Addressing Systemic Precarity: Trans Inclusion and Retention in STEM

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About the ASPIRE project

Background

In 2023 the Royal Society of Chemistry and the Science and Innovation Network (SIN) funded 5 research projects, conducting research into attrition and retention of LGBT+ individuals in STEM, including the ASPIRE project.

ASPIRE Overview

The ASPIRE project (Addressing Systemic Precarity: Trans Inclusion and Retention in STEM) is a collaboration between researchers at Oxford Brookes University in the UK, and University of Missouri in the US. It is led by PI Dr Cal Horton (Brookes), in partnership with Dr. Quinnehtukqut McLamore (University of Missouri), Professor Anne Laure Humbert (Oxford Brookes University), Dr. AJ Eckert (Quinnipiac University), A. L. Haas (University of Missouri), and TJ Oakes-Monger (the Trans Learning Partnership hosted by Spectra).

Research Aim

The RSC and Science and Innovation Network-funded ASPIRE project seeks to understand and address the barriers trans people face in STEM careers. In a time of increasing precarity in both the UK and US, the research will consider the impacts of systemic discrimination and hostile climates on trans support and retention in STEM. The research aims to help ensure STEM disciplines can attract and retain trans talent, creating welcoming professions where trans people can excel.

Context

The past decade has shown a significant rise in trans visibility, confidence, and inclusion including within STEM fields. However, trans professionals continue to experience significant inequalities, and specific challenges to equity and inclusion (Dowers et al., 2019). Research on the experiences of university students in STEM found that trans students were 10% less likely to continue in a STEM major than their cis peers, despite high levels of academic ability and academic self-confidence (Maloy et al., 2022). LGBTQ STEM professionals are more likely than their non-LGBTQ peers to plan to leave their current STEM jobs and to intend to leave STEM entirely (Cech & Waidzunas, 2021).

Trans is an umbrella term for individuals whose identities do not align with our assigned gender, including people who are transgender, nonbinary or gender fluid (Vincent, 2020). Trans people are estimated to make up 0.5% of the adult population in the UK and US, rising to 1.3% for 18-24 year olds (Herman et al., 2022; Office for National Statistics, 2021). The 2022 US trans survey found 18% unemployment (compared to less than 5% for cis people) highlighting continued barriers to trans employment (James et al., 2024). This innovative research seeks to enhance understanding of the challenges that are faced by trans professionals within STEM careers, seeking to enhance trans inclusion in STEM.

Research Methodology

Research design and positionality

The ASPIRE project comprises mixed method data from qualitative interviews and an online survey. Research was informed by best practices on ethical research with trans communities (Bauer et al., 2019; Vincent, 2018). The research received ethics approval through the first author's university. The research was framed within a feminist standpoint (Brooks, 2007), centring the views, experiences and insights of trans STEM professionals. The trans majority research team, primarily comprising social scientists, all of whom are white, provided an effective insider–outsider position from which to listen to the voices of those with relevant lived experience (Dwyer & Buckle, 2009).

Online survey methodology

The quantitative survey was open to trans including non-binary adults who have worked or done work experience in a STEM field in the UK or USA.

Participants were recruited through a wide range of open and closed forums, including general social media (Twitter, Bluesky, Linked-In), LGBT in STEM networks, trans researcher and trans professional networks and civil society networks (e.g. the Trans Learning Partnership). We initially received 238 records, but excluded one response which was a duplicated record, and three which exhibited obvious bad-faith responding (e.g., trolling, explicit hate speech or transphobia), leaving 234 usable records (n_{UK} = 113; n_{US} = 121).

The survey collected information on participant demographics, STEM background and employment status. Survey questions examined experiences in STEM careers including questions on stress, belonging, job satisfaction, and climate for trans employees in STEM. Alongside quantitative questions the survey included open ended questions, providing spaces for qualitative inputs on employee experiences in STEM careers.

Quantitative analysis was conducted, using Qualtrics and Excel for collation of the descriptive statistics presented in this article. Wider quantitative analysis was conducted in Stata.

Qualitative interview methodology

The qualitative interviews focused on trans people of colour with experience working in STEM careers in the UK or US. The interviewers' insider–outsider researcher position as trans and non-binary social scientists helped overcome trust and access-related barriers that often impede research with trans communities (Ashley, 2020). Interviewees were accessed via trans STEM networks, trans community networks and snowball sampling. Twenty qualitative interviews were conducted with trans people of colour (n_{UK} = 9; n_{US} = 11;

Remote semi-structured interviews were conducted from May 2024 to November 2024 (duration: *M* = 55 minutes, *SD* = 15 minutes) covering a broad range of areas of experience related to experiences in STEM careers.

Online interviews were digitally recorded with consent of the interviewees and stored on an encrypted platform to safeguard participant privacy. Transcripts were uploaded into NVivo for qualitative analysis, along with qualitative responses to the online survey, with the qualitative data coded for broad themes through inductive reflexive thematic analysis (Braun & Clarke, 2006), with data-driven development of codes and themes. In reflexive thematic analysis researcher knowledge

and positionality is valued as a resource to enrich analysis, prioritizing 'reflexive and thoughtful engagement with the data' (Braun & Clarke, 2019, p. 594). A key principle was to reflect participant accounts 'as faithfully as possible', while prioritizing data that most meaningfully answer the study's research question and 'acknowledging and embracing the reflexive influence of (researcher) interpretations' (Byrne, 2022, p. 4).

Analysis steps included re-reading the transcripts for familiarization, and coding diversely without pre-conceived coding categories. Initial codes were reviewed to identify broader themes, with all extracts for each theme collated and re-read. The initial themes were then reviewed, and themes and sub-themes revised to ensure they were internally coherent, consistent, distinctive and accurately capture the data set. The transcripts were re-read multiple times, and reflected upon, with quotes selected to illustrate key themes. This article does not utilise pseudonyms, respecting the importance of privacy and security for this cohort, and recognising the risk of patchwork identification.

Online Survey Sample

The online sample comprises 234 valid responses including 113 responses from the UK and 121 from the US (see Table 1 for regional distributions by country).

Table 1: UK Participant Locations

UK Regions (n=110; nonresponse = 3)	**No.**	**%**
North East of England	14/110	13%
North West of England	11/110	10%
Midlands	5/110	5%
South East of England	33/110	30%
South West of England	14/110	13%
Wales	6/110	6%
Scotland	25/110	23%
Northern Ireland	2/110	2%

Table 2: USA Participant Locations

US Region (n=121)	**States (Count)**	**No.**	**%**
Northeast USA	CT (2), ME (1), MA (12), RI (1), NY (7), PA (3)	26/121	22%
Midwest USA	IL (11), IN (4), MI (4), OH (4), KS (1), MN (2)	26/121	22%
South USA	FL (3), GA (2), MD (8), NC (2), SC (1), VA (2), TN (2), OK (1), TX (4)	25/121	21%
Western USA	CO (5), ID (1), NV (1), WY (5), AK (2), CA (23), OR (2), WA (5)	44/121	36%

Among the U.S. sample, the majority of participants (65%) lived in states categorised as having "high" levels of trans rights protections by the Movement Advancement Project (MAP, 2024); (see Table 3).

Table 3: American participants by state level of trans rights protections

Level of protection	States Included	Fraction	Percentage
Negative	AL, AR, FL, GA, ID, IN, KS, LA, MO, MT, MS, NE, OK, SC, SD, TN, TX, WY	19/121	16%
Low	AK, AZ, IA, KY, NC, ND, OH, UT, WI, WV	13/121	11%
Fair	PA	3/121	3%
Medium	DE, HI, MI, NH, NM, VA	7/121	6%
High	CA, CO, CT, IL, MA, MD, ME, MN, NJ, NV, NY, OR, RI, VT, WA	79/121	65%

Most survey participants in both the U.S. and the U.K. were white (US: 87% white; U.K. 90% white; see Tables 4 and 5).

Table 4: US race/ethnicity

Race/Ethnicity (of 121)	**No. (%)**
Asian	9 (7%)
Black	3 (3%)
Hispanic or Latino/a/x	2 (2%)
Native American or Pacific Islander	2 (2%)
Middle Eastern and North African	2 (2%)
More than one race	1 (1%)
White	105 (87%)
Other please specify	4 (3%)
Prefer not to say	1 (1%)

Table 5: UK race/ethnicity

Race/Ethnicity (of 113)	**No. (%)**
Asian, Asian British	5 (4%)
Black, Black British, Caribbean or African	3 (3%)
Mixed or multiple	3 (3%)
White	102 (90%)
Other	1 (1%)

Participants were able to select multiple gender responses. 17% (39/234) of respondents are men, 45% (105/234) are women, and 53% (125/234) reported a non-binary identity (including agender, genderqueer, gender fluid, see table 6). Note these percentage totals do not sum to 100 because 14 respondents were non-binary men, and 21 respondents were non-binary women.

Table 6: Respondent gender

Gender (from 234)	**No. (%)**
Agender	25 (11%)
Genderqueer	39 (17%)
Gender fluid	19 (8%)
Man	39 (17%)

Non-binary	96 (41%)
Woman	105 (45%)
Not listed please self-define [responses included transmasculine, transfeminine, transgender, trans, femme, transfemme, autigender, queer, non-conforming, genderflux].	18 (8%)

The respondents were a wide range of ages, with 14% aged 18-25, 40% aged 26-35, 22% aged 36-45, 11% aged 46-55 and 7% aged 56+ (M = 36.51, SD = 11.89, median = 33, range: 18-75). Forty-four percent (104/234) reported some form of disability and 65% (152/234) self-disclosed neurodivergence.

Respondents had a range of current contracts, with 40% (94/234) on a permanent contract, 13% (31/234) on a 1-2 year contract, 11% (26/234) on contracts with no security (at-will or zero hours contract), 9% (20/234) on a 3+ year contract, 4% (10/234) self-employed, 4% (9/234) unemployed and looking for work, and 3% (7/234) on a short term (under 1 year) contract. 38% (89/234) of respondents are at a low grade, 26% (60/234) at a lower middle career position, 18% (41/234) at an upper middle grade, and 12% (27/234) are at a high grade or seniority.

Qualitative Interviewee Sample

Twenty qualitative interviews were conducted with trans people of colour (n_{UK} = 9; n_{US} = 11; see Table 7 for demographic information). 50% of interviewees are disabled and 55% of whom are neurodivergent.

