Barriers within Barriers: Minorities within Minorities. The challenges for LGBTQ+ Inclusion in the UK-US STEM landscape through an intersectional lens

Prof Abigail Powell
The Eleanor Glanville Institute
University of Lincoln

R Bolton
The Eleanor Glanville Institute
University of Lincoln

R E Sterling-Morris
The Eleanor Glanville Institute
University of Lincoln

T Varrall
The Eleanor Glanville Institute
University of Lincoln

V Avila Torres
The Eleanor Glanville Institute
University of Lincoln

December 2024

Department for Science, Innovation & Technology

UK Science & Innovation Network

ROYAL SOCIETY OF CHEMISTRY

Barriers within Barriers: Minorities within Minorities. The challenges for LGBTQ+ Inclusion in the UK-US STEM landscape through an intersectional lens

Dec 2024

Prepared for	Royal Society of Chemistry
Suggested citation	Powell, A., Bolton, R., Sterling-Morris, R.E., Varrall, T., & Avila Torres, V. (2024) *Barriers within Barriers: Minorities within Minorities. The challenges for LGBTQ+ Inclusion in the UK-US STEM landscape through an intersectional lens.* Report for the Royal Society of Chemistry and the UK Science Innovation Network. The Eleanor Glanville Institute, University of Lincoln: Lincoln.
About the Eleanor Glanville Institute	The Eleanor Glanville Institute is a leader in transformational EDI change. Our sector-leading, research-informed approach to EDI is founded on the need to ask questions, to challenge, to seek solutions, to look for evidence of change, and to measure impact. We deliver accessible research, drawing on the lived experience of stakeholders, for businesses, government, and the third sector, supporting them to transform their EDI policy and practice for positive social impact.
Contact	The Eleanor Glanville Institute University of Lincoln Lincoln | LN6 7TS E: egi@lincoln.ac.uk W: www.eleanorglanvilleinstitute.lincoln.ac.uk
Data availability	Research data are not shared. This is to protect the confidentiality of participants.
Disclaimer	The opinions in this report reflect the views of the authors and do not necessarily reflect those of the Eleanor Glanville Institute, the University of Lincoln, the Royal Society of Chemistry, or the UK Science Innovation Network. Although every effort was made to accurately capture, record, and appropriately analyse information contained in this report, the conclusions are subject to the limitations of the data and methodologies used and described.
Acknowledgements	The authors of the report would like to thank a range of people who have contributed to this research and without whom the research would not have been possible. This includes our partners, Dr Lauren Esposito at the California Academy of Sciences, Dr Mark McBride-Wright of EqualEngineers and Dr Arti Agrawal of Vividhata Pty Ltd, and colleagues past and present, Professor Belinda Colston, Dr Xiaotong Zhu, Leila Lamoureux, Megan Walker, Eleanor Newton and Harvey Do. We would especially like to thank the participants in the research who gave up their free time to share their personal experiences with us.

Executive summary

Professional roles in science, technology, engineering, and mathematics (STEM) have historically been dominated by white, heterosexual men – a masculine culture with the expectation of heteronormative identity. As a result, the scientific world is now at high risk of losing Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, Intersex, Asexual, and non-binary (LGBTQ+) scientists and engineers because of hostile and exclusionary working environments. However, little is known about the cumulative effects of this environment on those who are minoritised within the LGBTQ+ community. This research aimed to understand how those within the LGBTQ+ community, especially those with intersecting marginalised identities (e.g., women, disabled people, people of colour) navigate the layered barriers to inclusion across both the UK and USA. Drawing primarily on a climate survey and focus groups with those working in STEM, we provide a deeper insight into the barriers and enablers to LGBTQ+ inclusion in STEM and establish a richer evidence base to inform effective strategies to promote inclusion for all LGBTQ+ groups in STEM.

Key findings

- LGBTQ+ individuals workplace experiences vary widely from very positive to hostile and exclusionary. Many who describe positive experiences describe themselves as 'lucky.'
- While overt discrimination persists, much more commonly reported were examples of subtle forms of discrimination and microaggressions, which contribute to an overall 'chilly climate' for LGBTQ+ communities in STEM.
- Transgender people appear to experience the highest levels of overt discrimination in the STEM workplace. This points to the need for better protections and support for this group, but also that there is increased acceptance in the workplace of gay and queer communities. That said, findings also point to the need for further research about minoritised sexualities, such as ace communities, who, based on our limited data, often feel unseen and misunderstood.
- There is a conflict between notions of the 'ideal' professional scientist – someone who is objective and 'neutral from identity' – and queer identities – which are imagined as colourful and flamboyant. While both of these are stereotyped images, that do not necessarily represent the norm, they appear to contribute to the subtle exclusion of LGBTQ+ individuals in STEM, and the extent to which LGBTQ+ scientists and engineers feel able to be their authentic selves in the workplace.
- Many participants felt that their immediate teams/colleagues were welcoming and supportive, but that wider LGBTQ+ inclusion (and equality, diversity, and inclusion (EDI) more generally) was

not sufficiently supported by organisational policy or senior leadership. There was a perceived lack of accountability and inadequate handling of issues when they did occur, which also negatively influenced reporting behaviours.

- Leaders play a significant role in LGBTQ+ inclusion. Not only do they shape EDI workplace culture (positively and negatively, depending on the leader), LGBTQ+ leaders are hugely influential in terms of role models and increased representation.
- There is an additional workload, or 'minority tax', that comes with being a member of the LGBTQ+ community. This can include doing 'diversity work' such as delivering talks or training, informally educating others in the workplace, or supporting those with shared identities. There are both positive and negative elements to this, which vary for different individuals. Either way, this 'workload' is not something those with privileged identities have to contend with.
- Workplace experiences are directly and indirectly influenced by the wider policy context and societal attitudes and behaviours towards the LGBTQ+ community. The current hostile environment, especially for the Trans community, shapes workplace experiences, including overall wellbeing and the desire and motivation to stay in an organisation.
- For some participants, it was other aspects of their identity – often those that were seen to be more visible, such as ethnicity and disability – that were perceived to have a greater negative impact on their inclusion in the workplace, rather than their LGBTQ+ identity.

Contents

Boxes

Figures

1. Introduction and project background

Although inclusion in STEM workplaces has been a focus of research and interventions for many years, LGBTQ+ individuals remain underrepresented in the STEM workforce (Freeman, 2020). Yet there remains limited research on the experiences of LGBTQ+ individuals in STEM. Emerging research has shown that LGBTQ+ underrepresentation is driven by a hostile and exclusionary environment (e.g., IoP, 2019; Atherton et al, 2016; Yoder and Mattheis, 2016; Cech and Waidsunas, 2021; Hughes, 2018). This is significant given the known benefits of workplace inclusion: fewer experiences of exclusionary behaviours, increased employee retention, self-esteem, acceptance, and sense of belonging (Jansen et al., 2014) and more diverse teams and innovation (Freeman, 2020). For these reasons this research explores the barriers and enablers to LGBTQ+ inclusion in STEM, particularly for those who might be further minoritised as a result of also being a person of colour, woman, or person with a disability, and whose experiences in STEM are currently under-researched. We do so by drawing on data primarily from a climate survey and focus groups and interviews with STEM employees in the USA and UK.

Within the UK and the US, there are various policies in place that aim to support and prioritise equality for marginalised groups, such as the UK Equality Act 2010 and the US Civil Rights Act 1964. In the US, many States also have their own legal protections in place, and many organisations across both the UK and US have policies aimed at addressing discrimination and harassment. That said, gender and sexual identities remain a topic of popular and political debate, with LGBTQ+ identities and experiences questioned and used as clickbait in the media. This research was conducted in the lead-up to the 2024 US election, with a further Donald Trump administration now confirmed, leading LGBTQ+ communities (and others) to feel unsafe, targeted, and disenfranchised (Schlehofer et al, 2023). This context may be reflected in some of the participant responses in this research.

Box 1: A note on language

Throughout this report we use the acronym LGBTQ+ but acknowledge that there are various acronyms in use. We use LGBTQ+ as an umbrella term and do not intend to either exclude or homogenise experiences. We also use the term Black, Indigenous and other People of Colour (BIPOC). We acknowledge the limitations of this term, but due to the small numbers of non-White research participants, as well as the differences in categorisations of race and ethnicity across the UK and USA, it is challenging to disaggregate the numbers of BIPOC responses further. Where we use quotations from research participants, other language may be used.

2. Research Methodology

The research adopted a mixed method approach, including policy analysis, a climate survey, a policy survey, and interviews and focus groups with those working in STEM. The research received ethical approval from the University of Lincoln Human Research Ethics Committee (Ref 2023_16141). The climate survey was designed for anyone working in a STEM profession in the UK and US and sought to understand their experiences of the climate, or culture, in their industry and organisation. While the survey was open to all (regardless of LGBTQ+ status), the context of the survey was clear in participant information and may have contributed to the survey being completed predominantly by those who identified as LGBTQ+. A policy survey was also conducted to capture the range of policy measures in action in organisations that employ scientists and engineers. Only qualitative analysis is included from the policy survey due to a low response rate (n=13). Recruitment for both surveys occurred primarily via social media (Twitter/X, Facebook, LinkedIn, and Instagram), including some paid advertisements. Email invitations were also sent to contacts identified via website searches. The climate survey was used to recruit STEM professionals to participate in a follow-up interview or focus group. In addition to this, we held a co-creation workshop with 10 people working in the field, where we presented and discussed preliminary findings of the research. These discussions, along with our own analysis of the data, have shaped the recommendations.

2.1 About the participants

After data cleaning, 194 climate survey responses were included in the data analysis. Further information about the data cleaning process is available on request. The sample is described further in Box 2. A total of 10 participants also participated in either an interview or small focus group, with a further three of these providing additional information by email. Using a number of climate survey questions, we created an indicator of LGBTQ+ status, identifying a total of 166 LGBTQ+ respondents.

Box 2. Climate survey – sample characteristics

Gender: 44% of respondents were women, 28% men and 26% non-binary or gender non-conforming.

Sexuality: 13% of respondents were heterosexual/straight, 17% identified as queer, 20% as gay, 12% as lesbian, 9% as pansexual, and 9% as asexual.

Trans: 23% of respondents were transgender.

Country: 37% of respondents resided in the UK and 63% in the US. 88% were citizens of their country of residence.

Ethnicity: 58% of participants were White British or White American, 25% were Black, Indigenous, or a Person of Colour (BIPOC); the remainder did not respond to this question.

Disability: 32% of respondents identified that they had an impairment, health condition, or learning difference that has a substantial or long-term impact on their ability to carry out day-to-day activities. The most frequently occurring disabilities were learning differences (e.g., dyslexia, ADHD) and mental health conditions.

STEM field: the highest proportion of respondents said they worked in biology (28%), followed by engineering (17%), chemistry (14%), computer science (10%) and physics (9%).

Type of organisation: 45% of respondents worked in a university, 26% in a private company and 26% in either the public or third sector.

Work setting: 46% of respondents were primarily office-based, 25% were laboratory-based, 23% home-based, and 6% were based in the field.

