



Open Research Online

Citation

Macbrayne, Louise; Bellamy, Jennie; Richards, Angela and McPherson, Elaine (2025). Black student experience on an introductory STEM module: Closing the awarding gap by listening to our Black students. In: The 13th eSTEEeM Annual Conference Proceedings: Sharing Best Practice - Implementing What Works (Pawley, Susan and Chang, Daphne eds.), 10-11 Apr 2024, The Open University, UK, pp. 46–53.

URL

<https://oro.open.ac.uk/102266/>

DOI

<https://doi.org/10.21954/ou.ro.00102266>

License

(CC-BY-NC-ND 4.0) Creative Commons: Attribution-Noncommercial-No Derivative Works 4.0

<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Policy

This document has been downloaded from Open Research Online, The Open University's repository of research publications. This version is being made available in accordance with Open Research Online policies available from [Open Research Online \(ORO\) Policies](#)

Versions

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding



Black student experience on an introductory STEM module: Closing the awarding gap by listening to our Black students

Louise MacBrayne¹, louise.macbrayne@open.ac.uk

Jennie Bellamy², jennie.bellamy@open.ac.uk

Angela Richards¹, angela.richards@open.ac.uk

Elaine McPherson², elaine.mcpherson@open.ac.uk

¹ **School of Life, Health and Chemical Sciences**

² **School of Environment, Earth and Ecosystem Sciences**

Abstract

In the UK HE sector, including the Open University, White students tend to achieve better outcomes compared to their Black peers. This difference is the awarding gap between Black and White students' outcomes. The module S112, Science Concepts and Practice, is a first year, interdisciplinary science module currently serving 24 qualifications. 2019 data revealed that the pass rate for Black students (35%) was low in comparison to White students (67%) and students of other ethnicities, despite comparable completion rates. The S112 awarding gap was wider than both Faculty and Institutional values. This report summarises the findings, conclusions, and recommendations from a completed project to investigate Black student experience on S112. The findings from an online focus group followed by interviews with Black students are presented, together with a concurrent intersectionality study investigating possible double disadvantages for S112 Black students. Thematic analysis identified a lack of representation of Black scientists and University staff, together with a lack of sense of belonging for the university's Black students, as being the most impactful barriers to success. Other themes such as perceived hidden costs associated with study could be relevant to wider student communities. The report summarises recommendations to address issues likely to be faced by Black students and highlights the need for further research to investigate an apparent lack of trust in the University, to open two-way channels of communication with University staff.

Keywords: Awarding gap, Black students, intersectionality, STEM, distance learning.

Introduction and Literature Review

Pass rate awarding gaps between Black students and White students have been reported across Universities in the UK (Advance HE, 2020; Woolf et al, 2011) throughout the last 25 years. Whilst there has been some success in reducing this awarding gap sector wide, significant awarding gaps persist for Black students when compared with their White peers, with this issue receiving considerable attention in the literature and media.

Previous research has reported that when factors such as Prior Education Qualifications (PEQ), age, gender, disability, Index of Multiple Deprivation (IMD – a proxy for socio-economic status) and ethnicity are controlled, although the gap can be reduced, being from a minority ethnic community is still statistically significant in predicting final attainment (Broecke et al, 2007). A more recent study suggests that the reasons underlying the awarding gap are complex, with Black students feeling underrepresented and unwelcome at university both in terms of their fellow students but also due to a lack of representation in the staff body (Greaves et al, 2022).

The module Science Concepts and Practice (S112) is a distance learning, undergraduate, interdisciplinary science module (FHEQ Level 4) with a typical cohort size of approximately 1800 students in a single presentation, of whom approximately 30 students declare their ethnicity as Black. Data from 2017 to 2019 revealed that pass rates for Black students were lower than White students and students of other ethnicities, despite completion rates closer to the rest of the cohort. This is consistent with the findings of Cramer (2021) who reported that an analysis of students studying cell biology at University College London revealed that exam performance contributes significantly more to the

Black versus White student awarding gap than differences in performance in continuous assessment, and hence institutions themselves could be responsible for the awarding gap between Black and White students.