Table 7: Interviewee Demographics

Country	Gender	Age	Ethnicity	Locations worked in STEM	Disability & neurodiversity
UK (9)	woman (5), non-binary (4), man (3)	18-25 (4), 26-35 (2), 36-45 (1), 46-55 (1), 56-65 (1)	Asian/Asian British (3), Black, Black British, Caribbean or African (3), Mixed or Multiple (4)	NE England (2), SE England (6), SW England (2), Wales (1), Scotland (1)	disabled (4), neurodivergent (5)
US (11)	woman (5), non-binary (9), man (1), trans-femme (1), genderfluid (2), genderqueer (2), two-spirit (1) agender (1)	18-25 (2), 26-35 (8), 36-45 (1), 46-55 (0), 56-65 (0)	Black (3), Asian (7), Latino/a/x (1), Native American/ Pacific Islander (4), More than one race (2)	California (3), Colorado (1), Connecticut (1), Florida (1), Illinois (2), Kansas (1), Massachusetts (1), New York (2), Pennsylvania (2), Rhode Island (1), Texas (2), Virginia (1), Wisconsin (1)	disabled (6), neurodivergent (6)

The interviewees had worked in a range of STEM disciplines including in natural sciences (11), engineering and technology (2), medical and health sciences (8), agricultural sciences (1) and social sciences (1). Within the natural sciences category interviewees had worked in mathematics (1), physical sciences (3), chemical sciences (1), earth sciences (2), and biological sciences (8).

Key Findings

The research key findings are presented in 4 sections, aligning with 4 distinct journal articles (forthcoming). Each article, presented here in abridged form, has its own analysis, discussion and recommendations for enhancing policy and practice to better support trans inclusion in STEM.

1) Hostile climates and transphobic hate: Trans people's experiences navigating STEM careers in a time of precarity
2) Gender Minority Stress, Exhaustion & Being a Problem: Transgender professionals' experiences in STEM careers in the UK and USA
3) Trans professionals in STEM Careers: Barriers to equitable career progression
4) "*They see the potential and they want us in the field"*: Trans Inclusion in STEM

Article 1: Hostile climates and transphobic hate: Trans people's experiences navigating STEM careers in a time of precarity

Abstract

In the past decade there has been a growth in the visibility of trans communities, accompanied by a significant rise in anti-trans policy and rhetoric in countries including the UK and USA. Existing literature provides some insights into the challenges and barriers to LGBT professionals thriving in careers including in STEM. There has been limited research on the experiences specifically of trans professionals in STEM careers, and little research of the impact of anti-trans hostility and hate on trans people's ability to succeed in STEM careers. This innovative mixed method research seeks to understand and analyse the impact of hate and prejudice on trans people's STEM experiences in the UK and USA, with qualitative research focusing specifically on the experiences of trans people of colour. Research findings draw attention to the impact of prejudice, discrimination, harassment and oppression on trans people within STEM careers. The research highlights concern that cis colleagues and managers may fail to recognise transphobic hate, and that there is a lack of institutional action to protect trans employees. The research calls for greater institutional commitment to safeguarding the rights and well-being of trans employees, recognising the structural barriers to workplace equality in a time of growing state-sanctioned transphobia.

Research Aim

The work addresses the following research questions:

- RQ1: How do trans STEM professionals perceive the UK and USA in terms of a welcoming or hostile national or sub-national climate for trans people?
- RQ2: How does this external climate impact on trans professionals in STEM careers?
- RQ3: What can STEM actors and institutions do to better support trans STEM professionals?

At this time of increased politicisation of trans lives, and increased state-sanctioned harassment and oppression, this research adds value in two distinct ways. It provides novel mixed method insight on the impact of transphobic harassment and prejudice on trans people's experiences in STEM employment in the UK and USA. Additionally, the research addresses the marginalisation of trans people of colour even within research on trans experiences (Hennekam & Dumazert, 2023), focusing the qualitative component on listening to the experiences of trans people of colour in STEM.

Abridged Research Findings

Within this report a sub-section of research findings, a small portion of research data and interviewee quotes from this article are shared. Please see the full research article (forthcoming) for richer data and analysis.

The research findings are presented in three broad themes, i) being afraid ii) navigating transphobia and institutional protection. Illustrative quotations are presented from the online survey (OS), the UK interviewees (UK-I) and US interviewees (US-I).

Theme 1 – Being afraid

The first theme on 'being afraid' highlights trans STEM professional's fears in the UK and USA in 2024. It is divided into two sub-themes on a) hostile climates and b) being unsafe.

1.1 Hostile climates

A majority of respondents felt safe and welcome within their STEM workplace (see Table 8). Sixty-two percent (117/190) of trans people felt they had a safe and welcoming climate for trans people in their team. This decreased to 53% (100/190) when asked about their institution, and to 35% (66/190) when asked about their discipline or STEM field. One-sample t-tests compared to the scale midpoint (3) found that participants reported a significantly positive climate averaged across workplace, institution, and sector), $M = 3.36$, $SD = .95$, $\alpha = .763$, $t(189) = 5.28$, $p < .001$, $d = .38$.

Table 8: A safe and welcoming climate for trans people

Statement	Strongly agree (5)	Agree (4)	Neither agree nor disagree (3)	Disagree (2)	Strongly Disagree (1)
There is a safe and welcoming climate for trans people in my team	62/190 (33%)	55/190 (29%)	46/190 (24%)	19/190 (10%)	8/190 (4%)
There is a safe and welcoming climate for trans people in my institution	34/190 (18%)	66/190 (35%)	42/190 (22%)	36/190 (19%)	12/190 (6%)
There is a safe and welcoming climate for trans people in my discipline/STEM field	14/190 (7%)	52/190 (27%)	54/190 (28%)	48/190 (25%)	22/190 (12%)
There is a safe and welcoming climate for trans people in my state (for US)	13/99 (13%)	36/99 (36%)	18/99 (18%)	12/99 (12%)	20/99 (20%)
There is a safe and welcoming climate for trans people in my country (for US)	2/99 (2%)	3/99 (3%)	8/99 (8%)	39/99 (39%)	47/99 (47%)
There is a safe and welcoming climate for trans people in my country (for UK)	1/91 (1%)	7/91 (8%)	3/91 (3%)	24/91 (26%)	56/91 (61%)

However, respondents did not feel safe and welcome in their country overall, with the vast majority feeling unsafe. Overall, only 9% (8/91) of UK respondents, and 5% (5/99) of US respondents, felt their country was a safe and welcoming climate for trans people. 88% (80/91) of UK respondents felt their country was not a safe and welcoming place for trans people, with 56% (56/91) of UK respondents feeling this strongly. 86% (86/99) of US respondents felt their country was not a safe and welcoming place for trans people, with 47% (47/99) of US respondents feeling this strongly.

In both the UK and the US, participants strongly disagreed that the political climate was safe and welcoming for trans people. One-sample t-tests indicated that the average rating was far below the scale midpoint (3), for the US [M = 1.73, SD = 0.89, t (98) = -14.23, p < .001, d = -1.43] and for the UK [M = 1.60, SD = 0.95, t (90) = -13.97, p < .001, d = -1.46].

1.2 Being unsafe

One interviewee described the impact of a deteriorating and increasingly hostile political, media and legislative climate on their ability to safely live as a trans person, and a person of colour in the UK.

"So I think UK laws wise, it's definitely completely deteriorated…It's still really painful to exist as a trans person in the UK… As a trans brown person and a trans Muslim it's even more so… I'm not able to actually access a lot of the things that other scientists are able to access… I'm quite terrified a lot of the time because again…there is of course very much a level of fear around being a trans person and a trans person of colour in the UK" (UK-I)

Individuals reported the environment for trans people having got significantly worse over recent years for trans individuals, as the impact of targeted culture wars take root.

"I think it definitely feels more hostile…I think there has to be a moment in British politics where maybe in a similar way that people have now come to condemn homophobia, to really make a stand against transphobia and recognize it for what it is". (UK-I)

"(Prejudice) is now very much conscious and emboldened by it and they are more free to voice the prejudice, without, without realizing that it's a prejudice… Even when you call out, this is, you know, this is actually discrimination. It just doesn't bother them as it used to". (UK-I)

Theme 2 – Navigating transphobia

The second theme explores trans STEM professionals' experiences navigating transphobia, with sub-themes on 'a) 'being a target', b) 'recognising transphobia' and c) 'chronic stress'.

2.1 Being a target

Interviewees highlighted how a growth in overt prejudice, and in greater tolerance for such prejudice, led to people being exposed to more overt hate at work.

"There may be people in the office who don't believe that you should exist. Right? Who believe your existence is an affront to them." (US-I)

Interviewees talked about worsening institutional and societal climates, and growing tolerance of transphobia, making STEM workplaces more hostile for trans professionals.

"The tone and the language... it's all sort of changed… all completely changed now. [STEM leaders] were asking things like… we should hear the other side, we should listen to other side and (I'd) say, what other side?...I felt betrayed… Eight years ago everyone was sort of supportive, you know… [trans people were] celebrated for diversity, inclusivity… now it's completely turned around". (UK-I)

Several interviewees described their fears about their safety as a trans STEM professional. They described how safety concerns limit their horizons, curtailing travel, and negatively impacting on their confidence in interacting with or collaborating with new people. Several individuals

experienced targeted abuse in social and traditional media. They reported being left to deal with such attacks on their own, unable to call upon any institutional support or backing.

One interviewee shared how targeted transphobic harassment had impacted on their work. They spoke of the extra burden planning for security at work events, needing to be prepared for targeted abuse.

"Most people just don't have to consider this at all…That is an extra layer of organization and actually of pressure, and that's not a form of professionalizing that you are going to get from just an average experience in the academy, because the average experience in the academy is not a trans experience. There are small numbers of…very negative interactions that the people around me aren't necessarily prepared for, and I'm not necessarily prepared for". (US-I)

Several interviewees spoke of the impact of feeling unsafe on their jobs, wanting more protection and recognition of their experience from their employer and colleagues.

"I think anything that would provide some sense of safety in regards my trans identity would make an absolute world of difference. I think not feeling safe definitely interferes with my work… Literally anything within my department that says we're gonna try to protect you I think that would be helpful". (US-I)

2.2 Recognising Transphobia

People talked about institutions, managers and colleagues not understanding the direct link between anti-trans views, speech and behaviour and trans professionals feeling unsafe. Interviewees felt managers did not understand or recognise anti-trans prejudice or hate. Others felt that transphobia might be recognised when in the form of very clear slurs, with subtler forms of transphobic prejudice disregarded. Some felt transphobia was taken less seriously than other prejudices.

"I was openly/visibly queer before transitioning socially and the difference in how people treat LBGQ+ people versus trans and nonbinary people is really obvious to me. Most people in my environment would shut down homophobia almost immediately even if it was something really small/inadvertent but I feel way more on my own defending my trans identity" (OS).

Respondents noted that institutions can be particularly unattuned to the ways in which science and research can be weaponised to attack trans people. One survey respondent wanted scientific leaderships to *"recognise when "research" is used as a vehicle to harm trans people" (OS).* Several interviewees shared examples of professional scientific bodies or societies giving support or legitimacy to opinions or research that harms trans people. Interviewees spoke of the negative impacts on trans professionals of seeing professional bodies tolerate or even legitimise transphobia. A number of interviewees felt that, because cis institutions and managers failed to recognise transphobia, a trans professional refusing to engage with or debate transphobia could be misinterpreted as the trans person being unreasonable or aggressive, with the trans person further marginalised. This was particularly seen as an approach that marginalises trans women, and trans women of colour.

