

# LGBTQual+: Creating change by telling the whole story: Making the case for qualitative research methods to strengthen LGBTQ+ retention in STEM in the US and the UK

Dr Marco Reggiani  
University of Strathclyde  
Dr Jessica Gagnon  
University of Manchester  
Dr Timothy Atherton  
Tufts University

December 2024



Department for  
Science, Innovation  
& Technology



UK Science  
& Innovation  
Network



ROYAL SOCIETY  
OF **CHEMISTRY**

# LGBTQual+

**Creating change by telling the whole story: Making the case for qualitative research methods to strengthen LGBTQ+ retention in STEM in the US and the UK**

## Executive summary

This report explores the preliminary results of the LGBTQual+ study, particularly the emerging themes identified from the analysis of focus groups conducted with 34 participants across the UK and the US.

LGBTQual+ is one of five projects funded by the Royal Society of Chemistry and the Science and Innovation Network under the LGBTQ+ Inclusion in STEM initiative. The project is focused on developing sector-wide, cross-disciplinary, international understandings of, and best practices for, engaging with qualitative and mixed methods approaches in exploring and improving the experiences and retention of LGBTQ+ people in STEM.

Between February 2024 and December 2024, the research team conducted semi-structured focus groups in the UK (22 participants) and the US (12 participants). The focus group protocol was flexible, emphasising both systemic challenges and examples of support encountered during participants' STEM careers, as well as their experiences navigating sexuality, gender, and other social identities. The research team also conducted two workshops to explore Queer experiences in STEM through creative methods. We organised and joined events to build networks and engage with LGBTQ+ people in STEM, policymakers, and other interested stakeholders.

After transcribing, checking for accuracy, and fully anonymising transcripts, we are now thematically analysing data. Key emergent findings from focus groups are:

- (In)visibility remains a key issue for queer people in STEM environments.
- Participants' accounts highlight that visibility and representation can be empowering, but also comes with risks in environments and organisations where homophobia, transphobia, racism, bias, and discrimination are still present.
- Participants described that the presence of positive and affirming factors (e.g., having supportive mentors, having role models, or having access to supportive networks) was key to their retention in STEM.
- Participants argued that, when addressing EDI issues, institutions often take “passive” and performative approaches rather than focusing on accountability, addressing structural barriers, and providing tangible support.
- The lack of intersectional approaches to inclusion in organisations had significant consequences for participants—particularly for those who experienced multiple

marginalisation and when institutions had no policies and mechanisms in place to support them.

- There are notable differences across regions, nations, and states within the UK and the US when it comes to the inclusion and well-being of LGBTQ+ people in STEM.
- The data underscore that promoting equity, diversity, and inclusion for LGBTQ+ people requires addressing long-standing issues within STEM environments, which are still influenced by exclusionary norms around what science and an “ideal” scientist look like.

Reflecting on the way we designed the study and our methodology; another key finding is that:

- Qualitative data, as demonstrated by our study is essential to capture nuanced, holistic, mechanistic and intersectional insight into issues of attrition and retention. Both focus groups and creative workshops allowed participants to explain the decisions that they had made in navigating their careers in the context of their experiences, the professional climate and policy landscape.

Based on our findings, the following recommendations are focused on the actions and changes that can contribute to address the challenged and the inequities that have emerged.

**Recommendation 1:** STEM organisations must act in concert and synergistically to address inequities and improve retention of LGBTQ+ people in STEM.

**Recommendation 2:** STEM organisations should continue to develop new policy to address gaps and regularly assess the effectiveness of policy interventions from the perspective of people they aim to support.

**Recommendation 3:** STEM organisations should prioritize investment in LGBTQ+ climatic research and fund the development of interventions to address inequities.

**Recommendation 4:** STEM organisations should promote the visibility of LGBTQ+ STEM voices and highlight good practices where they already exist. Visibility should be accompanied by robust safeguarding measures.

**Recommendation 5:** Future LGBTQ+ in STEM qualitative research, especially international studies, should allocate adequate time to understanding ethical and regulatory procedures; employ intersectional, queer and critical approaches; collect data carefully in ways that prioritise participants’ anonymity; offer multiple options to engage with data collection; engage with LGBTQ+ communities in STEM and other stakeholders; and share results that tell a whole story.

## Introduction and project background

LGBTQual+ is one of five projects funded by the Royal Society of Chemistry and the Science and Innovation Network under the LGBT+ Inclusion in STEM initiative. The project is focused on developing sector-wide, cross-disciplinary, international understandings of, and best practices for, engaging with qualitative and mixed methods approaches in exploring and improving the experiences and retention of LGBTQ+ people in STEM.