Figure 1 illustrates the pass rates for S112 which shows, as expected, a persistent awarding gap at module pass rate for Black versus White students, with the gap being highest in the October 2019 cohort at 32%.

S112: Comparison of Pass Rates Black vs White Students

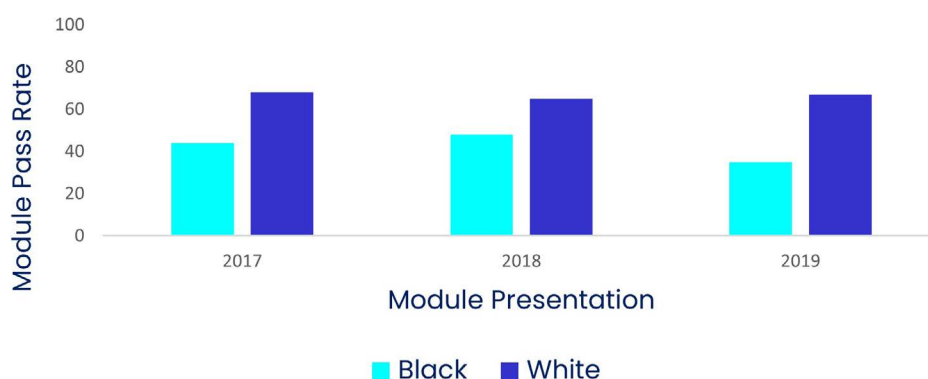


Figure 1: The Awarding Gaps on S112 for Black vs White Students 2017-2019

Therefore, as a response to the Black versus White student awarding gap evident on S112 in all presentations to date, this project was conceived to have two research questions:

- What are the needs of Black students in S112 and possible barriers to their study?
- What could be influencing the experience and outcomes for Black students in S112?

To address these research questions, the project had three aims:

- To develop understanding of issues faced by Black students throughout their study of the S112 module.
- To raise awareness of these issues amongst STEM staff including module tutors, student support staff, and module teams.
- To consider module wide interventions (including module material modification and changes to assessment strategy and tuition) to support and improve Black student experience and success on S112.

Methodology

Phase 1: Intersectionality Study

The double disadvantage hypothesis states that individuals with more than one disadvantaged status experience poorer outcomes than their singly disadvantaged or privileged peers (e.g. De Jong and Madamba, 2002). The main intersections investigated were (2017–2022):

- Ethnicity and Index of Multiple Deprivation (IMD) where IMD1 is the most deprived 20% of UK postcodes and IMD5 is the least deprived 20% of UK postcodes
- Ethnicity and gender
- Ethnicity and parents in Higher Education ('first-in-family')

Pass rates for students according to their ethnicity were analysed against pass rates for the other factors and if the rate for students at the intersection was below the rate for both the factors alone there was a 'double disadvantage'. Six years' data was analysed for each intersection.