"My action (refusing to discuss) is sort of like being aggressive and that certainly plays into a whole cultural narrative about trans women". (US-I)

Trans STEM professionals worried that their reaction to hate and prejudice would be strongly policed, and that they would face consequences for calling out transphobia.

"You deal with people not using your pronouns and you deal with people being insensitive, or people making potentially racist remarks, and professionalism says that you can't react. And if you do react, you're being judged very carefully by how you react… This person might just have straight up insulted me consciously, and I need to not be flustered and need to be calm and need to deal with it in the most perfectly diplomatic way or I will be the one who is judged…You don't always have people backing you up or people who even understand why a statement might be problematic". (US-I)

Interviewees did not feel their institutions and managers would support them in challenging transphobia.

"I felt that, if anything happens, no one's going to support me…I am not able to… call out transphobia because there is no backing… If I were to… call out transphobia, I would just be side-lined... No one's going to support me. Yeah. I feel that the repercussions [would] be even worse, [it would] impact me in a very, very negative way". (UK-I)

2.3 Chronic stress

Interviewees spoke of the impact of hostility and insecurity on their stress levels.

"It is an enormous stress…the stress for me is not to be underestimated. It's very difficult sometimes to continue the resilience when everything, every day is under attack, it's like oh my god I thought that like things would have changed but it's still an uphill struggle". (UK-I)

Many trans STEM professionals emphasised the impact transphobia had on their mental and physical health. One interviewee left the country to rebuild from the impact of being trans in the UK. A respondent described dropping out of a STEM job because of the impact of transphobic harassment on their mental and physical health.

"I have left my previous job… [transphobic harassment] had ground me down to the point where my mental health troubles were so bad they translated into physical symptoms; I knew I would quite literally not survive the end of my 30s if I had stayed" (OS).

Interviewees emphasised how heavy anti-trans commentary weighed on them emotionally. Individuals reported being under significant chronic fear and stress as a result of ongoing and escalating hostility towards trans people

"I mean I live in constant stress because of it. I think a lot of us do. The future is pretty scary right now. And I definitely think kind of the side effect of that, is this sense of existential stress, that people who aren't in this community probably don't have to deal with". (US-I)

"Especially around trans issues it's like my God, we are not safe anywhere… My God. I can't... Here we are talking about the state is coming for us… We're just sitting and thinking about paying bills and getting food, the state is coming for you. Why?" (US-I)

Trans STEM professionals wanted managers and STEM leadership to recognise that external climates of trans hostility have a direct impact on trans people's ability to thrive in STEM careers.

"Understand that if politicians are trying to kill me off, then that affects my ability to do my work." (OS)

"Recognise that a number of things, not least the state of the news, may affect your mental health and therefore your focus". (OS)

Interviewees and online survey respondents drew a direct connection between transphobic environments and professional burnout.

Theme 3 - Institutional protection.

This theme examines trans STEM professional's reflections on the need for institutional protection from transphobia with sub-themes on a) tackling transphobia b) leadership commitments.

3.1 Tackling Transphobia

Quantitatively, online survey respondents varied considerably in whether they felt their peers, colleagues, senior leaders and managers would confront transphobic language, policy, or practice at work, $M_{average}$ = 3.05, *SD* = 1.15, *t* (194) = 0.68, *p* =.49, *d* = .049, non-responses = 39. Forty-three percent (85/195) of respondents felt confident or very confident that peers and colleagues would challenge transphobic language, policy or practice at work, 19% (37/195) felt neither confident nor unconfident, and 37% (73/195) felt not confident or not at all confident. Levels of confidence in managers was similar though slightly below confidence in peers. 39% (77/195) of respondents felt confident or very confident that managers and senior leaders would challenge transphobic language, policy or practice at work, 23% (45/195) felt neither confident nor unconfident, and 37% (73/195) felt not confident or not at all confident.

Several survey respondents felt transphobia would only be challenged if raised by a trans person. Others felt colleagues would only challenge very overt offensive slurs, not noticing more subtle manifestations of transphobia. Several felt that HR and senior management did not uphold their responsibilities to protect trans employees. Numerous felt a lack of commitment to tackling transphobia.

"Senior management are wary of challenging transphobic dog whistles as they claim the need to support all points of view, regardless of the form or context of expression, even if they harass or cause acute distress" (OS).

Respondents to the online survey who had experienced violence, harassment or discrimination at work (n=87) were asked whether they had reported it to management or Human Resources. 21% (18/87) confirmed that they had reported it. 36% (31/87) confirmed they had not reported it (44% (38/87) did not provide a response to this question). Reasons for not reporting included having experienced transphobia from senior management or HR, not wanting to disclose their trans identity to their employer, not seeing any potential benefit in reporting it, or fearing that reporting would have negative repercussions for them.

Survey respondents varied significantly in whether they felt reported workplace complaints of transphobia would be resolved to their satisfaction (non-responses = 36). 29% (58/198) agreed or strongly agreed that if they reported transphobia at work, their complaint would be resolved to their satisfaction, 22% (44/198) neither agreed nor disagreed, and 38% (75/234) disagreed or strongly disagreed. A number of interviewees described being unsupported by their HR departments, with hostility and transphobic harassment disregarded. One respondent shared a positive example of feeling supported by their HR manager and line manager.

"My line manager is an amazing ally and the HR manager offered to increase the severity of the company discipline policy when it came to internal transphobia" (OS).

Trans STEM professionals felt action against transphobia needed to be a much more significant priority for institutions with commitments to diversity and equality, alongside action on other axes of discrimination.

3.2 Leadership commitments

Trans STEM professionals wanted stronger institutional commitments to protecting trans employees. Online survey respondents emphasised the importance of organisational commitments against transphobia.

"I would like to see employers take complaints of transphobia more seriously" (OS).

"More awareness overall and more severe consequences for bigotry" (OS).

Several respondents emphasised the need for institutions to ***"****put trans specific anti-discrimination policies in place" (OS),* recognising and address workplace manifestations of transphobia.

Others wanted organisations to be more proactive in ensuring existing legal protections are acted upon in institutional practice.

"Enforce anti-discrimination and anti-harassment policies, and make sure cis employees actually understand what transphobia looks like" (OS).

Respondents emphasised the need for organisations to be proactive in protecting trans employees from harassment or victimisation. Several interviewees emphasised that institutional protection should be active, without placing a burden on trans employees to need to defend themselves from transphobia.

"Don't make trans individuals be the ones who have to push back against transphobia in the workplace; take responsibility for disciplining the people who say/do transphobic things" (OS).

Respondents wanted clearer pathways for tackling transphobia.

"I wish there was a zero-tolerance approach to transphobic behaviour and language in the workplace" (OS).

Trans STEM employees also wanted their institutions to communicate more assertively that trans employees are welcomed.

"I wish employers would speak out publicly to show support. To stand up and say unequivocally that trans people are welcomed, valued, and respected". (OS)

Others wanted organisations to uphold commitments to trans staff at a more macro scale beyond individualised actions. Some wanted commitments to avoid investment in locations that are unsafe for trans employees, calling for STEM organisational commitments to "n*ot placing offices in states with transphobic policies" (OS).* Others wanted institutions to use their position and platform to more actively stand up for trans staff members facing state persecution. Respondents argued that that organisations that claim to value staff inclusion and equality need to take a more active role in ensuring trans people are safe.

"Visibly support trans people, speak out against the disgusting treatment of trans people by the UK government" (OS).

"Actually support us! Put policies in place that pre-empt the government coming in and taking our rights away. Pledging to treat us as humans even if the government says we aren't". (OS)

Article 2: Gender Minority Stress, Exhaustion & Being a Problem: Transgender professionals' experiences in STEM careers in the UK and USA

Abstract

Across diverse sectors and disciplines, including in STEM (Science, Technology, Engineering and Mathematics), there is a commitment to ensuring all talent is nurtured and supported, especially for minoritized professionals. Within the literature there is recognition of the stresses and strains that negatively impact minoritized professionals, including LGBT professionals, in workplaces that fail to welcome and make space for diverse identities. There is less literature specifically on the experiences of trans people navigating STEM careers. This mixed method research aims to understand and articulate the challenges faced by trans STEM professionals through the theory of Gender Minority Stress, recognising the stress and mental health burden that trans people can experience navigating systems and institutions inadequately adapted for trans inclusion. The research examines the experiences of trans people in STEM careers in the UK and USA, with a qualitative component that focuses specifically on the experiences of trans people of colour. Research findings highlight widespread experiences of gender minority stress in STEM careers, with qualitative insights into sources of chronic exhaustion and stress. This research provides novel evidence on drivers of exhaustion and stress, understanding that is vital to reforming institutions to provide safe and equitable workplaces for trans professionals.

Research Aim

Existing literature provides limited insights into the stressors experienced by trans professionals at work. This study aimed to add to the literature by examining how stressors including Gender Minority Stress (GMS) are experienced by trans people working in STEM in the UK and USA, exploring the following research questions:

1. What are trans people's experiences of stressors including Gender Minority Stress in STEM?
2. What lessons can we draw from these insights to better safeguard trans employee well-being, retention and success in STEM?

Abridged Research Findings

Within this report a sub-section of research findings, a small portion of research data and interviewee quotes from this article are shared. Please see the full research article (forthcoming) for richer data and analysis.

Research is presented in two major categories, firstly examining Gender Minority Stress, and secondly exploring additional sources of stress and strain experienced by trans people in STEM careers. Illustrative quotations are presented from the online survey (OS), the UK interviewees (UK-I) and US interviewees (US-I).

Part 1 - Gender minority stress

The research demonstrated a wide variety of experiences of GMS, with a majority of respondents highlighting one or more components of GMS. This included experiences of i) negativity and rejection ii) harassment and violence iii) discrimination iv) non-affirmation v) negative expectations and vi) community connectedness.

1.1 Negativity and rejection

Experiencing negative attitudes to trans people is a recognised dimension of gender minority stress. On the topic of negativity, respondents were asked about how often they hear colleagues talk negatively about trans people at work. 54% (109/203) of respondents had heard colleagues talking negatively about trans people at work at least once, for 38% (77/203) this happened several times and for 2% (5/203) this happened regularly.

Several survey respondents described the experience of overhearing transphobic conversations. Some survey respondents felt transphobic discussions were accepted and tolerated in their workplace, describing how this left them feeling unsafe.

"There is widespread acceptance of transphobic speech and expressions of violence towards trans people" (OS).

"When trans hostile jokes and language are used at work, I have never seen a single person challenge it other than trans people. It makes me scared to bother advocating for myself or to be identified as trans" (OS).