Notes: Numbers may not add to 100% due to missing data. See also Appendix A1. for more details about the participant sample.

2.2 Data analysis

Data analysis was conducted by an interdisciplinary team with a range of characteristics and insights from different perspectives to minimise researcher bias. The numerical survey data were cleaned and analysed using IBM SPSS. Descriptive statistics were conducted to explore the data. Inferential analysis was also conducted where possible, using tests of significance to examine whether there were statistically significant differences in the survey responses of different cohorts. The qualitative data (survey open-ended responses, interviews, focus groups, and written (email) submissions) were analysed thematically with the aid of NVivo 14. The qualitative data were very rich, with the climate survey gathering over 400 qualitative responses, in addition to the interview and focus group data.

2.3 Research limitations

While every effort has been made to ensure the robustness of the research, some limitations remain. First, the focus of the research was on those currently employed in STEM, rather than those who may have chosen to leave. Second, as the focus of the research was not comparative, we are unable to confirm whether some of the findings presented are exclusive to STEM. This means that some of the findings may be relevant to LGBTQ+ individuals working in other sectors. Third, while the data are rich, the number of respondents is still relatively low; this means we need to be cautious about making generalisations from the findings. Fourth, there may also be a self-selection

bias, such that those in the LGBTQ+ community who have had particularly negative experiences were more likely to participate in the research. That said, the findings revealed a range of positive experiences as well as negative ones. Fifth, in relation to the focus group and interview data, a high proportion of respondents (45%) were based in academia, which may also skew the findings. Finally, the policy survey received a very low response rate (n=13), so perspectives of employers, Human Resource and EDI professionals are under-represented in the research.

3. Research Findings

The findings are structured around key, intersecting themes identified as impacting inclusion for the LGBTQ+ community in STEM. The themes do not explicitly distinguish between barriers and enablers to LGBTQ+ inclusion, as often these were two sides of the same coin. For example, leadership was an enabler of inclusion when it was supportive but a barrier to inclusion when it was not. Throughout the findings we draw on positive and negative examples of inclusion, indicative of the range of responses in our findings. Several breakout boxes explore issues such as sense of belonging in further depth. Key findings are illustrated with quotations from the qualitative data, and where known, we have indicated key demographic characteristics of the person from whom the quotation is from. Quotations have been lightly edited, for example, correcting spelling and punctuation.

Overall views about the perceived diversity of the workforce were mixed, with the climate survey indicating 39.6% of respondents thought their organisation was moderately or very diverse, while 31.7% indicated their organisation was either slightly or not at all diverse. This varied somewhat between respondents in the UK and USA (although not significantly), with 52.3% of UK respondents stating their organisation was moderately or very diverse in comparison to 33.9% in the US. Many of the climate survey respondents agreed that LGBTQ+ employees are treated with respect (71.6%), and 63.2% agreed that the atmosphere for LGBTQ+ employees is improving (also reflected in qualitative responses). Indeed, several participants described feeling ‘lucky’ to work in an inclusive environment, something which may reflect both their own and others prior experiences of exclusion.

3.1 Experiences of exclusion

Previous research has found that experiences of exclusion are a barrier to the retention of LGBTQ+ individuals in STEM (e.g., Boustani and Taylor, 2020). The climate survey asked a range of questions about participants experiences of discrimination, harassment, exclusion, and microaggressions in the six months prior to completing the survey. Only 6.6% of LGBTQ+ respondents answered ‘never’ to all

questions, meaning that 93.4% had at least one negative experience. Seventy-two respondents (44%) had experienced at least one example of exclusion on a weekly or daily basis.

3.1.1 Experiences of discrimination and harassment

Overall, few research participants reported overt experiences of discrimination and harassment; 86.5% of climate survey respondents said that in the last six months they had never experienced intimidating behaviours in their workplace. However, 17.1% said they had experienced insulting or offensive remarks occasionally and a further 10.3% had experienced this at least monthly. Examples of discrimination were revealed in qualitative responses, such as, 'people talking about me and my relationships behind my back', 'isolated, ostracized and bullied'.

I experience daily microaggressions and occasionally, outright hostility including losing a spot in a research lab due to a medical leave for gender affirming care and having been told that I am 'too out' and too visible by leadership within my department (Climate_111: Man, Gay, Trans, White, US).

My university has been pretty openly transphobic … I have personally been sexually harassed because of my status as a trans person (and shortly after I returned from a gender affirming surgical procedure), and it made me consider dropping out. My mental health spiralled for about six months after (Climate_113: Non-binary, Trans, White, Biology, US).

Consistent with other research (e.g., Maloy et al., 2022), experiences of overt discrimination and harassment appeared to be more strongly felt among the Trans community (see also Box 3).

Several participants spoke about how their workplace experiences were shaped by people beyond their colleagues. This related primarily to clients, and in the case of higher education, students. Participants made a distinction between colleagues and others, indicating that while organisations can hold employees accountable to some degree, this was much harder, and they felt less protected when experiencing discrimination and harassment from others. For example:

As a teacher there is a clear distinction between my colleagues (who are all very respectful and inclusive) versus the students (a significant proportion of whom aren't), as well as the organisation-wide policies and procedures to address issues and behaviours when they come up … Swastika carved into table by student, not dealt with appropriately. I still had to go back and teach student until [the] end of year (Climate_149: Woman, Gay, White, Maths, UK).

There was also a perception within the qualitative data of a generational divide relating to attitudes around LGBTQ+ identities. Many of the sentiments expressed by respondents were captured in one respondent's view that, 'A key barrier is perhaps the older generation of workers who are less comfortable with talking about LGBTQ+ issues' (Climate_084: Woman, Pansexual, White, Psychology, UK). Consequently, there was a perception that things may improve over time for LGBTQ+ people due to greater acceptance among younger generations.

I think as new faces have come into the field, acceptance has expanded. Folks in positions for 30+ yrs tend to hang onto outdated ideas (Climate_147: Woman, Queer, White, Marine Biology, US).

It [change] will take time. We need this current generation to make our way through and into the workforce. Then to turn around and educate and mentor the next generations of LGBTQ individuals in how they can succeed (Climate_122: Man, Queer, Trans, White, Biology, US).

Box 3. Trans discrimination

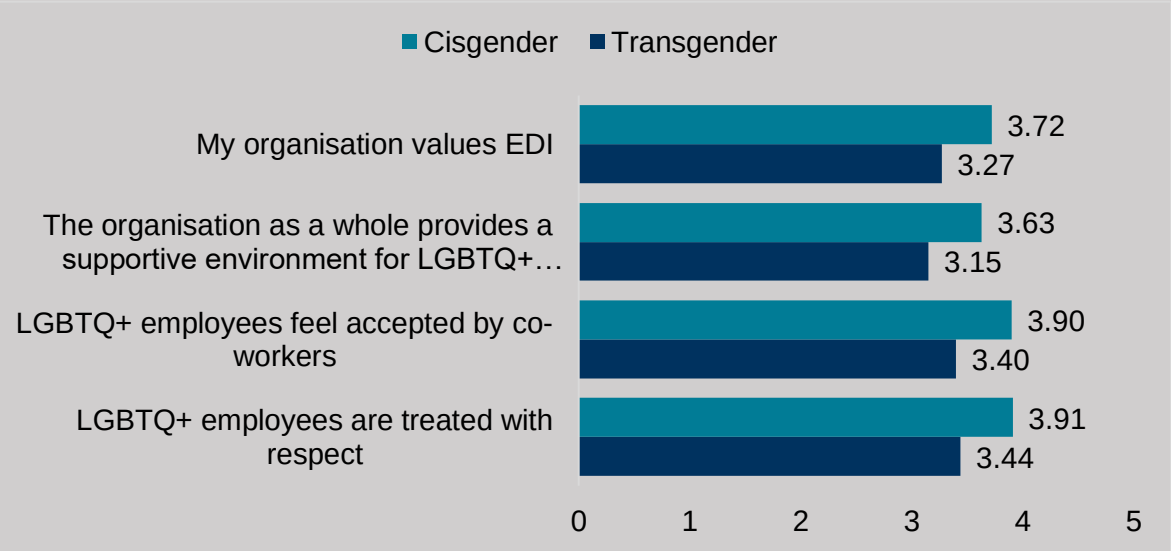
Trans folks' lives are hell right now (Survey_176: Woman, Bisexual, White, Multiple areas of expertise, US).

As mentioned above, there appeared to be a substantial difference in the experiences of Trans participants and other LGBQ+ participants, with transgender individuals facing greater levels of hostility.

My past blue-collar environment was very welcoming to me, and not in a fetishizing way, either. They were really cool with me being bi, but not with the idea of trans people (Climate_203: Woman, Bisexual, White, Multiple areas of expertise, US).

This was reflected in both focus groups and the climate survey. Transgender respondents were less likely to agree that their organisation valued EDI or that LGBTQ+ employees were treated with respect (Figure 1).

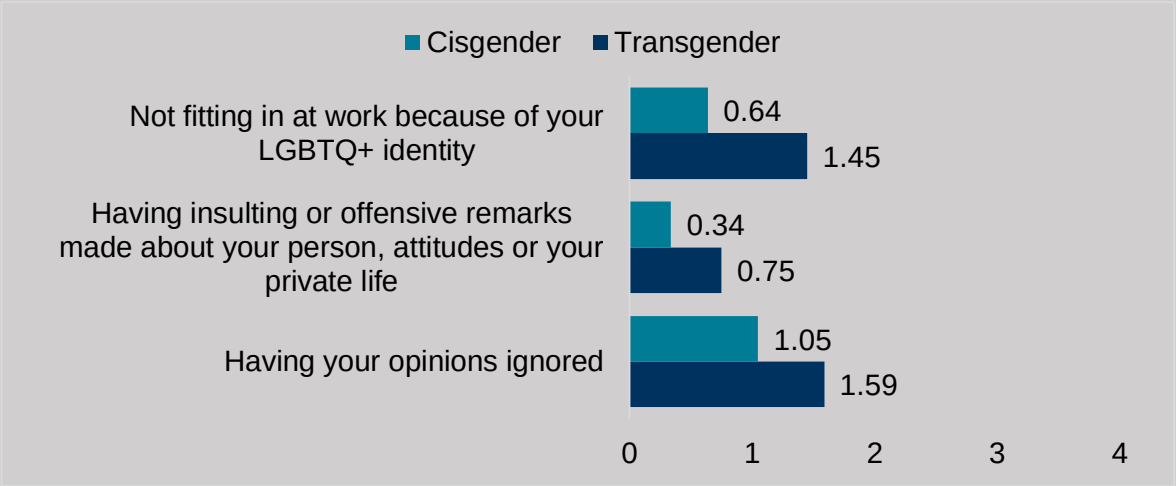
Figure 1. Perspectives of EDI by Trans Identity (mean)



Notes: Respondents were asked whether they agreed or disagreed with the statement on a scale of 1 (strongly disagree) to 5 (strongly agree). These were all statistically significant differences ($p<0.05$) when measured using a Mann-Whitney U test. Comparison is of Transgender and LGBTQ+ but cisgendered.