Phase 2: Online Focus group and Phase 3: Semi Structured Interviews

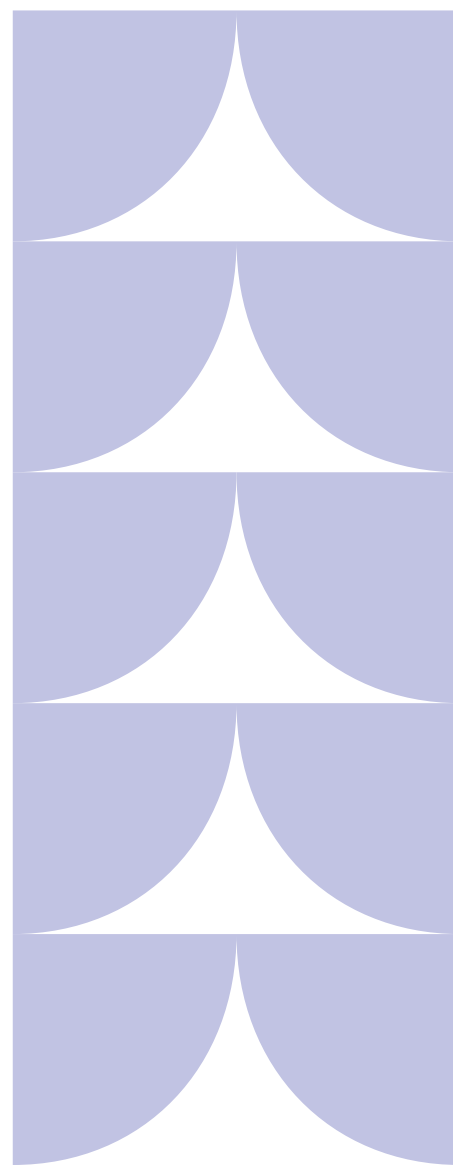
Phase 2 of the project was inspired by Heron's "Friendship as a Method" approach (Heron, 2020) which assumes that the project leaders are not present during data collection. The online focus group facilitator (the author, A.R.), represented a culturally appropriate demographic and was able to guide the focus group discussions (Dec 2021) uncovering insights and experiences that may not have been shared with a White facilitator.

Approximately 60 Black students in total were initially either unresponsive or reluctant when invited to speak to the project but, after focussed effort from A.R., four

contributed in two online phases. Phase 2 was an online focus group in which two students participated. Phase 3 involved semi structured interviews with two further students who were unable to attend an online focus group at the same time. The online focus group and interviews shared a common structure, were each approximately one hour in duration and were based around the following open questions:

- Can you tell us what led to you studying with the OU?
(prompts - career stage, employment, caring)
- Can you remember your initial impressions of S112 when you started the module?
(prompts - how did your impressions of S112 compare with previous study? Anything you liked? Anything off-putting? Was it what you expected?)
- Can you tell us about any challenges you faced during your study of S112?
(prompts - outside life challenges, e.g. changes to work/caring; challenges in the module itself)
- Is there anything else that hasn't been mentioned that you think the OU could do to help future Black students studying at Level 1 in Science and Environment?

Conversations were recorded from both the focus groups and the interviews, and thematic analysis (using first and second order coding for key words/phrases, followed by grouping into themes) was undertaken on anonymised transcripts.



Findings

Phase 1 Intersectional Study

The study identified that Black students living in IMD1, the poorest postcodes, were most likely to experience a double disadvantage.

Figure 2 shows only 16.7% of the Black students in IMD1 passed the module in 2019 compared to 60% of White students in IMD1, and over 70% of White students in IMD5. Note that there were no Black students residing in IMD5 in 2019. The lack of double disadvantage for IMD1 Asian students suggests they do not face the same barriers as the Black students.