Respondents to the online survey were asked whether they feel comfortable discussing trans news Respondents to the online survey were asked whether they feel comfortable discussing trans news and issues with their co-workers. 34% (68/199) agreed or strongly agreed that they feel comfortable discussing trans news and issues with their co-workers, 21% (42/199) neither agreed nor disagreed, 23% (45/199) disagreed and 22% (44/199) strongly disagreed.

Respondents were asked about how often they feel excluded at work because of being trans. 59% (117/200) of respondents had felt excluded at work because of being trans, with 36% (72/200) having experienced this several times and 13% (25/200) regularly. Several online survey respondents described transphobic workplaces. Several interviewees felt a tone of general rejection and unwelcomeness. Several survey respondents described hostile workplaces where they face rejection and isolation, with rejection pushing them towards leaving their STEM job.

"Sometimes feel like quitting because my colleagues do not accept me for who I am" (OS).

1.2 Harassment and violence

Respondents were asked about experiences of victimisation, including verbal harassment, violence and discrimination at work. 7% (15/201) had experienced sexual or physical violence at work, with 2% (5/201) experiencing this several times and 1% (2/201) regularly. 25% (50/202) had experienced verbal harassment, mocking or threats at work related to being trans, with 14% (28/202) experiencing this several times and 1% (2/202) regularly. 58% (107/185) had experienced microaggressions at work and 38% (69/184) had experienced transphobic behaviour at work.

Some online survey respondents described experiences of being "threatened with bodily harm" (OS), or "verbally abused" (OS). One interviewee described the intersection between racist and transphobic microaggressions. Another interviewee described how alongside positive experiences of

support and acceptance, they had negative experiences of misgendering, abuse, and hostility, that prevented them from flourishing in their workplace.

"I did have problems, I did have (people) misgendering me, people who were downright rude to me, had somebody who… actually it was, you'd call it, sexual abuse… and so it wasn't easy… to be a young trans person in an environment that was yeah, it felt quite hostile at times. And yet, there were little islands of lovely words, and lovely acceptance. And ultimately, I really loved the job. I loved what I was doing. The environment I was in just wasn't that conducive to flourishing". (UK-I)

1.3 Discrimination

37% (72/197) of respondents had experienced discrimination at work linked to being trans, with 22% (43/197) having experienced this several times and 4% (8/197) experiencing this regularly.
One interviewee reported being told a fellowship was not open to trans women, while another was told their pronouns would not be respected in a STEM publication.

"I contacted the head of school, head of department to inquire and I think he somehow had the information that I was a trans woman and his reply was this Fellowship is not available for people like you". (UK-I)

"I have had issues where some publications… refused to use my pronouns because they say they're not grammatically, correct. Which is kind of shocking. that's happened more than once. So that wasn't just that time. I definitely think there's a sense of erasure". (US-I)

Several survey respondents felt being trans had negatively impacted on their experiences applying for jobs.

"I put my CV out to try and find a new job. It had on it that I'm trans. I heard nothing so after several weeks I removed that and got 2 job interviews within a couple of days. The job interviews were cut short when they realised I am trans". (OS)

"I have walked out of interviews at prestigious institutions because they're making transphobic assumptions or asking transphobic questions about my body or experiences being trans" (OS).

Some survey respondents described being sacked for being trans. Others described being pushed out of workplaces where they had experienced discrimination.

"I wasn't allowed to use the women's restroom…I ended up having to hold it for 9 hours because there wasn't really time to go elsewhere". (OS)

"I was literally pushed out of a position at a previous company in a similar field and role to my current role when it came out I was trans". (OS)

1.4 Non-affirmation

Respondents were asked about their experiences of affirmation at work, whether people use their correct pronoun and respect their affirmed gender. 72% of respondents (145/202) agreed or strongly agreed that they were almost always correctly gendered at work, 10% (21/202) neither agreed nor disagreed. Some respondents were not affirmed at work, with 9% (19/202) disagreeing and 8% (17/202) strongly disagreeing with the statement that they are almost always correctly gendered at work.

Non-binary respondents were the least likely to be affirmed at work, with 14% (15/108) of non-binary respondents disagreeing and 13% (14/108) strongly disagreeing that they were almost always correctly gendered at work.

Interviewees referenced the chronic strain of being in spaces where their identity was not respected.

"I kind of have to deal with a lot of having to affirm myself. I'm not able to be affirmed by the people around me". (US-I)

"I'm so tired… it is just another chore on my list of holding cis people's hands and going, "It's okay that you've gotten my pronouns wrong six times now. At least you apologized"…Surely if you can remember all of the words to supercalifragilisticexpialidocious you can remember that somebody uses them and not she her". (UK-I)

Several referenced experiences of having their identity invalidated, including by their managers.

"He switched to she her pronouns in front of a very prominent donor. And I'm like, why did you do that? He's like, well he wouldn't have been comfortable with it. And I'm just like okay, I just don't like being treated like my identity is some kind of taboo subject that needs to be hidden". (US-I)

37% of respondents had their pronouns respected all the time at work (71/193), with 33% (63/193) having their pronoun respected most of the time. 14% (27/193) had their pronoun respected sometimes, 6% rarely (12/193), while 1 respondent said they never had their pronoun respected at work.

Some trans individuals do not feel able to be socially transitioned as much as they might want to at work, with this likely contributing to non-affirmation stresses. From the survey respondents 64% (139/216) are fully socially transitioned at work and 8% (17/216) are socially transitioned with most work colleagues. 10% (21/216) are not socially transitioned at work, 10% (22/216) only with work friends, and 6% (13/216) are only socially transitioned with a few work colleagues. 4 (2%) respondents felt this question was not applicable.

For several qualitative interviewees, fear prevented them from being able to socially transition in their STEM workplace. One interviewee described how fears related to safety and potential discrimination prevented them from asserting their trans identity at work, leaving them hiding and pretending to be cis. They described how pretending to be cis offers some safety, but at a cost.

"It's kind of a privilege that I can kind of go under the radar and kind of pretend to be a cis woman. and be safe… but on the other hand sometimes I just feel like I don't exist, and I'm not able to be myself". (US-I)

Trans people are known to face stresses at the point of, and in the early years after social transition (Hennekam & Köllen, 2023). From the sample 26% (51/193) of respondents have been socially transitioned at work for less than 2 years, 28% (55/193) for 2-4 years, 28% (55/193) for 5-9 years and 11% (21/193) for more than 10 years (for 11 respondents this question was not applicable). A majority of trans people in STEM have socially transitioned at work relatively recently, a factor likely impacting on the average stress levels of trans professionals.

Feeling afraid to disclose a trans identity or history at work is a recognised dimension of non-affirmation. The survey showed a wide range of levels of disclosure of trans identities at work. 18% (35/193) of respondents felt that all their colleagues know they are trans, 33% (63/193) felt that most or 16% (31/193) felt that some colleagues know they are trans. 19% (36/193) felt that a few colleagues know they are trans and 6% (12/193) felt that no colleagues know they are trans. Qualitative responses shed light on some of the fears that prevent some trans professionals from

sharing their trans identity with work colleagues. Several online survey respondents described keeping their trans status private to avoid discrimination or harassment. Others described their fears that disclosure of their trans identity would lead to violence.

"No one at work knows that I'm trans. It's a trans hostile environment and it can be quite scary at times". (OS)

"If he [transphobic work colleague] ever learns that I'm trans then I am sooooo dead…And on the last day I work with him I'm going to tell him I'm trans and my story, see if I can change his mind about us. Hey I know you despise trans people but this person that you have worked with for years and highly respect is trans. It might just change his mind. Or he could kick my teeth in". (OS)

Some interviewees described being outed by their managers, with significant impacts on well-being.

"They'd already outed me before I'd even joined and I sort of collapsed at that point. and I became very, very depressed and it was, quite apparent things weren't going very well" (UK-I).

Several people described the horrific treatment trans predecessors had faced in STEM, with this making people afraid of being visible.

"When I was first starting out and as far as I knew, I was the only one... there was one person at the time who was a well-known [STEM job] who had come out, and then was outed by the tabloid press. So the tabloid press, I remember in the 90s and early 2000s, had the sort of a penchant for picking on particularly trans women and just kind of sticking them on the front page, and trying the best to humiliate people. So I knew that that's what happened to her. So that really didn't make me any more keen to be out" (UK-I)

Respondents were asked about whether they often feel that they need to hide their trans identity at work. 49% (99/202) of respondents agreed or strongly agreed that they often feel that they need to hide their trans identity or gender history at work. The issue of feeling the need to hide one's trans identity was brought up by several qualitative interviewees, with some having been advised to not disclose their trans ness.

1.5 Negative expectations of the Future

Respondents were asked about their expectations for the future. 53% (107/202) of respondents agreed or strongly agreed that they feel confident in a positive future in their career, 11% (23/202) neither agreed nor disagreed, 13% (27/202) disagreed and 9% (19/202) strongly disagreed. 75% (151/202) of respondents agreed or strongly agreed that they often worry that being trans will have negative consequences for their career.

1.6 Community connectedness

Community connectedness is an ameliorating dimension of Gender Minority stress, with greater community connectedness expected to reduce GMS. Respondents were asked whether they regularly have an opportunity to connect with trans professionals. 65% (132/202) disagreed or strongly disagreed that that regularly have an opportunity to connect with trans professionals in professional networks or settings, with 9% (18/202) neither agreeing nor disagreeing. Only 26% (52/202) agreed or strongly agreed.

Several interviewees spoke on the importance of finding communities of connection and solidarity, how that gave them strength and confidence in their place as a trans person in a STEM field.

“I don't feel alone anymore - I've met loads of other trans [STEM professionals] now and there's networks of us, and it is more just than just being trans myself… it's about being able to bring that lived experience and that knowledge into the profession… moving, adapting. (UK-I)

Part 2 - Other sources of stress and strain

Further inductive analysis of qualitative data, both from the interviews and online survey, revealed two prominent stress related themes that do not directly map onto the recognised domains of GMS. These relate to a) being a problem and b) exhaustion.

2.1 Being a problem

64% (120/187) of respondents to the survey reported having had to advocate for their own rights at work. When trans employees interacted with institutions not designed for trans inclusion, the trans employee seemed to create problems to be fixed.

“Being trans in these systems or in these cultural contexts in a way that just don't have a lot of trans people. You do sort of see yourself I think as a problem, not in that it's bad, but that you create situations that need to be fixed”. (US-I)

Survey respondents felt that trans inclusive adaptations could be perceived as an inconvenience or worse by STEM managers and leaders. Some felt that being an inconvenience harmed their career opportunities. Several spoke of being considered a troublemaker for seeking equality.