The survey also found a statistically significant difference in the proportion of transgender respondents who have regularly had their opinions ignored in the workplace, who have had insulting or offensive remarks made about them and who felt that they did not fit in because of their identity, compared to those respondents who are LGBTQ+ but cisgendered (Figure 2).

Figure 2. Negative workplace experiences by Trans identity (mean)



Notes: Respondents were asked how regularly they experienced various issues in the workplace from 0 (never) to 4 (a great deal/daily). These were all statistically significant differences ($p<0.05$) when measured using a Mann-Whitney U test. Comparison is of Transgender and LGBTQ+ but cisgendered.

One specific issue raised in the qualitative data was how transgender people are subject to 'debate' both within society generally and within the workplace. Participants highlighted how transgender individuals live within a context of increased societal hostility towards the transgender community. Participants from the US in particular described how this wider context impacted their workplace experiences and job prospects:

I am in academia. The number of universities I can reasonably work for is limited by the fact that some states in the US have laws that make it difficult or impossible for me to access transition-related healthcare. I'm lucky that I was able to find a job in a place where I don't face that. But due to the competitive nature of the academic job market, many trans people won't be so lucky, and will leave the field (Survey_132: Woman, Bisexual, Trans, White, Maths, US).

The broader transgender 'debate' may lessen the likelihood of transgender individuals feeling able to come out at work, given how some participants reported that these wider debates can seep into workplace discussions, contributing to an overall negative climate:

I find the wider debate about Trans rights provokes individual responses which make me uncomfortable in wider (online) meetings in my organisation… (Climate_049: Man, Gay, White, Multiple areas of expertise, UK).

These 'debates' and experiences are indicative of the wider context in which this research took place. In the US, for example, while there is currently federal protection of sexual orientation across all States, in 2024 alone there have been 531 anti-LGBTQ+ bills proposed at State level that limit the rights and protections of the LGBTQ+ community (ACLU, 2024). In the UK, there has been

a 186% increase in hate crimes against trans people in the last five years, and a 112% increase in sexual orientation hate crimes in the last five years (Stonewall, 2023).

Participants also reported more explicit examples of transphobia within their workplaces, which included sexual harassment and misconduct and misgendering:

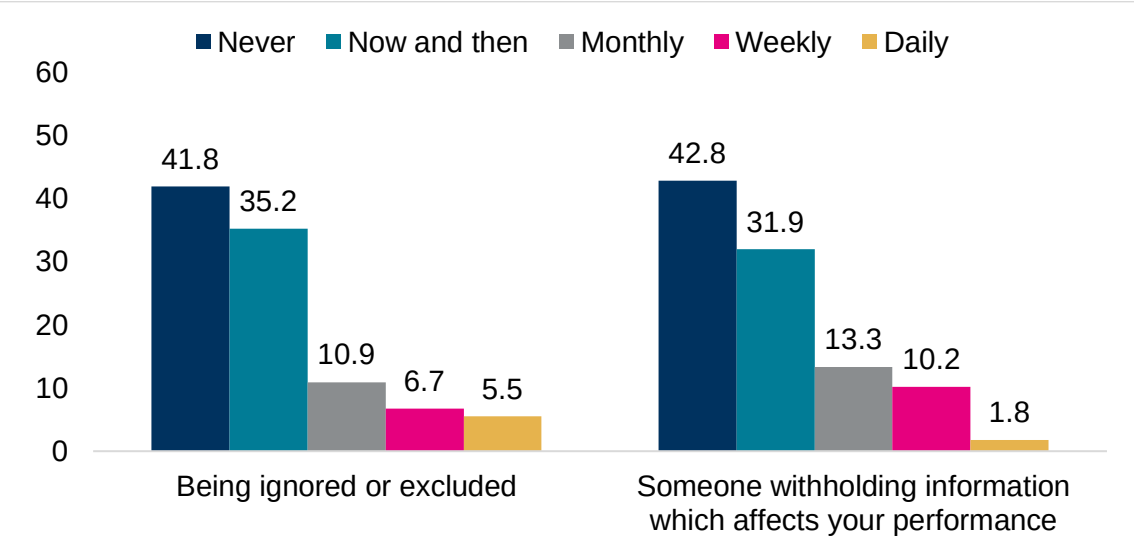
There were some very transphobic comments made in an anonymised Teams meeting a few years ago (Climate_062: Nonbinary, Asexual, White, Computer Science, UK).

Trans people still have some explicit barriers: e.g., being consistently misgendered during lab meetings makes it harder to focus on science. (Climate_104: Woman, Pansexual, Trans, White, Biology, US).

3.1.2 Microaggressions and subtle exclusion

While participants did describe examples of overt discrimination and harassment, more common were covert or subtle examples of exclusion, microaggressions[1] and a general sense of being left out or treated differently. In the previous six months, 35.2% of respondents said they had been ignored or excluded occasionally (now and then) and a further 23.1% at least monthly. Additionally, 31.9% of survey respondents said they had experienced occasional withholding of information that affected their performance, with 25.3% experiencing this more regularly (Figure 3).

Figure 3. Experiences of discrimination (%)



Notes: N=166 (LGBTQ+ respondents only). Participants were asked how frequently, within the last six months, various workplace experiences had occurred.

[1] Microaggressions are 'brief and commonplace daily verbal, behavioural and environmental indignities, whether intentional or unintentional, which communicate hostile, derogatory or negative slights, invalidations and insults to an individual or group because of their marginalized status in society' (Sue, 2014) and usually occur when there is a power imbalance, inequitable social norms or pathological stereotyping.

However, many participants also found it difficult to describe tangible examples of this subtle exclusion, reflecting more on an overall chilly or uncomfortable climate.

The team is generally friendly but also quite un-diverse (ethnicity and gender-wise, and sexuality is hardly discussed), so I don't always feel comfortable being 'myself' (Climate_065: Non-binary, Bisexual, Trans, BIPOC, Physics and Maths, UK).

This climate and perceptions of STEM made it challenging for some respondents to feel like they could always be their authentic selves, rather having to adapt and conform to feel accepted. That said, not all respondents necessarily wanted to bring their 'authentic self' to work, preferring to keep their private life private. Nevertheless, our findings suggest that the STEM workplace environment can be perceived as 'stifling'. This was reflected in comments about not feeling like there was space to be open about one's identity, which was also associated with a sense of isolation.

In my old company they would always say this thing, 'bring your whole self to work.' And I have never done that just because I feel like it's just none of their business. But I've found that not being able to be truly open or, I guess, authentic is quite difficult, especially when everybody else is like a certain group. You feel like you're separate (participant, focus group_2).

Now I can [be my authentic self]. I have not always felt like that. I think what's helped me do that now is just wanting to live [a] more authentic life. You know I'm an African, African descent. I cannot hide that. That's just what it is, right? But other parts of my identity are not visible. They're internal. And so often those are the parts of identity or even like pressure to, like, straighten your hair, for instance, or to dress in a certain way that's expected by your biological sex, right? Or even age. Like all those things were toned down over the years to try to be more profitable. Or fit in better. And just get through the rigours of scientific training, because you see your peers who are sometimes equal in a skillset to you, and sometimes they're a little bit less in skillset to you, but they would get opportunities. You know like I did an extraordinary job, and it would be … ohh you got that because you're Black. And so you're trying to hide those things and say I'm a scientist, right? Make everything else as neutral as possible. For you to ignore them, it's just, judge my brain, judge my scientific attitude. And I think in time you realise that you lose the essence of who you are. It's really taxing (participant, focus group_3).

While a challenge for a number of participants, the chilly climate in STEM seemed to be particularly challenging for those who identified as asexual or ace. A general lack of awareness about asexuality was a barrier to ace individuals' sense of belonging.

As an ace individual, I have not discussed this at all openly because I don't think society and culture broadly are familiar with it enough (Climate_141: Woman, Bisexual, UK).

Asexuality is not something that comes up, it just makes me very awkward to talk to when people talk about someone being 'hot', about sex etc (Climate_056: Woman, Asexual, Health Science, UK).

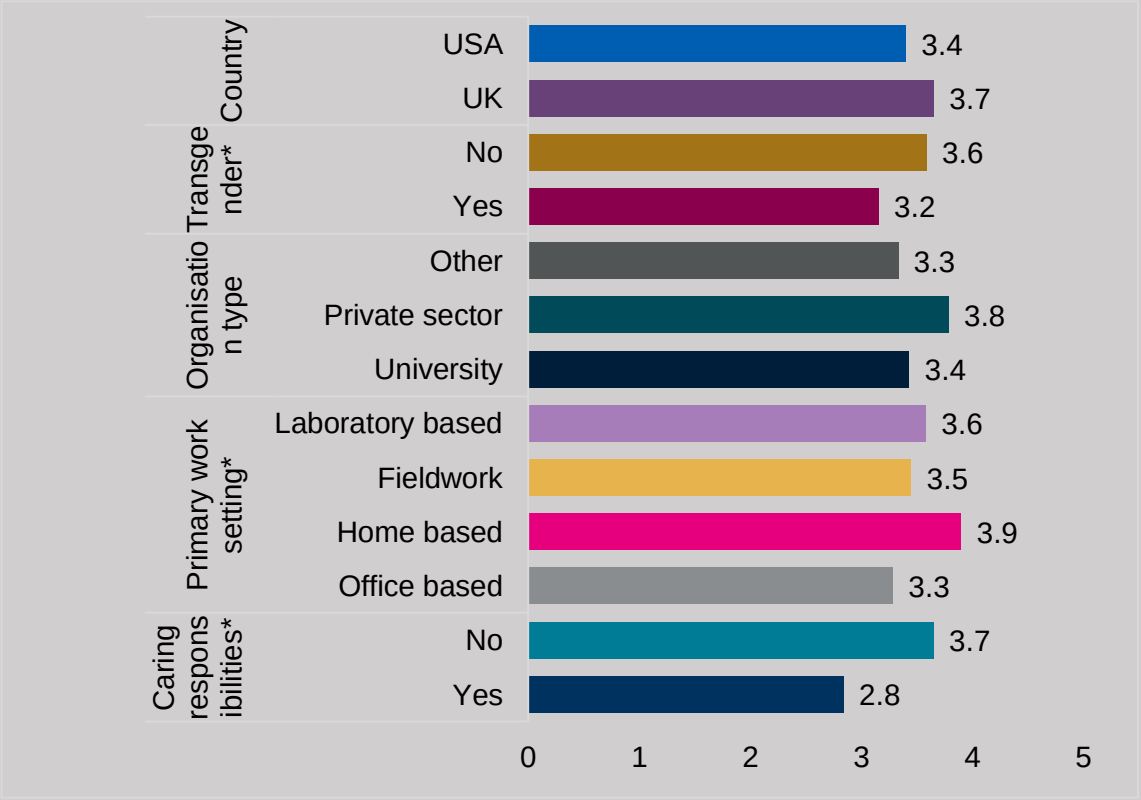
This aligns with findings from the climate survey, which showed that asexual respondents were significantly less likely to be out to their co-workers and colleagues compared to other gay/queer

respondents[2]. This was similarly reflected in the policy survey, with one respondent indicating the need for 'broader understanding and mandatory training to understand particular identities beyond gay/lesbian.'