S112 2019 October Cohort Pass Rate Intersection Comparison IMD Q1-Q5

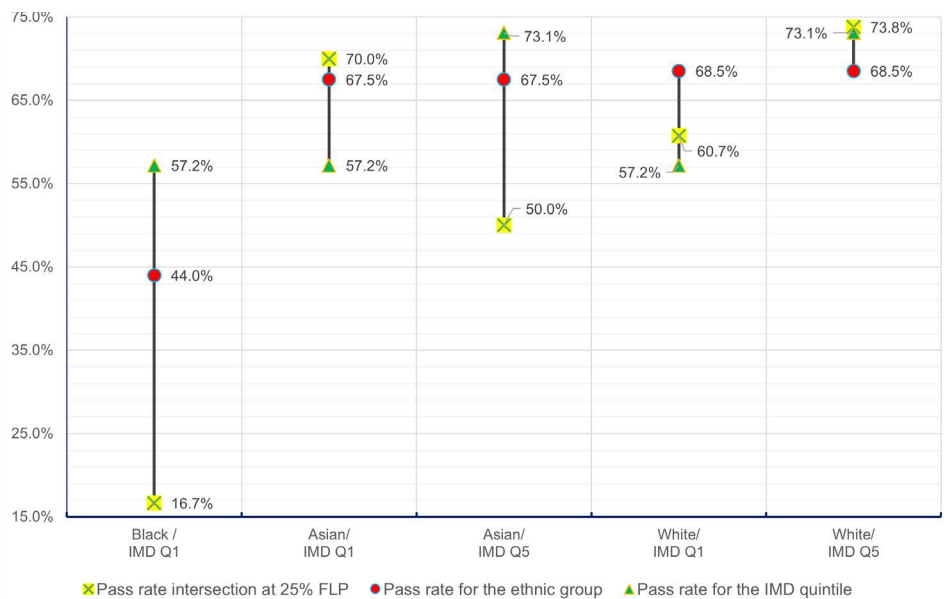


Figure 2 Pass rate comparison for students of different ethnicities and their IMD status for the 2019 presentation of S112

The pass rate for all 2019 Black students was 44%. An already large difference between pass rates for Black and White students was considerably larger for Black students living in the most deprived UK areas, experiencing a double disadvantage. Even though numbers of students in the intersectional groups are often small, the ones with the large double disadvantage are often Black.

Importantly, about 38% of the OU's Black students live in IMD1 postcodes, compared to about 17% of our White students meaning the Black students are already more likely to be facing financial difficulties. This observation is also made by Byrne et al (2020).

The Black students in IMD1 having the intersectional double disadvantage links to the focus group quote about assumptions about owning, or having the money to buy, items for kitchen experiments. Khan (2020) concludes that Black people in Britain experience economic inequality.

No consistent pattern was found for Black students who are first in their family to go to university being doubly disadvantaged nor a consistent double disadvantage for students of a particular gender. The lack of double disadvantage for first-in-family students might indicate that S112 makes fewer assumptions about prior understanding and experiences (which could be referred to as the hidden curriculum) than some HE offerings. Adamecz-Völgyi, Henderson and Shure (2022) also report that being 'first-in-family' into HE has minimal impact, although they focus on the labour market post-graduation.

Phase 2 Online Focus Group & Phase 3 Semi Structured Interviews

Five themes were identified from thematic analysis (e.g. Braun and Clarke, 2006) of transcripts. The two strongest themes identified were (1) lack of representation of Black scientists in the curriculum, alongside (2) a lack of sense of community and belonging for Black students, which together led to students questioning their

choice of study, feeling that there was no visible pathway to success (academic or professional) for "someone like me".

Theme 1: Representation in curriculum

A dominant theme evident throughout was the under-representation of scientists from the Black and other minority ethnic communities.



as a BME person you want to be inspired by your own.

Student

This is consistent with the findings of Greaves et al (2022), who states that engagement by marginalised students is not limited to academic content, and that learning takes place in a variety of settings both within and outside the formal curriculum.

Theme 2: Sense of Belonging

The second most dominant theme was the feeling of disengagement from the wider student community, for example, feeling as if they were the “only Black student”:

To have a [Black] partner to study with, that would be nice.

Student

I feel like I was alone, I don't think there was a Black student there!

Student

Marginalised students may not only perceive a lack of representation on their course materials, but also face difficulties when building relationships with their student peers and staff members if not from an equivalent demographic. This is consistent with the findings of Krause (2011), who states that the enhanced sense of belonging often found within marginalised communities impacts beyond education.

Theme 3: Student costs

To meet S112 practical-work-focused learning outcomes, students are required to set up experiments at home, using a variety of household equipment and consumables, some of which may need to be purchased. A student in the focus group highlighted that not all students had access to such equipment.

This also revealed issues surrounding financial hardship and the requirement to have to ask for permission to use alternative resources (data supplied by the module team) when they did not have suitable equipment to set up the experiment themselves.

it [the experiment] assumed that you had a freezer and a fridge, it assumed that you had everything in your house and they don't support you.