“It's well known - It's well studied that whenever people from minoritized backgrounds speak up, they get labelled as problematic or trouble, or they get labelled as the actual problem…. Yeah. That is my label”. (US-I)

Some spoke of the pressure to be perfect as a visible (and targeted) minority.

“I feel like I need to be perfect and exceptional just to be allowed in the room. I don't immediately get allowed into rooms. I have to be 12 times as good as the person next to me just to be able to sit next to them. and that's something that I've heard echoed by a lot of other people of colour as well, not just specific to the trans community. But I think if you also have additional layers on top of that, you feel that even more… because this room is not built for me. This space is not meant for me. but I've pulled up my fold-up chair to this table… and I'm not moving… That's kind what it feels like. There's definitely a sense that you can't slip up in the way that other people might be able to slip up and…be forgiven”. (US-I)

Trans professionals report having to build their own workplace supports, with this being a significant burden.

“I basically have to create it myself… Because, you know, for example, there was no guidelines for trans staff in [institution]. So basically, I created the guidelines myself. I definitely have to start it from scratch. And I don't see any higher ups getting on this”. (US-I)

Many trans STEM professionals were forced to develop and advocate for institutional policies to support themselves.

“When I first started, there wasn't any policies, there wasn't any guidance. There wasn't any, there was basically - there was nothing”. (UK-I)

2.2 Exhaustion

Interviewees described needing to educate their work colleagues on trans inclusion.

"I was the first out trans person in that school, in that faculty actually, and I think this is probably not unique for a lot of trans people in STEM that when you come out you not only just had to deal with your being out and transitioning, you have to educate others". (UK-I)

Trans STEM professionals emphasised the exhaustion of having to continually explain themselves. Several interviewees felt trans people were shouldering the burden of educating those around them

"I don't want to be in a position of having the educate people with more privilege… who are geniuses in the field and… should be able to educate themselves without me". (US-I)

"When it comes to transness, there's such a difference in knowledge a lot of the times between cis and trans people. Trans people in general are so tired of having to explain themselves and we cannot keep shouldering the burden of filling this knowledge gap". (UK-I)

People talked about the exhaustion of navigating systems that do not reform, where the same problems are repeatedly encountered by trans employees, without the institution making adaptations to properly include trans people.

"It is really exhausting to unwrite a lot of these problems, to unlearn a lot of these issues, and to help other people do them whilst you're still struggling with a lot of them yourself. Even now when I'm mentoring people, I'm still going through a lot of the things that I'm helping them get through. and that can be really painful - To go, actually nothing has been solved really." (UK-I)

Folks talked about being burnout by the experience of navigating unwelcoming workplace environments.

"I am concerned about burnout… work[ing] in an environment where I don't feel fully seen, and I don't feel free to be my complete self. It's like an extra layer of exhaustion, right?...to be personally struggling all the time and code switching all the time. I'm sure that doesn't help". (US-I)

Trans STEM professionals spoke about how being burdened with additional work to educate and advocate for workplace trans inclusion put at risk their own scientific research.

"Leaned on for a lot of diversity equity inclusion work that was unpaid… you end up on the committee and… you end up putting more time into that than your own research". (UK-I)".

"I left the job above for a large number of reasons, several of which were related to how I was treated as the only trans person that most of my coworkers and managers knew. I was expected to perform unpaid labour outside of my job scope, while receiving minimal support for my actual work, which made it feel impossible to accomplish what I wanted in my own career" (OS).

Trans professionals spoke of the exhaustion of continually being surrounded by low-key ignorance, feeling an outsider or misunderstood.

"There's a huge cognitive drain created by having to navigate inequality in the workplace, and the stress takes away from our ability to do our jobs effectively for no reason. There's a lot of talent about that is undervalued and overstressed because we're part of gender minorities". (OS)

Article 3: Trans professionals in STEM Careers: Barriers to equitable career progression

Abstract

LGBT employees are known to face a range of barriers to equity in employment, although there is limited literature specifically on trans people's experiences. This article addresses a recognised knowledge gap, exploring trans people's experiences in STEM (Science, Technology, Engineering, Mathematics) careers, examining the factors that impact on career entry, retention and progression. Mixed methods research provides rich insights into the experiences of trans STEM professionals from the UK and USA, with a focus on the experiences of trans people of colour. Referencing the sociology of ignorance, the article highlights the importance of HRM policy and practice being informed by an understanding of trans people's barriers to career equity. Trans professionals represent a significant and growing population, and an under-tapped source of STEM talent. Better understanding of the barriers to equitable career entry and progression is critical to understanding how to better support and benefit from the skills and expertise of trans professionals. The article provides Human Resource Management (HRM) policy and practice recommendations to enhance trans equity and inclusion. We call for greater structural and institutional supports for trans professionals across the career pathway, supporting trans professionals to succeed in STEM careers.

Research Aim

The work addresses the following research question:

- RQ1: What are trans people's experiences of structural barriers to equitable career progression in STEM careers, in career entry, retention and progression?

Abridged Research Findings

Within this report a sub-section of research findings, a small portion of research data and interviewee quotes from this article are shared. Please see the full research article (forthcoming) for richer data and analysis.

Research findings are presented in categories relating to a) barriers to entry b) barriers to retention during periods of strain c) a lack of mobility, and d) barriers to promotion. Illustrative quotations are presented from the online survey (OS), the UK interviewees (UK-I) and US interviewees (US-I).

Part 1 - Barriers to entry into STEM careers:

Interviewees highlighted the particular challenges faced by many trans individuals that constitute a barrier to entry into STEM careers. Several interviewees shared how educational barriers linked to a challenging adolescence or family situation resulted in them falling behind cis peers in educational attainment.

"My family life hasn't been very good and it had an impact on my ability to engage with education… I finished college [high school] when I was like 20… because I had moved around and then I didn't go to uni until I was about 22 because of that.... it definitely feels like it was really disruptive… Because I only have an undergrad it was really hard to compete against people with a Master's". (UK-I)

Academic barriers were highlighted as a significant obstacle to trans people getting into STEM careers.

"All these other things that may prevent someone from being able to go down a standard path of education as a young adult and as a child…. once you fall off of this path, it's near impossible to get back on…If those things could possibly be opened up…(if) I could have access to these opportunities and show that I am suitable for these types of jobs". (US-I)

Trans individuals with unsupportive or hostile families, experienced barriers to financial support entering into STEM further education. Several interviewees emphasised the links between systemic obstacles, including financial insecurity, and a lack of multiply marginalised scientists in STEM spaces.

"Why there are so few trans people within these spaces, why there are so few queer people, and especially as to… why there are so few black and brown trans women in STEM spaces… It's because our communities have been decimated by systemic obstacles which haven't allowed us to grow and progress… Only certain peoples and communities are allowed into these spaces." (UK-I)

Other interviewees highlighted higher incidences of youth homelessness in trans populations, especially those rejected by their families, with this impacting on career opportunities

"Trans people, and especially trans people of colour have some of the highest like poverty and homelessness rates… That is something that prevents so many of us…from reaching all the great things that we would be able to do… I definitely have firsthand experience with that…, after dropping out of high school…I spent a while like homeless and I spent a while just jumping around and scraping by for years until I managed to like kind of scrape together what I have right now of a career". (US-I)

Some individuals felt that transition related education and career delays were seen as unfavourable by STEM employers, creating a barrier to being given an opportunity in a STEM career. Candidates felt that career delays, or even the strengths and skills they had developed through transition, were harder to explain or sell as an asset on a STEM CV compared to other fields.

Some interviews described having been advised against certain career paths, and worried whether being trans was a barrier to some professions. Others described feeling uncertainty about working in science fields that have historically caused harm to trans communities.

"When I came to applying to do medicine…I felt really nervous about being part of the system that causes harm to people like me. I deferred it because I was like, I don't know if I want to be part of this system". (UK-I)

Some survey respondents expressed a hope that STEM employers would invest in supports to enable trans scientists to gain initial opportunities in STEM careers,

"I wish that STEM employers would consciously recruit and retain trans employees. Work with local trans organizations to hold job fairs. Offer on-the-job training so people who haven't had the opportunity to pursue higher education can get into STEM via job experience". (OS)

One individual spoke of the difference that was made by an employer being willing to recruit someone with a non-standard educational pathway

"[Company] as a company hires pretty much only from universities. And this year they kind of did a unique program where they tried to hire like from the community without sifting only for university graduates. So, I was the only person there who hadn't gone to school". (US-I)

Part 2 - Barriers to retention during periods of strain

A fifth of respondents had left a STEM job for reasons related to being trans [22% (42/190)]. One

third of respondents reported that they had considered leaving a career in STEM for reasons relating to being trans [34% (65/193) of respondents agreed or strongly agreed that they have considered leaving a career in STEM for reasons related to being trans, 13% (26/193) neither agreed nor disagreed, and 53% (102/193) disagreed or strongly disagreed]. Qualitative data provides greater insights into some of the experiences underpinning these statistics (notably, this article does not focus on drivers of drop out from STEM that relate to prejudice and discrimination, factors that are covered in companion articles).

[Trigger warning reference to suicide within this section]

Interviewees highlighted the strain on trans individuals at particular times, including at periods of social and medical transition. Several interviewees mentioned the labour of navigating a transition, finding it hard to manage transition alongside employment.

"I think that transitioning is a tremendous amount of work… It sort of sucked the oxygen out of the room for you as an individual for a long time. I essentially had to take a year off of doing research to get my ducks in a row". (US-I)

Others did not think it was possible to transition whilst remaining in STEM.

"I was convinced that I had to choose between myself and my career". (UK-I)

Several described feeling compelled to drop out of employment at the point of transition.

"Just starting transition. There's so much shame and insecurity and (it's) so emotionally traumatizing and isolating…there'd be people who felt like... I can't face my co-workers and clients in this job while transitioning… I had so much shame about transitioning and about my identity". (US-I)

Interviewees described feeling unable to stay in a STEM career, feeling that the barriers and challenges outweighed existing supports. A lack of examples of people successfully transitioning at work made people think that drop out and under-employment was an expected side-effect of transition.

"It didn't even occur to me to ask for an appointment with HR for example and be like, I'm thinking about leaving the company because this is so stressful for me. How can you help me have a happy - be able to stay here. That would have been so bold. I didn't have the courage, right? It didn't occur to me that was possible. But if I'd seen someone else do it. I knew very few trans people who were in careers, like high paying professions. I knew many more who were underemployed. And who maybe even had transient housing". (US-I)

Several interviewees felt they were left to support themselves through cumulative stresses, which became too much for individuals without wider social and financial safety nets to sustain them. An interviewee who had left STEM employment mentioned the inaccessibility and hostility of STEM for multiply marginalised people.