Existing studies show that LGBTQ+ experiences of climate in STEM (working and research cultures) are constructed from perceptions and experiences with inconsistent policies and practices, experiences and observations of exclusionary behaviour, multiple and compounded discriminations (intersectional marginalisation and oppression), and shaped by the availability and quality of support structures and professional networks (Atherton et al., 2016; Barthelemy, Hughes, et al. 2022, 2022; Cech and Waidzunus 2011, 2021; Hughes 2018; Institute of Physics, Royal Astronomical Society, and Royal Society of Chemistry 2019; Patridge, Barthelemy, and Rankin 2014; Reggiani, Gagnon, and Lunn 2024a, 2024b)

Qualitative and mixed methods are essential tools to discover and untangle particular climatic factors impacting the retention of diverse talent in STEM, including LGBTQ+ people, and to deliver robust understandings about which policies, practices, and interventions work for better-informed policymaking for transformational change (Ford and Goger, 2021; Natow, 2020). This is because qualitative data enables a more thorough and nuanced understanding of the experiences of and barriers faced by historically underrepresented groups, including LGBTQ+ people in STEM, especially those who are multiply-marginalised who face complex and compounded discrimination (for example, disabled, LGBTQ+ people of colour in STEM) (Reggiani, Gagnon, & Lunn, 2024a). Yet, policymakers often misunderstand and devalue qualitative data, thus missing out “on the benefits that qualitative research uniquely offers” (Natow, 2020).

Through multi-disciplinary, intersectional, queer, and cross-national lenses, this project aimed to:

- **Share best practices** for using qualitative methods to create impact and deliver change on LGBTQ+ inclusion and retention in STEM.
- **Enhance** understanding of the purpose and potential impact of qualitative and mixed methods approaches for developing transformative policies and interventions to reduce attrition and enhance inclusion and retention of LGBTQ+ people in STEM.
- **Examine** career pathways for LGBTQ+ people in STEM, including mapping the “*field*” of institutions, social actors, and power relations that shape attrition and retention for LGBTQ+ scientists in the UK and the US.
- **Explore**, using qualitative methods and framed by intersectionality and queer theories, the multiple and embodied strategies of (in)visibility employed by LGBTQ+ scientists to navigate their career pathways and how these experiences might contribute to reducing attrition and improving inclusion and retention.

Tied to our purpose and aims, our research addressed multiple objectives—which included, for example, critically exploring the existing literature, modelling good methodological practice through our exploratory study, conducting workshops to explore issues of attrition and retention creatively, and organising a symposium to build networks and share best practice.

Achieving our aims and objectives—extending beyond the project’s formal conclusion—will benefit LGBTQ+ scientists in the UK, the US, and globally. This includes identifying and addressing factors affecting attrition and retention while building capacity to drive impact and foster lasting change in LGBTQ+ inclusion within STEM by using qualitative and mixed methods.

## **Addressing the experiences of LGBTQ+ people in STEM: Gaps in knowledge and methodological shortcomings**

Prior studies on LGBTQ+ people in STEM used a variety of methodologies and methods to collect and analyse data including qualitative exploratory studies, quantitative methods, and mixed methods approaches. These studies often fall short of problematising their methodological approaches and methods, and there are a number of grand challenges for researchers working on these issues including: What needs to be known to improve climate? What can be known, in other words, what is knowable about the experiences and identities of LGBTQ+ in STEM? What are the best methods to address and deliver change? How can we study those who are experiencing compounded, intersecting systems of oppression and centre their voices?

Some researchers, including members of the LGBTQual+ team, have critically explored these big questions and the challenges that arise in answering them. Our project intends to join these ongoing critical conversations to address some of these, and we aim to share anti-oppressive and counterhegemonic knowledge with other projects funded through this call as well as within our existing networks of Diversity, Equity, Inclusion, & Justice researchers more broadly.

As noted by Browne (2010) when accounting for the process of incorporating a sexual identity question in the census for England and Wales, the push towards numbers “comes with the promise of recognition and ‘resources’”. Implicit to this argument is the idea that to deliver social change and address inequities robust evidence is needed. However, if robust evidence is rather narrowly equated to results coming from the analysis of large-scale quantitative datasets, the powerful call to action towards evidence rests on problematic and dangerous grounds. On the one hand, as Browne’s account highlights (2010), quantitative approaches occupy an ambiguous place both in relation to queer theory and the organisations that simultaneously push towards the categorisation of queer identities and resist it on the grounds of accuracy and reliability. On the other hand, quantitative analysis incurs the risk of homogenising queer experiences and erasing the voices of minority groups within the LGBT + umbrella—which is contrary to a more inclusive, socially just, and meaningful usage of “queer data” (Guyan, 2022; Ruberg & Ruelos, 2020).

