The most thorough report identified in this literature review trying to explore the participation and outcomes of students from different religious backgrounds in UK HE was published by Advance HE and used HESA student data from 2017/18 (Codiroli Mcmaster, 2020). The report focused predominantly on undergraduate students and attainment, but some of its findings have repercussions for access and participation to postgraduate research studies. Specifically, the findings highlighted that Muslim students are underrepresented in Russell Group institutions and they graduated from their undergraduate studies with a First or 2:1 degree in smaller proportions compared to their peers (Codiroli Mcmaster, 2020). These differences intersected with ethnicity and socio-economic background most of the time, as Muslim students are mostly Black, Asian or minority ethnic. With the current funding award criteria prioritising previous achievement and opportunity, it becomes clear how Muslim students' lower degree awards and participation in lower-tariff institutions could disproportionately affect their access to postgraduate research and funding.

Studies have also explored the experiences of Muslim students in UK HE and have identified issues that highlight intersectional inequalities again. For example, among other studies, Stevenson's (2018) found that Muslim students had to manage their studies alongside other commitments, such as part-time working and/or caring responsibilities. Similarly, evidence from studies looking specifically at financial considerations showed potential issues with Muslim students not pursuing doctoral studies due to postgraduate doctoral loans not being Sharia compliant (Smith McGloin and Wynne, 2022).

Feelings of non-belonging. Evidence from the literature showed that Muslim students express feelings of exclusion, as they feel they are perceived from peers and/or staff members as being 'quiet' in terms of contributions to discussions or 'odd' because of the way they are dressed (particularly relevant to Muslim women) (Stevenson, 2018). In general, it was evidenced that UK HE acts as a secular space, separated from religion, despite the fact that, for many HE staff and students, maintaining religious beliefs is an important part of their identity (Islam and Mercer-Mapstone, 2021).

To address this tension, studies looking at the experience of Muslim students have shown that they tend to 'settle for less', by justifying "(unconsciously) not having access to a richer and more fulfilled university experience in relation to religious needs" (Islam et al, 2019, 94; see also Islam and Mercer-Mapstone, 2021). However, Codiroli Mcmaster (2020) highlighted that the more Muslim students are present within the HE setting, the smaller the awarding gaps when it comes to undergraduate studies. Also, Muslim students themselves denoted that the use of "micro-affirmations (i.e. small acts of inclusion)" (Islam and Mercer-Mapstone, 2021, 1408), such as representing religious diversity through acknowledging various major religious holidays in institutional calendars (Lindner, 2020), positively influences their level of belonging (Powell et al, 2013).

Conclusions

This literature review has attempted to collate evidence currently available from a variety of resources, ranging from HESA and UKRI data to blogs and policy reports, to identify pertinent barriers to doctoral education funding related to EDI characteristics. As demonstrated in the sections above, there remains inequitable access to doctoral funding and education for a variety of minoritised groups, including people with particular protected characteristics, but also those from certain backgrounds not currently protected by the Equality Act 2010.

What this literature review has highlighted is that EDI-related barriers to doctoral studies' access and participation is an under-researched topic and predominantly covered by grey literature resources. Broadly speaking, financial considerations, inequities arising in previous educational levels (e.g. degree awarding gaps and type of HE institution attended at UG level), as well as lack of sufficient and appropriate support mechanisms and resources, were the most commonly identified barriers to equitable access and participation in PGR studies. Moreover, none of the barriers identified across the various characteristics seemed to be mutually exclusive, something which could be interpreted as affirming the impact of compounding inequalities. However, although intersectional inequalities and their compounding effect in both access and participation to studies at all levels have been increasingly acknowledged, there seems to be a lack of research and data approaching EDI barriers to access and participation from an intersectional lens, particularly when it comes to PGR studies.

This literature review has also highlighted how certain characteristics are less well researched than others. Specifically, pregnancy, maternity, parental and caring responsibilities, age, gender reassignment, sexual orientation and religion and belief are much less explored than ethnicity, disability and sex. This highlights the need for more and broader coverage of EDI aspects when it comes to exploring barriers to access and participation in PGR studies.

Finally, the issue of a lack of systematic, robust and representative EDI data available across the sector has surfaced. Issues with inconsistent data collection practices as well as reluctance to disclose have been identified across the various EDI characteristics. These need to be addressed as high priority issues, as data forms the first step in better understanding and effectively addressing minoritised students' needs.

To conclude, this literature review provides evidence on what has been done and what we know with regards to EDI barriers to access and participation to PGR studies relevant to funding. It also shows what we still need to explore more and understand better. With this in mind, we hope that this literature review will form a platform for more research on EDI barriers to access and participation in PGR studies.

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