"STEM…is so behind… on disability justice and queer rights and, I'm just quite enjoying not being in STEM, like I do want to go back to it… but it feels quite inaccessible. A bit hostile to be honest for queer people of colour, for disabled people, yeah for working class people to be honest". (UK-I)

Several respondents had dropped out of STEM jobs when accessing surgical transition, not feeling able to take medical leave whilst maintaining their privacy. Others felt unable to pursue medical transition while in STEM employment, feeling that pursuing medical transition would have negative

consequences for their career. One interviewee emphasised the importance of employer policies that enable trans people to remain employed through periods of medical transition. Drop out during social or medical transition led to extended periods of under-employment for several interviewees, who found it hard to even get back into STEM employment, much less to actually catch up professionally.

"So that definitely affected my job at that time and started a period of maybe like seven years of being under employed. Transitioning took time and energy out of my life at a time that would have been really opportune to be establishing myself in a career". (US-I)

One interviewee attributed their ability to manage their career to their transition happening to occur during COVID, benefitting from the greater flexibility that was extended to research scientists during the pandemic. They wished such flexibility would be on offer to trans scientists outside of the pandemic, reducing the potential for drop out from STEM during periods of transition.

"I wish that there were more institutional or structural solutions … I started transitioning during the beginning of the pandemic and so partially I felt like I got a pass because everyone was being unproductive… [employer] was trying to ameliorate the issues of people falling behind or otherwise give people more time to complete stuff because they understood that many people had a long period of time where they couldn't do, especially lab work". (US-I)

Survey respondents wanted STEM employers to have greater "*understanding of career gaps" (OS),* being able to see beyond periods of un- or underemployment. Interviewees wished there was greater recognition of the challenges faced by trans candidates, and greater active support to help candidates compete on an even field with cis and white peers.

Mental health challenges were a commonly reported strain that disproportionately impacts trans professionals. Several folks referenced the levels of strain that trans communities are under, including the prevalence of disability, poor mental health and minority stress in trans communities.

A quarter of interviewees referenced the topic of suicide. One interviewee talked about the strain that is on trans communities, trying to support each other through challenging contexts, and the impact on the small number of trans people in STEM communities when one member dies by suicide. Several interviewees referenced the importance of having trans-positive support networks outside of STEM to help them through periods of strain.

Part 3 - Inflexible mobility

Respondents to the online survey were asked whether being trans is a key factor affecting what jobs they apply to. 78% (139/178) of respondents agreed or strongly agreed that being trans is a key factor affecting which jobs they (would) apply for, 14% (25/178) neither agreed nor disagreed, and 16% (28/178) disagreed or strongly disagreed. Qualitative responses provide insight into a variety of factors that impact on, or narrow, trans scientists' career opportunities.

Several respondents referenced healthcare inequalities as an important structural disadvantage impacting their career mobility. US respondents referenced employer inequities in health insurance coverage for trans healthcare, and UK respondents referenced the negative impacts of extremely long waiting lists for trans healthcare. Respondents from both countries referenced trans healthcare as a barrier to them being able to pursue international career opportunities.

Anti-trans hostility and discrimination was raised as a significant barrier to career progression and mobility. A range of online survey respondents who had found a position in which they were not discriminated against for being trans, felt afraid of leaving that position (even when they wanted to move role), as they may experience anti-trans discrimination in other STEM institutions.

"I'm so worried I'll never be hired for a different job because I'm trans. I've been in my current role got 6 years and want to leave (not for trans related reasons) but don't want to risk experiencing transphobia at a different company". (OS)

"With the current political environment in the UK I'd be worried about leaving in case new employer is less accepting". (OS)

The most cited barrier to career mobility relates to a growth in locations where trans people face overt persecution and discrimination. A majority of US interviewees described their career options being restricted to US states that are safer for trans individuals. Several interviewees had moved or were planning to move state to avoid locations that are unsafe for trans people.

"I knew that the sooner that I got to [STATE], where they have legal protections for…trans people… I knew that at some point if things kept going how they were going, I would be forced to leave (US-I).

Others felt unable to apply to jobs in states where they could not build a safe future.

"I would love to move back to [STATE] and work there… but just from a legal standpoint it feels sort of infeasible to consider putting down roots and becoming a permanent resident of the state just because…of legal challenges to parents of trans kids, various attempts to restrict the rights of trans people to change their legal markers, to access healthcare. It feels too dangerous of a legal situation to commit to living there". (US-I)

One interviewee wished they had the privilege to just focus on their career, but instead had to consider the severe risks of being trans in locations of growing persecution.

"I have to look for opportunities now because I have to find jobs soon… this is not a safe time for us to live freely... It sounds terrible. It's cheaper to live in [state] but… what are the laws…if they're gonna freaking put me in jail are we gonna do that? ... I would love to just be a scientist" (US-I).

Interviewees wished STEM employers would consider the consequences of investment in locations that are unsafe for trans employees, emphasising the power of industry to stand up for minoritized employees. Some interviewees who had moved state for their safety, felt the move had negatively impacted on their career. Online survey respondents wanted employers to offer assistance to trans STEM professionals fleeing unsafe locations. One interviewee referenced how geographical narrowing of career options made it extremely hard to navigate a successful STEM career path.

"I just outright said to some of my colleagues, I cannot work, I cannot find or apply for positions in the majority of states in the country that I live in…On top of the fact that advancing to the next career stage is incredibly competitive, it's an incredibly selective process – that even further narrows my prospects". (US-I)

One interviewee described finding their options so limited that they might end up leaving STEM entirely.

"I need to find a new job and it's hard because there's so many states in the USA drafting and passing anti-trans laws, which in turn limits the places I can apply to work, unless I want to live somewhere

where people can give me a felony for renewing my driver's license in my legal name or sue me for peeing in a bathroom a stranger feels isn't the right one for me. As a result, I am only applying for jobs in select states where trans protections are robust, and due to the terrible job market, this means I may have to leave my STEM field just based on what jobs are available". (US-I)

UK interviewees talked about concerns relating to anti-trans persecution and hostility to the same degree or potentially even more than US interviewees, but lacked safe options to move to. While US respondents primarily talked about the need to work in states with robust trans protections, and the impact of geographic immobility (or forced migration) on their careers, UK respondents did not have options to live in safer locations. Instead, UK interviewees and respondents referenced high levels of fear and stress across their lives and careers.

Part 4 - Barriers to promotion

Interviewees referenced trans-specific barriers to securing promotion within STEM fields. One described the challenge of being outed or misgendered by referees, worrying about the impact of this on their potential for securing new STEM roles. Another interviewee described being told by recruiters not to include their pronouns on a STEM CV.

Barriers to promotion included a lack of recognition of the impact of advocacy responsibilities. A wide range of interviewees spoke of the emotional and time burden of needing to advocate for one's basic human rights. Interviewees reference holding relative privilege, including holding as STEM job, and felt such privilege carried with it an obligation to advocate for themselves and their wider communities. Several felt a particular duty as scientists, understanding how 'science' has been and continues to be used to harm trans communities.

"I've become more aware of the historical misapplication of scientific authority, particularly from fields, like biology... It was kind of this motivation of any inkling of "scientific authority" that I have, I feel motivated to use it… It's gotten to the point now where I'm involved in a civil rights case… because of this overlap between the biological scientific aspects of this larger conversation about trans people and their place in society. This is a part of what I have to do as a trans scientist". (US-I)

Many interviewees described the burden of advocacy, work that they saw as essential to their basic rights and ability to exist and work as trans people. Several emphasised that advocacy efforts were taxing and traumatising, not rejuvenating like the hobbies their peers engaged with outside of work.

"I am very conscious of the fact that this work takes a lot of time and effort both timewise and emotional energy – just because of how close it is to who I am and what it would mean for me…It does take up a substantial amount of time… This is a part of my job, I'm doing work, expending work on this. This isn't like – I'm not playing a video game here". (US-I)

For some, the burden of advocacy work left them behind their peers on metrics like publications or research income, with negative consequences for employment or career progression.

"Especially in the [STEM field] and research. There's a very dominant sense of, how productive you're being. How much data are you getting? How many experiments are you doing? How many papers are you publishing of primary research…because I'm engaged in this work, I very obviously am not by those metrics producing as much. If our systems aren't set up in a way, especially within primary research, to acknowledge that this work is important… It's an extra crutch that is like, holding me back, in the view of what it's considered to be [a] stereotypically successful scientist". (US-I)

Trans STEM professionals wanted STEM employers to recognise the structural impediments to trans

professionals competing on an even playing field to cis colleagues.

Article 4: "They see the potential and they want us in the field": Trans Inclusion in STEM

Abstract

Inclusion and support are recognised as important to LGBT career retention and professional well-being, including in STEM careers. There is limited research on trans professionals' experiences in STEM fields and little insight into the factors that are shape professional impact trans professionals' perceptions of being included and supported. This research provides mixed-method insights into the experiences of trans STEM professionals from the UK and USA, examining the factors enable trans professionals to feel included and supported in STEM workplaces. It is shaped by and feeds into broader HR theory and scholarship including on diversity climates. This research highlights factors that make trans people feel unsupported in STEM, including isolation and systems that exclude. It identifies factors that support trans professionals, such as inclusive workplace practices, community building, and mentorship. These factors run parallel with a need for workplace reforms linked to intersectional diversity and strong allyship. This research concludes with recommendations for HRM theory, policy, and practice to better include and support trans professionals, with relevance within and beyond STEM.

Research Aim

The work addresses the following research question:

- RQ1: What factors enable trans professionals to feel included and supported in STEM workplaces?

Abridged Research Findings

Within this report a sub-section of research findings, a small portion of research data and interviewee quotes from this article are shared. Please see the full research article (forthcoming) for richer data and analysis.

Three major themes are presented, linked to not being included, finding support, and reforming workplaces. Illustrative quotations are presented from the online survey (OS), the UK interviewees (UK-I) and US interviewees (US-I).

Theme 1 - Not being included

The first major theme highlights barriers to trans people feeling included in STEM careers, with sub-themes on i) isolation and ii) systems that exclude.

Isolation

Isolation was a major theme in the qualitative research, with a majority of interviewees describing their STEM experiences as *"very lonely". (US-I)*. Many interviewees referenced the isolation of being a trans person, and a trans person of colour, in STEM.

"It's been a lonely experience really, especially in the UK... I think it's very rare for someone from a Black or Asian background, who has had a childhood as a trans person and has grown up and

overcome all these barriers, to achieve that level of attainment in STEM... I am surprised that I've survived this". (UK-I)

Many spoke of the challenges of being one of the first openly trans people in their discipline, institution or department. A large number of interviewees had never met someone like themselves in STEM.

"I don't think I've met one other global majority trans woman in STEM". (UK-I)

"I'd not even met anyone who was LGBTQIA at all let alone a trans person that was open about it. So, it was pretty isolating… I'm a person of colour as well, which is very rare in my field… So those intersectionalities were challenging because I didn't see representation on a lot of different fronts. I felt like the only person in the world going through it in my field, which I know isn't true, but it took me until two years ago to finally meet a trans person in [STEM field] who wasn't me". (US-I)

Several described feeling isolated and disconnected even at STEM professional events targeted at building connection and community.