Box 4. Sense of belonging and authenticity

Data from the climate survey was used to create a composite measure of respondents' sense of belonging and sense of authenticity (Jansen et al, 2014). This revealed that certain groups were statistically significantly more likely to have a low sense of belonging and authenticity in their workplace compared to other groups. In particular, transgender respondents, those based primarily in an office environment and those with caring responsibilities had a lower sense of belonging and authenticity (as shown in Figures 4 and 5). There were also substantive differences between respondents in the UK and US and by organisation type, although these were not statistically different.

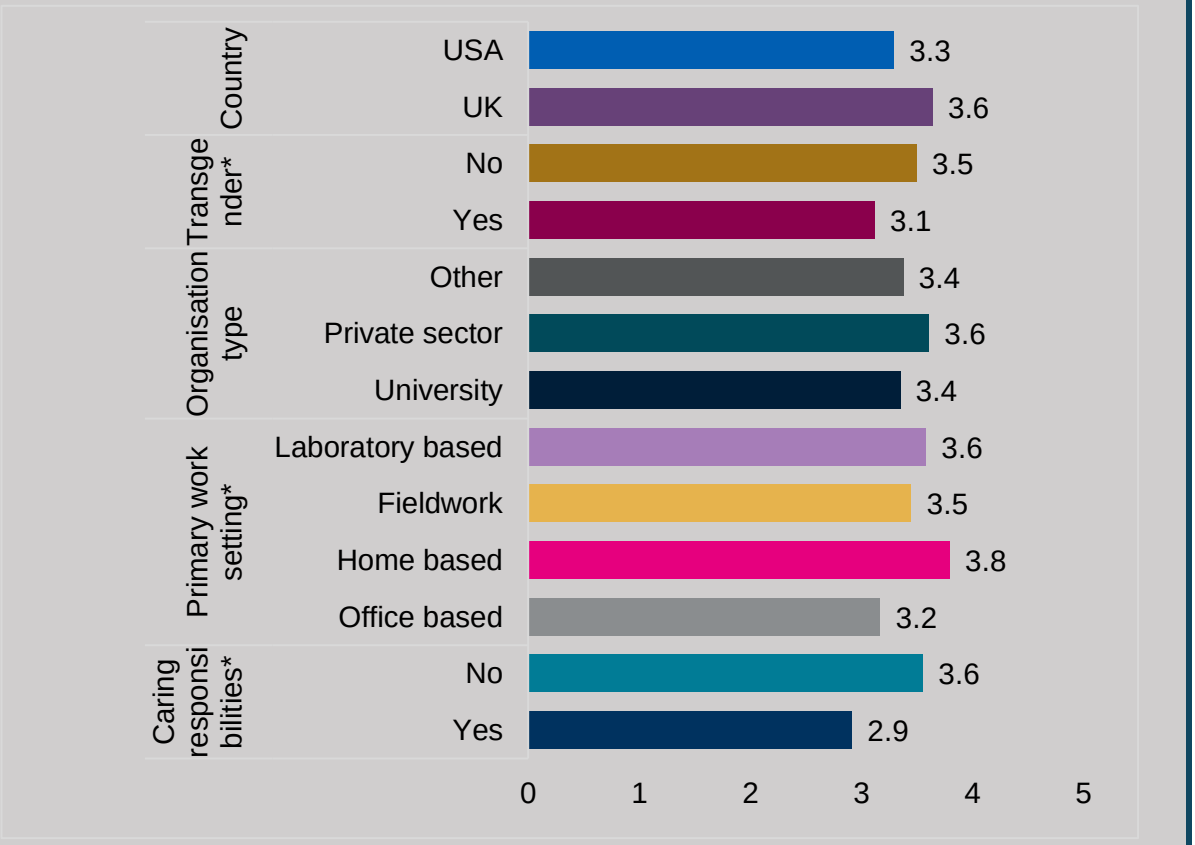
Figure 4. Sense of belonging (mean)



Notes: * denotes statistically significant difference. A score of 1 is indicative of a low sense of belonging and a score of 5 a high sense of belonging.

[2] Respondents were asked on a scale of 1 to 5, 'How out about yourself as an LGBTQ+ person are you to your co-workers and colleagues? Where 1 was equal to out to all and 5 was not out. The mean for asexual participants was 3.0 (N=17, s.d.=1.369), while for other LGBTQ+ participants it was 2.15 (N=2.15, s.d.=1.290). A Mann-Whitney U test was conducted demonstrating a statistically significant difference between those groups (U=787.0, Z=-2.519, p=0.012).

Figure 5. Sense of authenticity (mean)



Notes: * denotes statistically significant difference. A score of 1 is indicative of a low sense of authenticity and a score of 5 a high sense of authenticity.

However, this 'chilly climate' was not experienced by all, with some participants feeling a sense of belonging and feeling valued within their workplace. Indeed, some felt they could be and celebrate, their authentic self. Participants said, for example, 'the climate is very good', 'my team cares about me', 'feeling of being valued and appreciated':

We are an incredibly diverse group from different socioeconomic statuses, racial/ethnic backgrounds, geographic areas, disability status, first-generation college graduates, and LGBTQ+ individuals, and It's my privilege to work alongside them every day (Climate_006: Non-binary, Asexual, Trans, BIPOC, Biology, US).

I've been openly transitioning at work for over a year, and everyone has been incredibly supportive. I was in the office when I got the call that I was approved for top surgery, and my boss and coworkers celebrated with me when I broke the news (Climate_184: Non-binary, Man loving man, Trans, US).

3.2 The gendering of STEM

The findings in this section reveal the dominance of men in STEM and norms relating to masculine-coded practices that moderate experiences of inclusion and progression opportunities for LGBTQ+ individuals in STEM.

3.2.1 Men's dominance in STEM

I work at an academic institution in a very red state in the south. Strides have been taken with diversity and inclusion, but it's still an issue to be anything but a white male (Climate_147: Woman, Queer, White, Marine Biology, US).

Both implicit and explicit within participants' narratives was the continued dominance of men in leadership positions (see also Box 5). One of the problems with the numerical dominance of men in leadership positions is that it entails 'straight white men setting priorities' (*Climate_089: Woman, Heterosexual/Straight, White, Health and Social Care research, UK)* in ways that do not take into account the needs of diverse groups:

[We need] More inclusion in the recruitment process. The field is often still led by heterosexual males that carry out their views (Climate_133: Woman, Heterosexual/Straight, Physics, UK).

Others pointed out more interpersonal aspects of dominance by men in leadership positions:

In my previous institution, there were senior managers who would use intimidation tactics and passive aggressive behaviors on female leaders, which was one of the reasons I left (Climate_078: Woman, Heterosexual/Straight, Maths, UK).

Historically STEM jobs have been dominated by cis heterosexual white men, and there are still many of them in positions of power that can be intimidating/threatening to LGBTQ+ folks (Climate_126: Non-binary, Queer, Trans, BIPOC, Biology, US).

A further finding in the qualitative data was the explicit exclusion and devaluing of women in the workplace through both unconscious and deliberate ignoring of women's perspectives by men:

There is a meeting one level above me on a project where our team representatives are the only women/femme presenting folks in the room, and they consistently feel ignored and as if the other men don't care about our time or work (Climate_114: Non-binary, Bisexual, Trans, BIPOC, Chemistry and Engineering, US).

I left my previous job because of hostile and exclusionary behaviour due to the fact that I am a woman. I now work at an organization where I am happy and accepted (Climate_078: Woman, Heterosexual/Straight, Maths, UK).

As one survey respondent put it, 'I have experienced more marginalization as a woman in STEM than as a queer person in STEM' (Climate_041: Woman, Lesbian, Computer Science, US).

An indirect form of exclusion raised by some participants was the way in which they felt there was a sense of having to participate in a 'boys club' culture.

As a straight woman, I feel the need to conform to a "boys club" culture and I can imagine this pressure and stress is only intensified for folks who fall outside the gender binary or who aren't straight (Climate_223: Woman, Heterosexual/Straight, White, Engineering, US).

There might have been some negative behaviours that stemmed from me 'not being one of the blokes' rather than strictly being gay, but it doesn't fall very far (Climate_048: Man, Gay, White, Biology, UK).

These quotes exemplify another way in which some individuals felt the need to suppress or give up part of their identity in order to fit in. One participant highlighted how even in workplaces where there is 'good intention' about treating women with respect and adopting a 'gender neutral' approach to working, there was still an unconscious devaluing of objects coded as feminine and a privileging of a certain masculine way of being, that women have learnt over time:

I notice, at least in my workplace, that most people … don't talk about gender or act about gender much in their day, mainly from a good intention place, like the cis men want to be respectful towards the cis women… But it can kind of end up in this place of like, you feel like in some ways your workplace is trying to be gender neutral … You don't see a lot of overt femininity in this space because what happens is, earlier in their careers, women felt like they had to be less feminine. And then I think they found better men to be around, and the men were trying to not put an emphasis on gender, to not 'other' them. And so, it just feels like, even among the women, there's sometimes a bit of a masculinity there (participant focus group_8).

3.2.2 The 'ideal' scientist

I think one of the challenging things is … is the idea that there's a certain type of way to be a scientist (participant focus group_6).

Strongly linked to the numerical and cultural dominance of masculinity was the way in which participants felt 'the need to stifle' (participant focus group_6) their presentation of self. This appeared to be related to normative ideas around who or what constitutes the 'ideal scientist'. The ideal scientist is an idealised professional self against which individuals are both judged by others (whether real or imaginary) and judge themselves. The norm of the 'ideal' scientist, which has also been found in research about women in science (e.g., Moore et al, 2005), results in variations of professional exclusions (Marosi et al., 2024). Some of these variations appear to relate specifically to the LGBTQ+ community (e.g., 'being told to remain closeted for the sake of "professionalism"' (Climate_144: Woman, Bisexual, US)).

This norm manifested in a number of ways. First, there was a devaluing of STEM that involved integrating aspects of humanities and social sciences. Such integration is presumed to tarnish the rationality and 'objectivity' of STEM:

There is a whole field that is computing and social science, namely human computer interaction. But there is a huge part of the computing world that believes that entire field is invalid. Because there's girls in it and there's people talking about people (participant focus group_8).

Beneath this narrative is a suggestion that 'people focused' STEM work is coded as feminine, which pollutes the 'intellectual manliness' (Climate_194: Man, Asexual, Trans, White, Engineering and Geotechnical Sciences, US) historically associated with STEM. The same participant spoke about how they had received negative 'comments about work' they had done which integrated more subjective, social sciences perspectives and for which they felt they did not receive 'the same level of

respect' from colleagues. What is evident in the data, is that from the perspectives of LGBTQ+ individuals in STEM, STEM is not always 'neutral from identity' (see also Marosi et al., 2024). Another focus group participant spoke about how their personal experiences 'inform how I do science'. This contrasts with the image of the 'ideal' scientist, which holds that the incorporation of experiences into STEM constitutes bias as they are marked as 'social' (Marosi et al., 2024). A survey respondent similarly argued that this distancing from identity is a false notion:

There is often a false notion that recognizing identities and social factors leads to bias, as if one could remove everything that makes us human from scientific endeavours, when in fact it is the opposite. Acknowledging identity and social factors as valid factors makes science and STEM education stronger (Climate_135: Non-binary, Queer, BIPOC, Multiple areas of expertise, US).