Student

Having to give an alternative option for the experiment was like us asking for too much.

Student

Butcher and Curry (2022) investigated digital poverty on an Access module, concluding that low income intersects with other aspects of disadvantage, recommending promoting inclusion amongst students from poor socio-economic backgrounds for entry-level learning.

Theme 4: Motivations for study

One student was motivated strongly by a desire to illustrate to their children what a Black person can achieve.

I need to do what's best for my children, and show them that they can achieve – no matter who they are.

Student

Theme 5: The Importance of the Focus Group Facilitator

Whilst of not direct relevance to the research questions, the decision to have a focus group facilitator whose ethnicity reflected that of the participants was proven to have been worthwhile when this question was asked:

If you had received this invitation from a White lecturer, do you think you would have still engaged in this process?

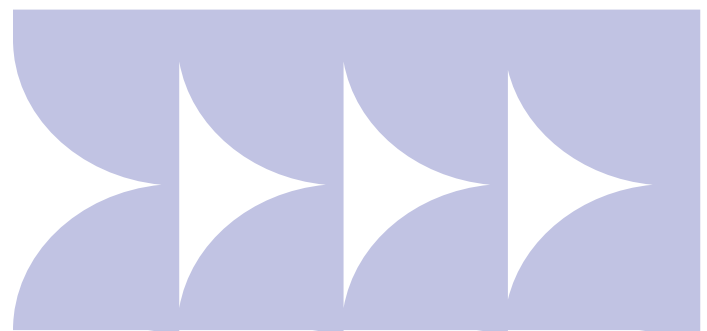
Focus Group Facilitator

Student response:

I would have engaged but I would have been a bit sceptical or suspicious.

Student

The creation of a safe space in which all users are of comparable ethnicity, meant that it is likely that participants were more open to sharing their experiences without fear of misjudgement, meaning participants could speak freely and in their own words (Greaves et al, 2022), anticipating a shared understanding of the meaning and thereby ensuring that experiences were shared as openly and as freely as was possible. A sense of safety for Black students is thought to be uncommon at schools, universities and in the workplace.



Theme 6: Being time poor

Students commented on the lack of available study time due to family, work and other commitments. One quote was from a student whose only study time was when their young children were in bed:



Wake up at midnight and study for 3 hours!

Student

This aligns with Grandner et al (2016) who reported that ethnic minorities are likely to experience less/worse sleep with self-identified race/ethnicity and socioeconomic factors being associated with differing sleep patterns.

Other quotes of interest relating to a lack of time to study could link to poor Black student performance and progression:



When you don't have time to really study as much as you would like to, you are basically whizzing through everything.

Student

Black students in both phase 1 and phase 2 were very reluctant to participate in this research. Possible reasons to explain this are that many students tend to be time poor (due to work/family commitments) and were reluctant to commit time to improve a module that they had completed. Black students may be reluctant to trust in a study that includes White project leads and/or to trust that it would improve outcomes for future Black students. There was also a hesitation for fear (unfounded but nevertheless real to the students) of impacting their

exam results/ future study. The existence of this fear itself indicates disconnect in worldview and understanding between the project team members and the students around the intent of this project, trust in the anonymisation of comments and separation from all module marking processes.

This may be consistent with the findings of Bashir (2023), who also reports how the perceived power of researchers influences the engagement of minority ethnic participants.

Recommendations

The project makes the following recommendations:

Build a sense of Belonging:

Create informal Black student moderated communities, networks and spaces to enable Black students to find each other. Consideration could also be given to whether Black students could be grouped together in pairs and trios when allocated to tutors.

Reverse a lack of representation:

Identify module materials that lack representation of diverse people, places and literature. Global South researchers and their work should be included in every module. Module teams that are not themselves ethnically diverse should organise Guest Lectures by diverse colleagues from other universities/industry.