"It feels like there's so few of us. I remember feeling very, very isolated at that first conference". (US-I)

Several trans STEM professionals spoke of being in demanding or high workload careers and spending all their time in STEM spaces that are predominantly or fully cis, with minimal time available for connection to trans-positive spaces outside of STEM.

"The nature of how time demanding [STEM] graduate school tends to be, it was just - this was where I spent most of my time. And in a lot of ways that actually made it feel much lonelier, because I didn't really have trans community outside of [STEM]... It can feel kind of pretty isolating... It's hard to find time to go out and find trans community that isn't related to science". (US-I)

Experiences of isolation significantly impacted trans professionals' perception of workplace belonging, which in turn affected their ability to thrive in STEM careers. Individuals without support structures in place referenced burnout, continually needing to steel themselves to endure unsupportive workplaces.

Systems that exclude

Interviewees emphasised areas where trans employees were disadvantaged by institutional policies and practices, drawing a direct connection between these disadvantages and their perception of workplace fairness and inclusion. Administrative systems, bathrooms, healthcare, and travel were frequently highlighted as stressors and concerns.

The research highlighted numerous examples of administrative systems not working for trans people. Several interviewees described problems linked to administrative systems not set up to enable simplified record change.

Interviewees who were immigrants described the additional challenges of updating their administrative record, especially difficult for those from countries without a legal route to trans identity recognition.

Many online survey respondents emphasised that a lack of safe and accessible bathrooms was a significant example of workplaces being unfair and unsupportive for trans professionals. Non-binary professionals described walking long distances to the only available gender-neutral facility.

“Bathroom situations at work, that's terrifying as well, especially in Texas. There is one, that is actually an accessible bathroom [far away]. So, it's not anywhere close to where the normal bathrooms are. It doesn't feel particularly safe to go to”. (US-I)

Another interviewee described how bathroom harassment at a conference made them feel that professional events were inaccessible to them.

“Attending conferences. I had to be very selective. I pulled out of one conference… just after I had a painful experience… being pulled up and questioned. And I felt at that point… I'm not gonna travel anymore… for conferences”. (UK-I)

Online survey respondents highlighted healthcare as a key factor in making a workplace fair and inclusive for trans employees. Many respondents emphasised the importance of workplaces having and advertising that they have trans inclusive health insurance. Several respondents found their workplace insurance policy excluded trans healthcare coverage and had to fight for healthcare policy change on their own.

“Our medical insurance had a blanket ban on covering trans healthcare. My colleagues did not help me get it overturned. I had to fight that alone” (OS).

The degree to which organisations support trans professionals at risk of health inequalities was seen as integral to a fair and inclusive diversity climate.

STEM institutions were also seen as uninformed and ineffective in supporting trans professionals with professional travel. Interviewees felt that managers and employers did not consider the challenges faced by trans employees when expected to travel to locations unsafe for trans people. Others feared having international travel routed through locations where being trans is criminalised, and felt that their managers and institutions had not considered the risk to trans employees.

“The problem is a lot of senior academics are not my demographic. So they aren't necessarily going to intuitively immediately think.... I told him that… being put through [location where being trans is criminalised] gave me an anxiety attack”. (US-I)

Several interviewees felt organisations leant on existing trans employees for advice, responding in ad-hoc ways that further burdened trans employees. They emphasised that institutions need to value trans expertise and pay trans people for advice on ensuring systems work for and support trans employees. Survey respondents wanted institutions to respond quickly and proactively when trans people highlight policies and practices that disadvantage trans employees. Other respondents highlighted the need for systemic and sustainable change, taking steps to include and support trans people intentionally.

“Plan for us from the start: so many issues (e.g., toilets and assumptions about pronouns in documents) are due to not thinking about us at the preparatory stage of doing something” (OS).

“Initiate changes as opposed to relying on [trans] people to identify problems; don’t be a barrier to needed changes” (OS).

Theme 2 - Finding Support

The second theme of ‘finding support’ emphasizes the institutional support desired by trans STEM professionals, focusing on i) inclusive workplace practices, ii) community building, and iii) mentorship.

Inclusive workplace practices

Amongst the interviewees, there were several examples of trans professionals finding the right institutional support to thrive in STEM.

"In that [workplace], I feel very supported. I'm able to thrive. I received enormous support. I feel valued". (UK-I)

Individuals provided examples of factors that made them feel included in STEM careers. One respondent mentioned that colleagues stating their pronouns at interview made them feel supported. Another respondent emphasised that small efforts, like cis peers and managers using pronouns in email signatures, would make them feel included. Interviewees highlighted the significance of institutional commitments to prioritise the inclusion of trans employees at all career stages. Many noted that proactive support and active efforts to build a genuinely trans-friendly workplace were essential.

"I'm happy I came out. I wouldn't want it any other way. I'm proud I did it. So I would say it's been a net positive. I just think the way to make it even more positive is to create structures within institutions that are more welcoming. And not just kind of from a not actively harmful way, but actually a supportive way and a forward thinking way, rather than reactive ending of problems, thinking about what the barriers might be". (US-I)

Many wanted to see institutions put more explicit effort into supporting trans employees.

"I would like to see more people in positions of power who have privilege who have experience and influence, invest in that extra effort to include people of colour, non-binary folks, trans people, like actively reaching out to the point of being intrusive that they want to support us. They see the potential and they want us in the field". (US-I)

Education focused at the leadership levels of organisations was considered especially important. Respondents emphasized the need for active promotion and communication of institutional efforts to include trans people, as well as proactive institutional commitment to identifying and addressing barriers to creating a positive for trans individuals. One interviewee shared an experience from serving on an LGBT advisory board that was actively listened to, and whose recommendations were implemented by senior management.

"They are eager to make changes in support of us. It's been a positive experience because I can be part of that shift and really have my voice heard". (US-I)

Survey respondents assessed their workplaces' support for trans employees. A large portion of respondents noted the following signs of inclusion: cis colleagues using pronouns in bios and introductions (79% [151/192]), LGBT or trans flags at work (72% [138/191]), trans inclusive policies (69% [132/190]), and visible allies (68% [131/192]). Fewer respondents observed trans-friendly support networks (51% [96/187]), trans positive statements (42% [77/185]), or celebrations of visible trans role models (25% [47/188]). The least noted were visible trans role models in STEM. Respondents emphasized the need for "*more visible trans role models in senior positions*" (OS) with representation at higher levels indicating an inclusive and supportive environment for trans employees.

Building community

Survey respondents were asked whether they felt accepted by their peers at work. 75% (146/195) of respondents felt accepted or very accepted by their peers and colleagues at work, 18% (35/195) percent felt neither accepted or unaccepted, 6% (12/195) felt not accepted and 1% (2/195) felt not at all accepted. UK respondents were less likely to feel accepted or very accepted than US respondents [67% (62/93) for UK respondents compared to 81% (83/102) for US respondents].

In terms of managers 66% (128/195) of respondents felt accepted or very accepted by their managers and senior leaders at work, 6% (12/195) percent felt neither accepted or unaccepted, 7% (14/195) felt not accepted and 4% (8/195) felt not at all accepted. UK respondents were more likely to feel unaccepted by senior leaders than US respondents with 17% (16/93) of UK respondents feeling not accepted or not at all accepted by their managers and senior leaders compared to 6% (6/102) of US respondents.

The importance of finding community connections was raised across the research. Several interviewees emphasised the positive impact of having other minoritised colleagues, fostering connection and solidarity when navigating spaces as a minority.

"(my workplace) is almost all older straight white men… I'm exhausting my capacity to be around those people also. That's why I feel like having protected spaces. To build our capacity and also to embolden us when we're in those spaces to be like that's not all right, I'm not okay with that, that's not a funny joke. " (US-I)

Others expressed feelings of not being fully recognized or included in STEM spaces needed to spend time outside of STEM to feel accepted.

"So, in terms of code switching I had a physical space where I could leave my department and go ta completely different set of people, and have a different language and presence… It just felt like I had to leave the department to be a human, to be a whole person, to like be celebrated". (US-I)

Several interviewees stressed the value of shared-experience communities in STEM, providing an emotionally safe space for minoritised professionals to recharge before returning to less inclusive environments.

"I think more community - if I knew other trans people in stem, trans people of colour in stem. Other people I could form a community around and have solidarity with that would be really good because it does feel very alienating to walk into a room of white cis people". (UK-I)

Many participants felt that resources for trans professional networking and support were insufficient.

"I think the sort of formal kind of infrastructure for networking, feels quite flimsy. It doesn't feel like there's anything particularly solid there and, I think sadly, especially for trans people". (UK-I)

Some expressed the joy found in connecting with queer communities in STEM, noting how those connections enriched their overall STEM experience. Survey respondents expressed a desire for institutions to invest in more structures and resources to support isolated trans employees.

"Having trans-specific resources would be an amazing place to start. If you have a "Women in Chemistry" committee, you should also have a "Trans in Chemistry" committee. If you have a scholarship for queer students, start one for trans students. And so on. Often, transness is either

lumped into the larger LGBTQ+ bucket (which makes sense, but trans folks experience unique forms of discrimination that LGBQ folks don't) or trans folks are put into a "gender minority" group and associated with women". (OS)

Several noted that financial barriers faced by trans people, especially trans people of colour, hinder networking and connection building. They want institutions to invest in targeted support.

"Supporting trans people to network with each other, particularly through financial support". (OS)

"I want there to be spaces that are for queer people, trans people, people of colour to gather and it's like organizers have to invest in those groups to be possible. Places where we are already where I often feel like I'm the only whatever whatever, would be an opportunity to designate a place and invest in a space and a time for me not to be alone". (US-I)

Survey respondents and interviewees urged employers to invest in support groups for trans employees to help them feel less isolated.

"Having a trans and nonbinary network… has been really helpful in providing some of that support, particularly, people who are struggling with difficulties in the workplace, how do you manage if your manager's not really backing you up and supporting you." (UK-I)

One individual highlighted the need for trans employee networks to have a clear route to influence organisational practices and improve conditions for trans employees.

"I'm very fortunate to have a position in senior leadership and I think that for me being, out and visible as a trans person and someone who is willing to engage with the staff network has been really helpful. The fact that they're not sort of screaming into the void. There's someone who can listen and can take the concerns up to our board meetings and I carry on and they'll hold my feet to the fire. If say, I'll do this, I do it. Then, I have my work colleagues to answer for, and I think that's really important, a sense of accountability, but also a sense that you've been being listened to… I think that that's why that whole thing about having In trans people in positions of senior leadership is so important". (UK-I)

Mentorship

The vast majority of interviewees reported that they had no advisors or mentors in STEM. Interviewees expressed a desire for mentorship opportunities in their careers. Respondents wanted targeted support and advice from mentors who understood the challenges faced by trans people and people of colour. Individuals recognised that informal mentorship involved minoritised communities taking turns to support each other, which can quickly lead to collective burnout.