The idea that STEM should be 'neutral from identity' constitutes a second form of professional exclusion that the ideal scientist norm propagates, suggesting hierarchies around intellectual-professional objectivity.

The third form of exclusion relating to the ideal scientist relates directly to more corporeal aspects of self-presentation and the way in which these aspects are perceived to tarnish notions around professional self-respectability. Here, STEM boundary maintenance was about overt self-presentation and the stigma around more visible markers of queerness, which meant that some individuals felt the need to choose what aspects of themselves to present at different times. Identity signs that are coded as non-conforming mark the LGBTQ+ community as 'unserious' (Climate_172: Non-binary, Queer, Trans, White, US) and 'less professional' (Climate_167: Woman, Bisexual, White, Engineering, US). As one survey respondent indicated:

There's a caricature of how you're supposed to be to fit in. And sometimes it feels like some aspects of queer culture are looked down upon based on that sterile, professional stereotype (Climate_083: Woman, Pansexual, Biology, US).

It is precisely this 'sterile professional stereotype' that one participant first associated with STEM when growing up but over time realised they needed to reject:

One of the things I love about the queer community is how colourful it is. So to me, it was this like opposite to like what a scientist was of, like, the bland lab coat versus like this very loud, flamboyant, even though that was in this, in and of itself, a caricature because it was the only one I really knew. The time that felt more appealing to me than having to put on the mask of the of the scientists (participant focus group_6).

At the more overt end of having to 'stifle' oneself, one survey respondent generalised that in STEM discussions related to sexual orientation were considered too 'personal' and 'inappropriate to share in the workplace'. Here, simply being a person who does not present as cisgender and heterosexual tarnishes professional respectability.

The ideal scientist norm often appeared to operate in very subtle ways, that did not necessarily involve overt exclusionary. One participant, for example, spoke about the trepidation they felt by being in a laboratory occupied by a leader who they felt embodied the image of the ideal scientist:

He's the like the definition of professionalism, of that professional old white man in a suit … he's just so cautious in everything that he does and it makes it really hard to feel like you can ever authentically be yourself around him, even though it's not because he'll be judgmental, but it's because of the way that he presents himself, the way that he's very careful with everything and makes it feel like I can't just be my unfiltered, unedited self around him (participant focus group_6).

A number of participants described how they felt that increasing the diversity of those joining the STEM workforce would help address inclusion in the workplace (e.g., 'hire more queer people, and things will continue to improve'). However, the persistence of norms such as the 'ideal scientist' also show just how 'sticky' or difficult some aspects of the STEM workplace culture may be to change.

3.3 Organisations and Inclusion

Several issues raised so far speak to the wider norms and practices within both STEM and the organisations in which participants worked. While many participants (although by no means all) indicated that their immediate work group was supportive of LGBTQ+ co-workers (82.0%), only 54.4% agreed that their organization as a whole provided a supportive environment for LGBTQ+ people.

My advisor is pretty good at keeping a safe environment, but as a big university I sometimes don't feel safe to express myself in other spaces of the University (Climate_013: Non-binary, Gay, US).

Although 28% of survey respondents disagreed that policies in their organisation were inclusive and accommodated the needs of all employees, policy still has a role to play in supporting inclusion. Some participants commented on the importance of inclusive policies for their sense of belonging.

My institute is relatively diverse. We have a lot of policies supporting queer folx such as insurance coverage of gender affirming care and some gender-neutral restrooms (Climate_110: Non-binary, Asexual, Biology, US).

It is clear, however, that there needs to be greater consistency in the implementation of policy and practices, such that experiences are not based on the 'luck' of who staff work with. Equally, organisational accountability can be promoted by taking complaints seriously, avoiding denial of lived experiences, and greater acknowledgement of EDI issues in key performance indicators (KPIs) and promotion criteria.

Ensuring taking any complaints from LGBT individuals very seriously and listening to the experiences of LGBT individuals (Climate_084: Woman, Pansexual, White, Psychology, UK).

Organisations can also look to make hiring practices more inclusive. Examples suggested by participants included: focused hiring (cluster hires, hiring targeted groups) and ensuring recruitment practices are not only led by heterosexual men. One policy survey respondent in the US, for example, felt that targeted recruitment had been an effective strategy for their organisation in increasing LGBT hiring.

Similar to previous research which has found that organisational policies and procedures may not adequately support LGBTQ+ workers (IOP, 2019), participants in our research indicated that policies alone do not create an inclusive work environment, particularly where policies and practice are implemented inconsistently, if at all.

My team appears to be very 'woke' and the leaders strive to be inclusive. But this is surface level / performative. 'Behind closed doors' experiences may be different (Climate_082: Woman, Pansexual, Multiple areas of expertise, UK).

Company policy protects me only from overtly or demonstrably hostile behavior and does not codify how equitable conditions should be established or maintained (Climate_172: Non-binary, Queer, Trans, White, US).

The result of this is that individual experiences vary significantly, even within the same organisation. Furthermore, numerous participants felt that EDI policies and initiatives were tokenistic and 'performative' and not driven by genuine attempts to transform organisational culture, with significant differences between the rhetoric of inclusion and the reality on the ground.

My department is silent on queer issues and the university acts in a typical CYA [cover your ass] way, paying lip service to queer issues without investing much time or money (Climate_070: Woman, Lesbian, White, Biology, US).

The company supports LGBTQ+ diversity and inclusion, but this is quite superficial and variable across sites. The responsibility largely falls on LGBTQ+ people to push for this (Climate_077: Man, Gay, White, Chemistry, UK).

Most of these strategies are performative. They need to have real backing and support down to the line manager level to actually have an impact (Policy_11: University, UK).

Part of the performativity of organisational approaches to EDI included a perception by some respondents that EDI is about creating an inclusive façade only.

One of the hardest things is that when events happen that harm any minority on campus, the responses to that often happen through the lens of PR. So they view diversity and inclusion as a selling point to market a product or service to potential students, and when an event happens their primary goal is to maintain the integrity of a marketing strategy, which means that if you are the victim of something, there are desires to downplay or coverup and kind of limit visibility and pretend it didn't happen (participant focus group_8).

There was a suggestion by some that part of the answer to implementing genuine inclusion efforts is to communicate the business case of EDI, appeal to the humanitarian and wellbeing benefits of inclusion practices, attain meaningful buy-in from leadership, integrate and tie inclusion efforts and

participation in them to formal organisational goals and metrics of organisational 'success' and as parts of promotions criteria.

Have 'culture' be one of everyone's goals and holding people accountable. It is mostly about creating the environment where everyone can do their best work (Policy_05: survey respondent, private company, US).

3.3.1 Organisational responses to discrimination

While most climate survey respondents said 'never' when asked if they had ever had a harassment complaint ignored because of their LGBTQ+ identity (88%), 6.6% said this had happened at least occasionally. This varied significantly according to where respondents' primary place of work was, with only 75.8% of office-based workers stating they have never had a harassment complaint ignored because of their identity, compared to 93.9% of home-based workers. Qualitative responses further revealed that when discrimination does occur in the workplace, it is often perceived to be dealt with inappropriately or ineffectively. This was seen to have significant consequences, leading to people having to leave their place of work, as well as impacting mental health.

I've also experienced bullying in the workplace that was not dealt with on a timely manner and the effect of it caused considerable negative impacts on my mental health and physical wellbeing (Climate_096: Woman, Queer, BIPOC, Health Science, UK).

Box 5: Leadership and representation

One of the most common themes emerging from the data was the importance of leaders and leadership. Specifically, ideas around role models, mentors, and leaders were commonly cited as key agents of change (positive and negative). Participants discussed the importance of representation of the LGBTQ+ community among mentors and leaders. Some also stressed that these individuals need to be visibly or openly LGBTQ+:

More visible inclusion. More senior leaders that are members of the community being vocal (Climate_108: Man, Gay, White, Biology, US).

LGBTQ+ representation in leadership was cited as a source of inspiration. LGBTQ+ people can *look up* to those who occupy senior roles with a shared identity, and this was cited as inspiring confidence in their ability to progress within STEM:

I've been lucky. I feel like a barrier for a lot of people is representation and being able to see people like them succeeding and have the model who will like respect them for all of the identities that they hold (participant focus group_1).

Visible LGBTQ+ leaders were also cited as catalysts in fostering inclusion, where they shape workers sense of belonging and capacities to express an 'authentic self'. One survey respondent, for

example, suggested that a lack of diversity 'especially at higher levels' can prevent 'folks from being 'out' (Climate_115: Woman, Bisexual, BIPOC, Biology, US).

Leaders were also cited as key mediators of inclusion relating to their capacity to support or gatekeep the career progression of LGBTQ+ individuals:

My guy's very, very supportive… he's someone who's so supportive of what I want to achieve in science… I think one of the things that I found really valuable as a tool was learning what it meant to have mentors in these different spheres in in these different spheres … I think I never really realised that that was something that I should be looking for in a mentor is someone who sponsors me for opportunities, but he absolutely does. And that includes professional development opportunities, whenever he comes across them (participant focus group_6).

One participant lamented the lack of such support and highlighted the need for mentors who provide a safe space for LGBTQ+ individuals to communicate their work needs:

I've seen some companies that do just like senior level mentors and that kind of thing in the LGBT community… We don't have anything like that, but that certainly would help because it's 1) somebody to just bounce thoughts and experiences off of. And 2) it's creating a safe environment to be that person, if only with one other person. And that's important, because that kind of helps, I don't know what's the right phrasing. It allows you to understand what being out at work actually is, and then having a sounding board… (participant focus group_2).

Participants also emphasised the power of leaders in setting organisational agendas and mobilising change in relation to EDI:

If the leadership doesn't make inclusion a goal, then everyone below them is less likely to. (Climate_198: Woman, Queer, BIPOC, Engineering US).

Participants reflected on the significance of having diverse senior colleagues who can help set the tone for inclusion and senior colleagues who can generally be allies and speak out on EDI issues. Those that were already in leadership roles spoke of how they used their roles to this effect:

Found out the CEO is LGBTQ+ after the first year working there which has maybe helped normalise it for staff (Climate_022: Man, Bisexual, White, Multiple areas of expertise, UK).

Many of my colleagues and some of my mentors/supervisors are also queer and out, which sets the tone for a comfortable workplace (Climate_036: Woman, Woman loving Woman, Biology, US).

3.3.2 Education, training and allyship

The provision of organisational education and training about the importance of inclusion was seen as critical by several participants. Similar to perspectives on inclusion policies more generally, participants reflected that such training needed to be engaging and meaningful, 'not just a video'; that it should focus on challenging problematic behaviours and promoting greater understanding and awareness of LGBTQ+ lives. Reflecting the burdens that the LGBTQ+ community face, it is,

however, important to ensure it is not only the responsibility of minoritised individuals to educate others, highlighting the significance of the role of allyship[3].