No additional costs of Study:

Minimise additional costs to enable students to undertake all module activities. The university should investigate providing equipment to students in IMD1 postcodes. Any alternative online study materials should be made available to all

students not just those who request them or qualify, e.g. due to a declared disability. Module teams should undertake a cost/benefit analysis prior to incorporating activities with additional costs into modules.

Listen to students:

Create opportunities for Black students to share their study experiences in a variety of ways including the chance to contribute anonymously, including student moderated spaces (akin to social media) and online feedback forms.

Increased awareness of students residing in IMD1 postcodes:

Consider use of a flag whereby students residing in an IMD1 postcode area are highlighted to staff. This could raise awareness of the issues faced by many students residing in an IMD1 postcode and could encourage flexibility of approach by staff and could be taken into consideration if discretionary postponement is requested.

Conclusions and Discussion

This project has several findings, which could be relevant beyond STEM as identified themes were not science-specific.

One over-riding finding of the project was the reluctance of our Black students to talk to the project team to share their lived study experiences. Even a culturally appropriate researcher was unable to recruit a high number of participants for this study. Reasons for this require further investigation but likely include reasons such as time constraints along with lack of trust. One student did not wish to contribute at all until after their

module exam results were released, fearing that their participation in this research could impact their final module outcome. Another student questioned the motivations of the White project leaders, suggesting that career-related ulterior motives may be driving the project as opposed to a desire to improve Black student experience and outcomes.

Patience, perseverance, and cultural sensitivity are required to engage with Black students and the fact that this project was able to gather student insights is a reflection of the significant perseverance and time investment of the focus group lead.

To answer the research questions originally posed:

- What are the needs of Black students in S112 and possible barriers to their study?
- What could be influencing the experience and outcomes for Black students in S112?

Themes identified from the online focus group and Black student interviews are relevant to both questions. These themes largely focused on a lack of representation of Black scientists and staff, together with the absence of a sense of belonging within the Black student community. The project team has made recommendations to address this and would encourage all new modules in production or in review to consider how to increase diversity within their teaching materials and building visible Black student communities on a module, qualification, or wider basis.

Cost and time recommendations could benefit many student groups particularly those identified in awarding gap data.

The intersectional study identified a double disadvantage for Black

students in IMD 1 postcodes but no double disadvantage for gender or being first-in-family into Higher Education. This reinforces our recommendations regarding the need to minimise additional hidden costs associated with study.

Future research should consider other potential intersectional double disadvantages such as PEQ, employment status, caring responsibilities or other HESA identified characteristics, with ethnicity.

Further exploration of the reasons underlying the reluctance and hesitation of Black students to participate in scholarship research, together with their lack of trust (including in organisational EDIA) would be beneficial. If Black students feel more confident about sharing their experiences, this gives the University wider opportunities to listen, respond and adapt to their needs. This project has demonstrated how difficult it is to gain knowledge about Black student experiences on our modules, and that such knowledge is essential to close the awarding gap further for our Black students.

As the focus group facilitator A.R. herself said at the onset of the project: “The voice of African-Caribbean students who have an interest in science can somehow get lost if it is not encouraged.”

Acknowledgements

This project was supported and funded by eSTeEM – The OU Centre for Scholarship and Innovation in Science, Technology, Engineering and Maths. Project Reference 20K-LMJB-LHCSEES-01.

The project team would like to thank Jonathan Evans, eSTeEM Project Officer, for his invaluable assistance with data acquisition, Paul Piwek our

project mentor for his advice and guidance at project start, and to the eSTeEM team for their continued advice and assistance, particularly with the focus group and interview logistics.

The project team is also grateful to the Black students who did participate and share their lived study experiences with such honesty, without whom the project would not have progressed.