"This burnout and this exhaustion… because people tend to lean on each other…most people who are kind of global majority or local minorities… doing mentoring it doesn't tend to benefit them...in a monetary sense… it gives you nourishment but it also does take away a lot from you, so I think a model whereupon there is more funding available for mentorship and mentors in order to give whatever they have, their experiences, in a restful way, in a way that they are already nourished and so they can give accessibly would even the playing field a lot more." (UK-I)

A dedicated support person in STEM made a significant difference for some, especially for one individual who had faced abuse and hostility.

"They decided to assign me a [Support person]… honestly, to have someone that I could actually go and talk to. And when I was having a bad day, I would just phone up and she said, yeah, come over, have a cup of tea and have a chat and just would provide that level of support… It was emotional support. It was the fact that there was someone who I knew within the [STEM field] who actually cared about me, and cared about what happened to me… I was, very grateful for her just being kind and understanding and see willing to stick her neck out on the line for me". (UK-I)

The interviewee described this support as critical to remaining in their STEM field.

"I remember seeing her at a time when I was really, incredibly low… That really did help me basically get through it… there were so many times when I thought I'm just gonna throw in the towel. I can't do this". (UK-I)

One interviewee highlighted the need for trans-positive mentors who are connected to and knowledgeable about trans people and can provide valuable support. Several participants wanted a program that connects early career researchers with established trans professionals.

"(Re trans scientists) I'd love to hear them just talk about their career paths or get to chat with them… or like be mentored by them a couple times like and learn how they got into what they're doing and get supported doing that myself. That would be really cool because it feels like climbing a mountain a little bit. It would be really nice to hear how other trans people have done that". (UK2)

Theme 3 - Reforming workplaces

The third theme, 'reforming workplaces, ' focuses on perspectives of i) intersectional diversity and ii) meaningful allyship.

Intersectional diversity

Limited diversity efforts in STEM have not effectively reached trans people of colour and are often viewed as inaccessible, particularly investments aimed at women.

"When they say that, they mean cis women, and very often, it ends up being cis white women". (US-I)

"Most of what I see is definitely the white women thing and then they're 'and trans people'. It's like, no, that's not how this works at all. Please stop doing that - actually, we're not the same thing". (US-I)

Several interviewees, including trans women, found STEM resources for women unsuited for trans people's needs. Several individuals referenced the intersections between supporting trans people in STEM and the inclusion of other minority groups in the field.

"I think making STEM welcoming across the board irrespective of your gender to people of colour. I think it's actually really important. I think, it's got to start there. Because once you start to introduce other intersecting identities then that sort of level of discrimination is multiplicatively worse. It was really interesting when you were asking me, do I know other trans people of colour in STEM and sort of scratching my head, I'm not sure that I do - And that was kind of alarming to me". (UK-I)

Interviewees emphasized the need to address institutionalised racism in STEM while also promoting inclusivity for trans individuals. Interviewees wanted to see greater commitments to diversifying STEM leadership.

Strong allyship

Many spoke of the importance of finding collaborators, managers and peers who are strong allies. Having a manager who is a strong and active ally helped several interviewees feel supported and safe in their workplace, especially when they needed to challenge poor treatment or discrimination. Having active allies amongst colleagues was seen as crucial in creating a safe and supportive workplace.

"Colleagues who I can count on to have my back are the single most important thing. Policy is less important than individual people. I have been really lucky with most of the people in my professional circles". (OS)

Several survey respondents felt potential allies were insufficiently active in creating inclusive workplaces for trans professionals.

"I feel like they'd stay quiet in order to not make a fuss of it, but whenever I've brought something up in the moment or after the fact people have had my back. I do wish they'd be more proactive in their ally-ship though". (OS)

Several emphasised that good allies should do more than offer sympathy; they must take action to support trans professionals advocating for a fair workplace and actively challenge transphobia. One survey respondent described the importance of active allies in creating a genuinely safe and inclusive workplace for trans professionals.

"Having co-workers who respect and affirm one's gender identity, use correct pronouns and names, and stand up against discrimination or microaggressions can make a significant difference in fostering a sense of belonging and acceptance. When colleagues actively demonstrate ally-ship by educating themselves on transgender issues, advocating for inclusive policies and practices, and creating an environment where everyone feels valued and respected, it can help transgender individuals feel more comfortable and secure in their workplace". (OS)

Recommendations

Article 1: Hostile climates and transphobic hate: Trans people's experiences navigating STEM careers in a time of precarity

Trans STEM professionals in the UK and USA report feeling unsafe:

→Institutions need to place a greater emphasis on the physical and emotional safety of trans professionals

Trans professionals are targeted in climates that are growing in hostility:

→Employers and managers need to understand the ways in which trans professionals are actively targeted with transphobia and harassment

Transphobia is poorly recognised or understood

→Individuals and organisations need to get better at recognising transphobia, listening to trans perspectives on transphobia

Trans professional report chronic stress and burnout from transphobia and fear:

→Employers need to prioritise action to reduce chronic stress, more actively supporting trans employees

Transphobia is not taken seriously by institutions and employers:

→Institutions need to more proactively commit to zero tolerance for transphobia, with clearer sanctions and pathways to protect trans employees

Trans professionals feel under-supported in tackling transphobia:

→Trans individuals need more active organisational effort to tackling transphobia without burdening and further marginalising trans employees

Trans professionals cannot be expected to thrive in contexts where they face state persecution

→Institutions and sectors can do more to actively stand up for trans staff members facing state persecution

Article 2: Gender Minority Stress, Exhaustion & Being a Problem: Transgender professionals' experiences in STEM careers in the UK and USA

Trans professionals are exposed to Gender Minority stress in STEM workplaces.

→Employers and institutions need to recognise, monitor and minimise GMS stressors including negativity, rejection, victimisation, non-affirmation.

Trans employees can be treated as though they are a problem

→Institutions need to take action to ensure that trans people are not treated as a problem for the revealing structural inequalities in organisations.

Many trans STEM professionals are forced to develop and advocate for institutional policies to support themselves.

→Organisations need to be proactive in ensuring workplaces respect & welcome trans professionals without burdening individual employees

Many trans people are exhausted by navigating ignorance and unwelcoming organisations

→Trans people should not be burdened with educating their work colleagues and managers

Gender minority stress, being treated as a problem and chronic exhaustion negatively impact on trans professionals, with negative consequences for their success in STEM

→ Employers and institutions need to proactively reduce these stresses, enabling trans professionals to focus on scientific excellence

Article 3: Trans professionals in STEM Careers: Barriers to equitable career progression

Trans people face systemic obstacles to entry into STEM careers, with challenges related to educational achievement, including gaps or delays in formal education.

→ Inclusion focused sectors and organisations should consider routes to enabling trans employees with disrupted education entry into STEM fields.

Trans people are at risk of dropping out of STEM employment during periods of strain, particularly relating to social and medical transition, and to minority stress related mental health.

→ Targeted support is needed to enable trans professionals to remain in employment through periods of strain, alongside support to enable trans professionals to return to STEM following breaks in employment.

Trans professionals are disproportionately impacted by barriers to mobility related to discrimination, that put them at a systemic disadvantage in progressing in STEM careers.

→Employers and institutions interested in trans inclusion and equity need to consider targeted support for trans professionals with limited mobility options.

Trans professionals reported systemic barriers to promotion, particularly linked to the advocacy burden carried by trans individual in contexts of growing trans oppression.

→ Equity oriented institutions and managers need to understand that trans advocacy responsibilities are undertaken as an obligation rather than as a hobby, recognising that such responsibilities leave trans professionals at a systemic disadvantage when competing with peers who do need to advocate for their basic rights and safety.

Trans interviewees wished employers would do a better job of recognising the structural impediments the prevent trans professionals from competing on an even playing field to cis colleagues.

Article 4: "*They see the potential and they want us in the field*": Trans Inclusion in STEM careers

Many trans STEM professionals feel extremely isolated in their workplaces and fields. Individuals without support structures in place referenced burnout, continually needing to steel themselves to endure unsupportive workplaces.

Trans employees are disadvantaged by institutional policies and practices related to administrative systems, bathrooms, healthcare and travel.

→ Institutions need to include trans people by design, especially when considering administrative systems, bathrooms, healthcare and travel, without inconveniencing or disadvantaging trans employees.

→ Workplaces need to adopt trans inclusive workplace practices, putting effort into ensuring trans employees are actively supported.

Trans employees can feel stressed and excluded in STEM spaces, needing trans positive spaces to rest and recover. Current resources and structures for trans professional connection, networking and support are insufficient to current need.

→ Institutions and sectors need to put more investment into trans positive spaces for trans professionals to connect and gain the support to withstand ongoing stresses.

Trans employee networks can reduce isolation and build support, helping individuals who face workplace challenges.

→ Trans employee networks need to have a clear route to influence organisational practice, with senior level championing and commitment to improving conditions for trans employees

There is an appetite for enhancing mentorship opportunities from trans mentors, or mentors who understand the challenges and experiences trans people face in STEM careers. The demand for mentorship does not currently match either the supply or available mentors, the resources to sustain mentors or the infrastructure to organise such connections.

→ Sector and institutional investment in trans professional mentorship schemes is needed, alongside resourcing to ensure already stretched trans professionals are not over-burdened.

Institutional diversity efforts are not widely reaching trans individuals, or those multiply marginalised including trans people of colour.

→ Targeted investment is needed to support and promote into senior leadership trans professionals, alongside investment supporting and promoting into senior leadership people of colour and others who are multiply marginalised.

Having managers, colleagues and senior leaders who are active trans allies makes a significant difference.

→ Those committed to workplace equity need to understand and often raise ambition of what it means to be an active ally to trans people, stepping up and taking action to ensure trans people are supported and included.

Final Quotes

Several interviews reflected on whether they felt trans people should enter into STEM careers. Several wanted to share words of encouragement:

"I'd say go for it; you're never going to be the only one. There's trans people everywhere, you can't get rid of us. We're in every space imaginable. go for it. You're not going to be by yourself". (UK-I)

Another interviewee highlighted their hope for the future:

"I really hope for just more trans excellence. I suppose in the field, I mean trans people have always kind of been at the forefront of, you know, fields like this. Trans people have always been very important in making a lot of like big leaps forward in [STEM fields]…And I really just would like to see trans people receive more recognition for the things that, you know, we have been doing. And, you know, I have a lot of friends who are trans people in [STEM] who have done incredible things… when it comes to the corporate environment trans people are just not taken nearly as seriously as we should. I really do hope for trans people to keep being excellent and keep creating amazing things and for us to be recognized for that". (US-I)

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