The team in particular champions inclusion and respect, through having EDI leads who are happy to not just call out something that isn't right but explaining what is better and why. This makes the team so much more effective in being inclusive itself (Climate_089: Woman, Heterosexual/Straight, White, Health and Social Care research, UK).

More basic training around social justice for middle managers … they need to understand that structural biases exist and not to centre themselves when a marginalized junior colleague speaks up about their experiences (Climate_082: Woman, Pansexual, Multiple areas of expertise, UK).

Some participants felt that there was both a lack of, and an unwillingness to engage in, LGBTQ+ education, meaning that there is a general ignorance of the lives and experiences of LGBTQ+ people. It should also be noted that some participants spoke of the danger of too much mandatory training or poor-quality training, which risked resentment and backlash among staff and could therefore prove detrimental to LGBTQ+ experiences in STEM:

Our HR department puts so much emphasis on sensitivity training that it creates some resentment, and discomfort around LGBTQ+ folks (Climate_139: Man, Asexual, White, Engineering and System administrator, US).

3.4 The role of networks and communities

Though some of the above themes are indicative of the barriers that LGBTQ+ people face in the STEM workplaces, participants also spoke about the things which support their inclusion in STEM. Here, participants mentioned the importance of various forms of networks and communities in providing both bonding and bridging forms of inclusion (Putnam, 2000). Bonding forms of inclusion encompass the way in which connections to others through networks and communities foster a sense of belonging. Events (e.g., conferences) and spaces where LGBTQ+ individuals can come together can mitigate feelings of isolation and foster a sense of community between individuals who have a shared set of experiences. Networking with others and involvement in community spaces and events can also act as bridging forms of inclusion, where individuals identifying as LGBTQ+ are able to make connections with others in a way that enables them to acquire connections, skills, and experiences which support their career progression. Here, one participant spoke of how their participation in the 'Lesbians Who Tech' conference and their local pride parade afforded them opportunities to connect 'with people at what we would call, like headquarters'. Through these avenues she was afforded more opportunities, which in turn led to growth in her public speaking skills. Another participant spoke about spaces where communities can connect and enable

[3] Allyship is a 'process in which someone with more privilege and power in the workplace uses their position to empathise with and support those in a more marginalised group' (Parke, 2021).

opportunities to meet those who act as a source of inspiration for future career goals and possibilities:

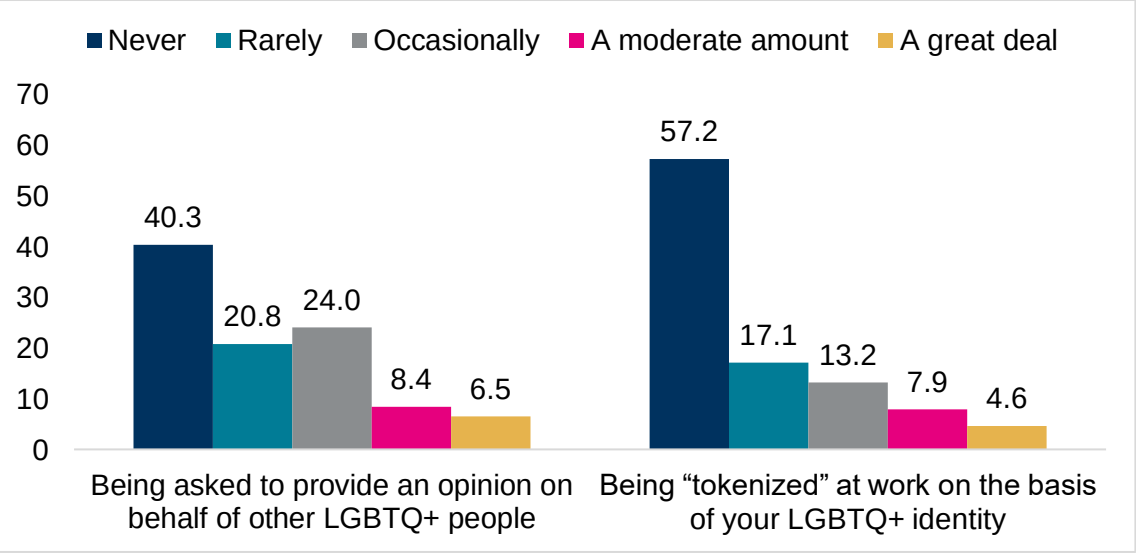
> *… or it's even setting up networks or hosting specific events that are like, a panel of people who are LGBT who work in this field, just asking them about their career journeys and showing to other LGBT people that it's possible to progress (participant focus group_5).*

The importance of networks was also highlighted in the policy survey, where respondents spoke of the effectiveness of their 'active LGBTQ+ employee resource group with support from senior leadership,' and the need to 'make individuals aware of the networks already in these spaces so people can build community.'

3.5 The minority tax

Another theme in the data was the additional 'workload' of being in a minoritised group. Referred to elsewhere as the 'minority' or 'cultural tax' (Betancourt et al., 2024), this refers to the work that minorities feel they must do or are put to do by employers to educate and/or support EDI efforts. This included a range of activities, such as being asked to represent the voice of the LGBTQ+ community and being asked to sit on panels/give talks to help demonstrate the diversity of the organisation. This was seen to be work that was frequently undervalued in the workplace. While many participants felt they were never asked to provide an opinion on behalf of other LGBTQ+ people (40.3%) nor were tokenised in the workplace (57.2%), 14.9% and 12.5%, respectively, felt this happened a moderate amount or a great deal (Figure 6).

Figure 6. Minority tax (%)



Notes: N=154 (LGBTQ+ respondents only). Participants were asked how often they had experienced various examples of LGBTQ+ discrimination with a colleague, client, or in their work environment in the previous 12 months.

The minority tax dynamic occurred in a variety of circumstances. First, given their shared minority status, minoritised individuals may end up being the 'go to' for other minoritised individuals who may either specifically seek out the help and advice of those with a shared identity, or minoritised individuals may feel a responsibility to support others who are minoritised. One participant, speaking within the context of higher education, drew upon their own example of this dynamic:

You have a bunch of students who share your identity, and you don't have any faculty that share your identity, what happens is you're an oppressed person trying to take care of a lot of other oppressed people who need you (participant focus group_8).

A second example of the minority tax comprised the perception by minoritised individuals that they needed to fill gaps in inclusion work, such as an LGBTQ+ person feeling the need to educate heterosexuals about issues the LGBTQ+ community faces. Minoritised individuals can feel obligated to address ignorance or 'educate' majority groups, who often will not seek out to understand minoritised identities (Kleinman and Cabanis, 2020):

The Royal Metrological Society… surveyed their members and they asked, is there an issue of EDI and so many people came back and were like, no, you know, there's no diversity problem in this field, and then you look at the results of the survey and it's like, 90% white male, so it's clear there is a diversity issue. And then at worst, you get people who are like well if you know weather and climate don't care about ethnicity… that's the most ignorant thing you could have said. Clearly that's not the case, but they don't know the barriers, right? Like the people who are in here, they don't really have the concept because they've not come up against them. And then it falls to people like me to educate them (participant focus group_2).

Third, two survey respondents specifically highlight how LGBTQ+ individuals are asked to take on inclusion-related work, arguing that LGBTQ+ individuals should not be responsible by default for educating non-LGBTQ+ individuals. This highlights the importance of allyship, mentioned previously.

A variation on this theme was the view that there can be a positive place for minorities to do inclusion-related work. One survey respondent argued for 'better and more specific diversity training led by LGBT individuals' (Climate_117: Non-binary, Lesbian, Trans, White, Biology and Ecology, US). One focus group participant articulated their positive experience of being in a position to enable non-LGBTQ+ individuals to ask questions and informally educate on LGBTQ+ issues:

I like to say I'm the most digestible version of trans nonbinary and in a way that's a good interface for folks who've never experienced, you know, transness. And so, I was the president of men things. And so, I actually did genuinely get a lot of questions of, like so, why do you have like she and they? Do you have a preference like what does that mean blah blah blah, and I can open up the conversation and kind of introduce people to you know the feelings. I have transness and stuff in a way that still looks, says Hetero (participant focus group_5).

These differing views highlight the complexity of seeking solutions to increase inclusion. Importantly, one focus group participant argued a middle ground perspective: that LGBTQ+ individuals should be afforded the space to 'define our own roles' in relation to how they want to engage with EDI efforts.

Regardless of both positive and negative aspects of this 'workload', it is something that those from the majority group have the 'privilege' of not doing or thinking about.

Box 6. Intersectionality

Where relevant, we have highlighted issues around intersectionality throughout this report. Nevertheless, it is useful to reflect more explicitly on participants' beliefs and experiences around their multiple identities. While exclusion and discrimination as a result of attitudes towards LGBTQ+ communities were clearly an issue for some participants, some felt that other aspects of their identity (e.g. gender, ethnicity, disability) were more pertinent to how they were treated.

The behaviours I have experienced are in relation to my health conditions and disabilities. I don't believe my gender, sexuality etc had come into it, not explicitly (Climate_068: Non-binary, Pansexual, White, Engineering and water management, UK).

I have experienced more marginalization as a woman in STEM than as a queer person in STEM (Climate_041: Woman, Lesbian, Computer Science, US).

I often feel like a second-class citizen, probably due to my ethnicity (Climate_095: Woman, Heterosexual/Straight, BIPOC, Medicine, UK).

Many of my colleagues can be very condescending to me - I don't know if this is because I appear to be a short, Asian, woman but certainly they don't talk to each other (white, cis, men) quite how they talk to me (Climate_06: Non-binary, Bisexual, Trans, Physics and Maths, BIPOC, UK).

Experiences of discrimination as a result of more visible parts of one's identity (e.g., ethnicity) also made participants reluctant or fearful about revealing more hidden parts of their identity. For example:

I am autistic and I feel since I was open about this and unmasked a bit people see me differently, especially my boss. Sometimes my boss avoids me and no longer sees me as leadership material even though I have a lot of experience in this area. I am reluctant to be open about other aspects of diversity because I think it will just make things worse (Climate_136: Woman, Bisexual, UK).

I think that there are some things about me that's kind of irrelevant, like my sexuality is pretty much irrelevant to my work, but then I think my ethnicity is quite obvious about me and I think my gender is also quite an obvious thing about me. But when I came when I first started here, I didn't think about that very much, and then I think as time has gone on, I had a very bad experience and I thought about my gender more and now it's like it's too late. Can't come out. Everybody knows me as this particular person. And yeah, what am I gonna do now? And that's something that I have to deal with, I guess (participant focus group_2).

Not only are there different experiences within the LGBTQ+ community, there are also differences in relation to other aspects of identity, compounding in different ways that manifest different experiences at the various intersections of who someone is. In focus group 4, participants discussed how experiences vary depending on your identity and how this intertwines with different aspects of someone's job, including pay.

Sexism looks really different when it's through a lens of class or through lens of race. It's not all same. And I think that even in our best interest to make things more inclusive, we have to deal with those subtleties. So, you know, like in the US, there's a pay gap for women compared to men, right? That exists, but white women make X percent more than Hispanic women makes X percent more than black women. Or the relative frequency of people in STEM professions, right. Indigenous folks can't even be counted because of privacy concerns, so it's not all the same for all the groups (participant focus group_4).