Citation: MacBrayne, Louise; Bellamy, Jennie; Richards, Angela and McPherson, Elaine (2025). *Black student experience on an introductory STEM module: Closing the awarding gap by listening to our Black students*. In: The 13th eSTeEM Annual Conference Proceedings: Sharing Best Practice – Implementing What Works (Pawley, Susan and Chang, Daphne eds.), 10–11 Apr 2024, The Open University, UK. DOI: <https://doi.org/10.21954/ou.ro.00102266>

References

Adamecz-Völgyi, A., Henderson, M., and Shure, N., (2022) *The labour market returns to "first-in-family" university graduates*, Journal of Population Economics 36:1395–1429. Available at <https://doi.org/10.1007/s00148-022-00908-y> (accessed 21 November 2023).

Advance HE. (2020) *'Equality in Higher Education, Student Statistical Report 2020'*, Advance HE. Available at <https://www.advance-he.ac.uk/knowledge-hub/equality-higher-education-statistical-report-2020> (accessed 20 November 2023).

Bashir, N. K. (2023) *'Community Gatekeepers: Power, Pitfalls and Possibilities When Recruiting and Researching Black, Asian, and Minority Ethnic (BAME) Participants'*. The Qualitative Report, 28(5), 1501–1519. Available at <https://doi.org/10.46743/2160-3715/2023.5549> (accessed 24th November 2023).

Broecke, S. and Nicholls, T. (2007) *'Ethnicity and Degree Attainment'*, UK Government Department for Education and Skills. Available at <https://dera.ioe.ac.uk/6846/1/RW92.pdf> (accessed 20 November 2023).

Braun, V., and Clarke, V. (2006) *'Using Thematic Analysis in Psychology'*, Qualitative Research in Psychology, 3, 77–101.

Butcher, John., and Curry, G. (2022). *'Digital Poverty as a Barrier to Access'*. Widening Participation and Lifelong Learning, 24(2), 180–194. Available at <https://doi.org/10.5456/WPLL.24.2.180> (Accessed 21 November 2023).

Byrne, B., et al (eds), (2020) *Ethnicity, Race and Equality in the UK*, Bristol, Policy Press. Available at: <https://directory.doabooks.org/handle/20.500.12854/34675> (accessed 21 November 2023).

Cramer, L. (2021) *'Alternative strategies for closing the award gap between White and minority ethnic students'*, eLife, 10: e58971. Available at <https://doi.org/10.7554/eLife.58971> (accessed 20 November 2023).

De Jong, G.F. and Madamba, A. B., (2002) *'A Double Disadvantage? Minority Group, Immigrant Status, and Underemployment in the United States'*, Social Science Quarterly, 82: 117–130, available at: <https://doi.org/10.1111/0038-4941.00011> (accessed 21 Nov 2023).

Grandner, M. A., Williams, N. J., Knutson, K. L., Roberts, D., Jean-Louis, G. (2016) *'Sleep disparity, race/ethnicity and socio-economic position'*, Sleep Medicine, 18, 7–18.

Greaves, R., Kelestyn, B., Blackburn, R. A. R. and Kitson, R. R. A. (2022) *'The Black Student Experience: Comparing STEM undergraduate student experiences at Higher Education institutions of varying student demographic'*, Journal of Chemical Education, 99: 56–70.

Heron, E. (2020) *'Friendship as a method: reflections on a new approach to understanding student experiences in higher education'*, Journal of Further Higher Education, 44 (3), 393–407.

Krause, N., Bastida, E. (2011) *'Church based social relationships, belonging and health among older Mexican Americans'*, Journal of Scientific Study of Religion, 50 (2), 397–409.

OU, (2020), *Access and Participation Plan, Access Participation and Success*. Available at: OU Access and Participation Plan 2020–2025.pdf (open.ac.uk) (accessed 21 November 2023).

Woolf K, Potts HW and McManus IC. (2011) *'Ethnicity and academic performance in UK trained doctors and medical students: systematic review and meta-analysis'*, British Medical Journal, 342: d901. Available at <https://doi.org/10.1136/bmj.d901> (accessed 20 November 2023).