Participants also problematised the assumption that all LGBTQ+ people have the same experiences in LGBTQ+ spaces and that they should all feel safe and welcome. This may not always be the case, particularly for those with multiple marginalised identities, and it is something to be mindful of in relation to networks and communities.

I feel like one thing that isn't addressed enough in queer spaces is how those of us with intersectional identities, particularly as women of color (cis and trans) have to navigate our multifaceted identities. As a person of color, it can feel isolating how white queer spaces can feel (Climate_120: Woman, Heterosexual/Straight, BIPOC, Chemistry, UK).

Participants also indicated that while there are some experiences and stressors in the workplace that impact all people no matter their identity, these experiences can be compounded for those with marginalised identities.

One thing that I want to recognise … is that when you're in a minority group, you still have to deal with all the problems that normal people have to deal with, and some days that's going to be the thing that bothers you …. And so, a lot of the inequalities that we face, it's not just that they're bad on their own, it's that you're carrying that at the same time as all the normal stresses that I'm supposed to be complaining (participant focus group_8).

3.6 The impact of issues in wider society

As indicated previously, the findings also revealed that feelings and experiences of in/exclusion in the STEM workplace were linked to external factors outside the immediate workplace. For example, there were several participants who expressed their desire to leave STEM or their specific workplace environment as a result of their negative experiences but stayed regardless. Reasons for this varied between participants in the UK and US, largely due to the wider political context. For employees in the US, where health insurance is provided by employers, staying in a workplace that was not positive was seen as essential to access good healthcare. This was particularly relevant for Trans respondents, for whom health insurance was critical to access gender-reaffirming surgery. Respondents also acknowledged that the financial reward of staying in STEM made it difficult to

leave, as did factors like their ability (or inability) to relocate. That said, the climate survey also found that satisfaction with pay was, on average, lower than satisfaction with other aspects of work[4].

I considered leaving because my workplace is incredibly homophobic but couldn't leave because the money is too good (Climate_174: Non-binary, Queer, Trans, White, Engineering, US).

While policies within an organisation may be inclusive, STEM organisations do not exist in a vacuum. As noted in the introduction, data collection for this research occurred in a period (2023-24) where we are witnessing an increase in hate crimes against the LGBTQ+ community (Stonewall, 2023). Collectively, this contributes to a wider culture in both the US and UK that impacts the ability of people to feel safe in society, including at work. While this did not appear to impact directly on respondents' workplace experiences (or hadn't to date), it did leave some participants thinking about leaving the country, which may have an indirect impact on their work.

I am actively in the process of moving to an organization in another country. Threats from strangers on the street on my way to and from work were a huge driver in that. It is hard to tell which of the toxic behaviours are directly due to my identity, but that's an insidious part of how bigotry operates in the real world. Much of the stress actually comes from my disproportionate work with trans students who pass their own pain on to me (Climate_180: Woman, Bisexual, Trans, White, Computer Science, US).

The wider negative experiences people face in life and society, as a result of their identity, is also likely to indirectly impact people by impacting their broader health and wellbeing.

It's not the people I work with, but the current constant barrage of hate in the media and politics makes me very paranoid at work now (Climate_146: Woman, Asexual, Trans, White, Life Science, UK).

3.6.1 Geographical barriers

Geographical issues were also cited as a barrier to feeling safe within STEM and in terms of opportunities for career progression. As already noted, some participants referenced how regional laws and attitudes (particularly in the US) impact their willingness to work in certain locations. Some participants also spoke about the physical and psychological risks of having to travel to locations (both within and outside of their country) to conduct fieldwork (including remote and solo fieldwork) and attend events, conferences, and meetings, where they are more likely to face greater anti-LGBTQ+ hostility. This largely related to feeling psychologically unsafe and 'being [un]able to present as ourselves in all areas'. However, this issue can also impact an individual's ability to progress in their careers, due to missing out on important networking or project opportunities:

[4] Respondents were asked, on a scale of 1 to 10 (where 1 is very dissatisfied and 10 is very satisfied), how satisfied are you with your total pay? Your job security? The work itself? The hours you work? Flexibility available to balance work and non-work commitments? Overall job satisfaction?

Travel for field work can be more sensitive as sometimes study sites are in countries with lack of LGBTQ+ protections or active discrimination/illegality. This can lead to lack of participation by some marginalized groups in certain projects for safety reasons (Climate_182: Man, Gay, White, US).

… another thing that's very practical is to confront the geographic issues. So, I've had times that major events were held in spaces where it is not safe for me to exist … it is important to realise that going to a certain conference location is not always safe (participant focus group_8).

As the above quotation indicates, the locations where scientific societies conduct meetings and conferences are also part of location-based barriers to inclusion.

Lastly, as the quote below indicates, some LGBTQ+ individuals in STEM may feel psychologically unsafe when working with transnational project partners who may not be as accepting of LGBTQ+ identities.

STEM work is often multinational. Some cultures are more accepting than others. My Swedish colleagues are very accepting, my Indian colleagues are not comfortable with the concept (Climate_215: Woman, Asexual, White, Environmental Sustainability, UK).

4. Policy Implications and Recommendations

The findings point to several policy implications and recommendations for STEM workplaces and employers, higher education, professional associations, and funders. These include the need to:

1. **Increase organisational commitment and accountability for LGBTQ+ inclusion**. This may include ensuring that inclusion strategies and interventions are not tokenistic or performative; better communication of the business case for inclusion, as well as training to increase understanding and awareness of LGBTQ+ lived experiences; training to equip employees with the skills and confidence to responsibly intervene when witnessing discrimination and harassment; formal recognition and valuing of EDI work by individuals, particularly if this is not an explicit part of their job role; listening to the experiences of LGBTQ+ individuals and taking concerns and complaints seriously when they occur; ensuring LGBTQ+ staff are not penalised for not pursuing opportunities where they may feel threatened or at risk (e.g. travel to certain countries).

2. **Support opportunities for intra-, inter-organisation, and cross-organisation networking and community building.** Intra-organisation networks involve connections with those within a single office building or campus. Local groups (e.g., pride groups) can be established by management to indicate support for LGBTQ+ employees from mid-to-senior leaders and management. Management may also actively support employees in establishing these networks within company time. Inter-organisation networks constitute networks between employees within the same organization/company but where offices, work locations, and campuses are geographically dispersed given the organisational size. Peer-to-peer ‘queer mixers’ involving employees of all ages, work grades, and sexualities to come together to network in the context of building a

whole-of-organisational approach to LGBTQ+ community and allyship formation. Cross-organisation networking and community building involve networking opportunities with individuals, groups, and organisations outside or beyond the employer, such as conferences and events. This can enable LGBTQ+ staff to build support networks, particularly for those working in organisations that lack diversity. While this may be facilitated by professional associations, it is also something workplaces can support by subsidising the cost for such events and/or enabling employees to attend in work time.

3. **Challenge the notion of the 'ideal scientist.'** This may include showcasing LGBTQ+ excellence in STEM, as well as the diversity of queer culture in STEM spaces. We found that the stereotype of the ideal scientist persists in STEM and acts as a major barrier to inclusion for the LGBTQ+ community, but also likely other minoritised groups. The 'ideal scientist' promotes the masculinity of STEM and, with it, notions of objectivity and what it means to be 'professional' in the workplace. For many, this makes it challenging to be one's authentic self in the workplace. Increased workplace diversity is one way to tackle this, although increasing diversity without first addressing inclusive workplace cultures is challenging.
4. **Acknowledge the workload of being in a minoritised group**, including as a member of the LGBTQ+ community. Organisations should ensure it is not only the responsibility of the LGBTQ+ community to educate employees and other stakeholder groups about LGBTQ+ issues. Employers may also wish to conduct regular audits of internal EDI work to explore who has been given responsibility for this work and their experiences of this.
5. **Recognise that the experiences of the LGBTQ+ community in STEM are not homogeneous**. In particular, the Trans community in STEM face more barriers than others and as a result, need additional workplace support and protections. The experiences of LGBTQ+ individuals are also combined with their experiences of belonging to other identity groups, such as being a woman or a person of colour. Recognising that different parts of a person's identity will be more salient to them with regard to different issues is important, as is understanding that individuals cannot compartmentalise aspects of their identity to know, for example, whether their experience is because they are gay, disabled, or Black. This highlights the importance of the concept of intersectionality and understanding the nuances of people's diverse experiences.
6. **Understand that STEM workplaces are not separate from society.** Understanding that wider societal norms, practices, behaviours, and attitudes influence and impact workplace experiences is critical.

5. Conclusions

This research has examined the experiences of the LGBTQ+ community in STEM in both the UK and the USA, drawing on a mixed methods research approach and with a specific focus on the barriers and enablers to inclusion. Key findings from the research are that while experiences of overt discrimination appear to be declining on average, this is less the case for Trans individuals working in STEM. While we identified some very positive workplace experiences, a general 'chilly climate' persists in STEM, where LGBTQ+ individuals experience more subtle forms of exclusion and microaggressions. This has a negative impact on sense of belonging and individuals' ability to be their authentic selves at work, to the extent that they may want to. This appears to also be associated with other intersecting elements of identity, for example, ethnicity, gender, age, and disability, such that teasing out the parts of a person's identity that are linked to experiences of more subtle forms of discrimination is impossible. This chilly climate is also shaped by a number of other factors, including the diversity of the workplace more broadly, the support of leaders and allies, the representation of LGBTQ+ identities in leadership roles, the persistence of the image of a sterile, 'ideal' scientist, which at a minimum contrasts with the idea of 'bringing yourself' to work, as well as the wider policy and societal context.

What this leaves is a complex picture – there is not just one thing (e.g., the role of leaders) or a single part of people's identities (e.g., being LGBTQ+) that impacts people's workplace experiences. As a result, there is not a simple solution to increasing LGBTQ+ inclusion in STEM, but rather a need for a range of measures. What is clear, however, is that LGBTQ+ individuals should be enabled to define their own roles in relation to how they engage with EDI strategies and activities, without fear of judgement or repercussion, particularly given the additional workload that belonging to a minoritised group entails.

Future research may include further exploration of the experiences of those identifying as asexual, as well as on the intersection of being disabled and LGBTQ+ in STEM, as well as further exploration of the perspectives of employers and organisations.

References

ACLU (2024) The ACLU is tracking 574 anti-LGBTQ bills in the US. American Civil Liberties Union. Available at: Mapping Attacks on LGBTQ Rights in U.S. State Legislatures in 2024 | American Civil Liberties Union [Accessed December 2024].

Atherton, T.J., Barthelemy, R.S., Deconinck, W., Falk, M.L., Garmon, S., Long, E., Plisch, M., Simmons, E.H. and Reeves, K. (2016) LGBT Climate in Physics: Building an Inclusive Community. American Physical Society.

Betancourt, R.M., Baluchi, D., Dortche, K., Campbell, K.M. and Rodríguez, J.E. (2024) Minority Tax on Medical Students: A Review of the Literature and Mitigation Recommendations. Family Medicine, 56 (3): 169-175.

Boustani, K. and Taylor, K.A. (2020) Navigating LGBTQ+ discrimination in academia: where do we go from here? The Biochemist, 42 (3): 16-20.

Cech, E.A. and Waidzunas, T.J. (2021) Systemic inequalities for LGBTQ professional in STEM. Science Advances, 7 (3): eabe0933.

Freeman, J.B. (2020) Measuring and resolving LGBTQ disparities in STEM. Policy Insights from the Behavioral and Brain Sciences, 7 (2): 141-148.

Hughes, B.E. (2018) Coming out in STEM: Factors affecting retention of sexual minority STEM students. Science Advances, 4 (3): eaao6373.

IOP, RAS and RSC (2019) Exploring the workplace for LGBT+ physical scientists. Report by the Institute of Physics, Royal Astronomical Society and Royal Society of Chemistry.

Jansen, W.S., Otten, S., van der See, K.I and Jans, L. (2014) Inclusion: Conceptualization and measurement. European Journal of Social Psychology, 44 (4): 370-385.

Kleinman, S. and Cabanis, E.R. (2019) Towards a feminist symbolic interactionism. In: Jacobsen, M.H. (ed.) *Critical and Cultural Interactionism: Insights from Sociology and Criminology.* London: Routledge, 119-137.

Maloy, J., Kwapisz, M.B. and Hughes, B.E. (2022) Factors influencing retention of transgender and gender nonconforming students in undergraduate STEM majors. CBE – Life Sciences Education, 21 (13): 1-13.

Marosi, N.K.M., Avraamidou, L. and López López. (2024) Queer individuals' experience in STEM learning and working environments. Studies in Science Education, https://doi.org/10.1080/03057267.2024.2313903

Moore, K., Griffiths, M. and Richardson, H. (2005) Moving in, moving up, moving out? A survey of women in ICT. Paper presented at 3rd European Symposium on Gender and ICT: working for change, Manchester, UK.

Parke, C. (2021) Understanding Allyship: the shared pathway to cultural change. The HR Director, 01 March 2021.

Putnam, R. (2000) *Bowling Alone: The Collapse and Revival of American Community.* London: Simon & Schuster.

Schlehofer, M.M., Eagner, K. and Bramande, E., (2023) 'Things will get worse before they get better': LGBTQ+ people's reactions to the 2020 US presidential election. *Sexuality Research and Social Policy* 20 (4): 1378-1392.

Stonewall (2023) New data: Rise in hate crime against LGBTQ+ people continues, Stonewall slams UK Gov 'inaction' (October 5, 2023). Available at: https://www.stonewall.org.uk/news/new-data-rise-hate-crime-against-lgbtq-people-continues-stonewall-slams-uk-gov- [Accessed November 2024].

Sue, D.W. (2014) Microaggressions and marginality: manifestation, dynamics and impact. Invited address at Penn State University, State College, PA., 16 September 2014.

Yoder, J.B. and Mattheis, A. (2016) Queer in STEM: Workplace experiences reported in a national survey in LGBTQA individuals in Science, Technology, Engineering and Mathematics Careers, Journal of Homosexuality, 63 (1): 1-27.

Appendices

A.1 Climate survey respondent characteristics

Sample characteristics		*Total sample*		*LGBTQ+ sample*	
		Frequency	**Percent**	**Frequency**	**Percent**
Total		***194***	***100.0***	***166***	***100.0***
Gender	Woman	85	43.8	66	39.8
	Man	55	28.4	47	28.3
	Non-binary	51	26.3	51	30.7
	In another way	2	1.0	2	1.2
	Prefer not to say	1	0.5	0	0
Transgender	Yes	45	23.2	45	27.1
	No	145	74.7	118	71.1
	Prefer not to say	4	2.1	3	1.8
Intersex	Yes	5	2.6	5	3.0
	No	186	96.4	159	96.4
	Prefer not to say	2	1.0	1	0.6
Sexual orientation	Asexual	17	8.8	17	10.2
	Bisexual	29	14.9	29	14.9
	Gay	39	20.1	39	23.5
	Heterosexual/straight	26	13.4	0	0
	Lesbian	23	11.9	23	13.9
	Man loving man	2	1.0	2	1.2
	Pansexual	16	8.6	16	9.6
	Queer	33	17.0	33	19.9
	Questioning	1	0.5	1	0.6
	Woman loving woman	1	0.5	1	0.6
	Other	5	2.6	5	3.0
	Prefer not to say	2	1.0	0	0
Country of residence	UK	71	36.6	49	29.5
	USA	123	63.4	117	70.5
Type of organisation	University	77	44.8	68	45.3
	Private company	44	25.6	39	26
	Charity/third sector	17	9.9	13	8.7
	Public sector	27	15.7	24	16.0
	Self-employed	3	1.7	2	1.3
	Other	4	2.3	4	2.7
Primary work setting	Office based	78	45.9	64	43.2
	Home based	39	22.9	33	22.3
	Fieldwork	10	5.9	10	6.8
	Laboratory based	43	25.3	41	27.7
Job role	PhD/doctoral student	31	18.1	31	20.8
	Post doctoral researcher	6	3.5	6	4.0
	Faculty/academic	23	13.5	18	12.1
	Administrator	5	2.9	4	2.7
	Research scientist	17	9.9	15	10.1
	Technician	13	7.6	12	8.1
	Engineer	19	11.1	15	10.1
	Project manager	15	8.8	14	9.4
	Senior manager	6	3.5	5	3.4
	Senior leadership/C-suite	4	2.3	3	2.0

Sample characteristics		*Total sample*		*LGBTQ+ sample*	
		Frequency	**Percent**	**Frequency**	**Percent**
	Other	32	18.7	26	17.4
Line manager	Yes	50	29.6	42	28.6
	No	119	70.4	105	71.4
Time in current organisation	Less than 12 months	35	20.7	31	21.1
	1-5 years	88	52.1	77	52.4
	6 years or more	46	27.2	39	26.5
Promotion in last 12 months	Yes	29	17.3	23	15.8
	No	139	82.7	123	84.2
STEM field	Biology	72	27.5	67	29.9
	Chemistry	37	14.1	31	13.8
	Physics	24	9.2	18	8.0
	Engineering	44	16.8	35	15.6
	Maths	14	5.3	11	4.9
	Computer Science	25	9.5	22	9.8
	Other	46	17.6	40	17.9
Age	18-24	19	11.2	17	11.5
	25-34	69	40.6	67	45.3
	35-44	42	24.7	37	25
	45-54	23	13.5	17	11.5
	55-64	7	4.1	5	3.4
	65 or older	10	5.9	5	3.4
Citizen of country of residence	Yes	150	88.2	131	88.5
	No	20	11.8	17	11.5
	Prefer not to say	0	0	0	0
Ethnicity (UK respondents only)	White British	42	70	30	66.7
	White other	10	16.7	10	22.2
	Asian/Asian British	2	3.3	1	2.2
	Black/Black British	0	0	0	0
	Mixed/Multiple	4	6.7	3	6.7
	Other ethnic background	1	1.7	0	0
	Prefer not to say	1	1.7	1	2.2
Ethnicity (US respondents only)	African	2	1.9	1	1.0
	African America	3	2.8	3	3.0
	Alaskan Native	0	0	0	0
	Asian American	6	5.7	6	5.9
	Southeast Asian	3	2.8	3	3.0
	South Asian	0	0	0	0
	Caribbean/West Indian	1	0.9	1	1.0
	White	70	66	67	66.3
	Latino(a)/Hispanic	4	3.8	3	3
	Latin American	0	0	0	0
	Middle Eastern	1	0.9	1	1.0
	Native American Indian	0	0	0	0
	Pacific Islander/Hawaiian Native	2	1.9	2	2.0
	Other	9	8.5	9	8.9
	Prefer not to say	2	1.9	2	2.0
Caring responsibilities	Yes	29	17.3	21	14.4
	No	138	82.1	124	84.9
	Prefer not to say	1	0.6	1	0.7
Highest level of education	University higher degree	109	64.1	95	64.2
	First degree level	51	30.0	46	31.1

Sample characteristics		*Total sample*		*LGBTQ+ sample*	
		Frequency	**Percent**	**Frequency**	**Percent**
	Diploma in HE	4	2.4	2	1.4
	Formal qualification lower than HE level	4	2.4	3	2.0
	Other	1	0.6	0	0
	No formal qualifications	1	0.6	1	0.7
	Prefer not to say	1	0.6	1	0.7
Disability (1)	Yes	54	31.8	48	32.4
	No	112	65.9	96	64.9
	Prefer not to say	4	2.4	4	2.7
Disability type (2)	Deaf or have a hearing impairment	2	3.7	2	4.2
	Development condition since childhood	4	7.4	2	4.2
	Learning difference such as dyslexia, dyspraxia, or AD(H)D	34	63	32	66.7
	Long-term illness or health condition	10	18.5	9	18.8
	Mental health condition	29	53.7	27	56.3
	Physical impairment0	9	16.7	8	16.7
	Social/Communication condition such as a speech and language disability	13	24.1	12	25.0
	An impairment, health condition or learning difference not listed	6	11.1	5	10.4
	Prefer not to say	1	1.9	1	2.1
Religion	No religion	126	74.1	114	77.0
	Christian	23	13.5	15	10.1
	Other religion	21	12.4	19	12.8

Notes: Numbers and percentages within characteristics may not sum to the total sample size due to missing data. (1) Disability is here defined as anyone with an impairment, health condition or learning difference that has a substantial or long-term impact on their ability to carry out day-to-day activities. (2) Percent is among those who have a disability.

A2. Focus group participant characteristics

Participant	Country	Gender	Sexuality	Trans	Ethnicity	STEM field
1	US	Non-binary	Asexual	Yes	BIPOC	Biology
2	US	Woman	Woman loving woman	No	BIPOC	Biology
3	US	Non-binary	Queer	Unknown	White	Engineering and computer science
4	UK	Non-binary	Asexual	No	White	Computer science
5	UK	Non-binary	Bisexual	Yes	BIPOC	Physics and maths
6	UK	Woman	Heterosexual	No	BIPOC	Engineering and computer science
7	US	Non-binary	Bisexual	Yes	BIPOC	Medicine
8	US	Woman	Pansexual	No	BIPOC	Engineering and chemistry
9	US	Woman	Queer	No	BIPOC	Biology
10	US	Woman	Bisexual	Yes	White	Computer science

This research was carried out as part of the "LGBT+ Inclusion in STEM" grant scheme which is funded by the UK's Department for Science, Innovation and Technology and managed in partnership by the Royal Society of Chemistry and the UK Science Innovation Network.

Please cite this report as:
Powell, A., Bolton, R., Sterling-Morris, R.E., Varrall, T., & Avila Torres, V. (2024) “Barriers within Barriers: Minorities within Minorities. The challenges for LGBTQ+ Inclusion in the UK-US STEM landscape through an intersectional lens – Final Report”, Royal Society of Chemistry, London UK.

Department for Science, Innovation & Technology

UK Science & Innovation Network

ROYAL SOCIETY OF CHEMISTRY