Despite having made key contributions to the understanding of the experience of LGBTQ+ in STEM, extant research is often characterised by a deficit framing that identifies shortcomings and gaps to be solved, rather than structural changes and redistribution of power and resources that might be needed. The lack of intersectional approaches (particularly when applied to large datasets) has limited how challenges and experiences of oppression and privilege are understood.

Significantly missing is also a more contextual and nuanced understanding of what we mean by STEM “fields” in the UK, US, and beyond. Far from being limited to abstract disciplinary conceptions, STEM fields are structured in complex networks which include, for example, higher education institutions (HEI), funders, policymakers, local, regional, and national networks as well as countless other online and offline spaces. These are governed by agents and unwritten rules that are complex, interrelated, and still largely not understood despite their influence on career trajectories and the sense of belonging of LGBTQ+ people in STEM—which, despite being not quantified, is likely to be significant.

### **This Report**

This report explores the preliminary results of the LGBTQual+ study. In particular, after outlining the research methodology and participants' demographics, the report presents the emerging themes identified from the preliminary analysis of focus groups conducted with 34

participants across the UK and the US. We then present policy implications and recommendations from the study and offer some concluding remarks, including future steps for this research. In the appendix, the report presents an overview of the events we have organised during the project and other initiatives we have joined.

## Research Methodology

### Theoretical Background

The approach to oppression, privilege, and identities that we deploy in this project is shaped by intersectionality and queer theories and methodologies (Butler, 1990; Collins, 2015; Crenshaw, 1989; Sedgwick, 1990). Intersectionality and queer theory benefit from each other (Davis, 2008; Fotopoulou, 2013), and engaging with qualitative and mixed methods approaches through the prism of queer and intersectionality theories allows for the possibility of counter-hegemonic (Apple, 2015) and “anti-oppressive knowledge production” (Brockenbrough, 2015). Thus, this framework facilitates turning findings from qualitative and mixed-methods research into policy and best practice recommendations that are innovative, actionable, and impactful.

All the members of the project team identify as LGBTQ+ individuals in higher education with expertise in both social sciences and STEM fields. Our lived experiences of oppression and privilege inform the ways we relate to and interpret participants’ accounts. We employed (self)reflexivity to address our positioning towards the study and, perhaps more importantly, to interrogate our research practices—particularly the ways we engaged with participants and co-constructed counter-hegemonic knowledge (Hesse-Biber & Piatelli, 2012; McDonald, 2013).

### Methods

#### Focus groups

Data for the study were collected between February 2024 and December 2024 by conducting semi-structured focus groups and workshops in the UK and the US. Participants were recruited through existing networks, online, on campus, and snowball sampling. The US team is planning to conduct additional focus groups in January and February 2024; this data will allow us to target demographic groups not well represented in the dataset and to resolve the effect of the rapidly changing landscape for LGBTQ+ issues in the US specifically.

During focus groups and interviews, which lasted approximately one hour each, participants shared their overall experiences of studying and working in STEM. The interview protocol was flexible and placed equal emphasis on eliciting information on systemic challenges and examples of support participants have encountered during their STEM careers, as well as experiences related to navigating sexuality, gender, and other social identities. When employing intersectional and queer approaches to shape the interview protocol, we prepared questions that allowed participants to broadly discuss their social identities (for example, gender and sexuality), and how these influenced their experiences.

After transcribing, checking for accuracy, and fully anonymising transcripts, we are now thematically analysing data. Our approach to thematic analysis is recursive and reflexive (Braun & Clarke, 2006). The current report focuses on illustrating some of the themes that we have started to identify within the data.

#### Creative Workshops

During the project, we organised two workshops (one in the UK in September 2024 and one in the US in December 2024) to explore Queer experiences in STEM through creative methods, as well as to test the potential of creative methods to elicit different information from semi-structured focus groups.

We designed a few guided creative activities for our participants:

- **STEM & Me**: Using a blank sheet of paper, participants created a concept/mind map that illustrates their ideas about STEM, themselves, and themselves in STEM.
- **STEM & LGBTQ+ Communities**: By working together and using a blank sheet of paper, participants co-created a concept/mind map that illustrates their ideas about STEM, LGBTQ+ communities, and the relationship between STEM and the multiple and intersecting LGBTQ+ communities they might or might not belong to.
- **Your House of STEM**: In this activity, we invited participants to imagine their STEM field/environment as a house that they inhabited and navigated. Using a sheet of paper and stickers, participants sketched their house of STEM and annotated their sketch with the ideas, impressions, and feelings they associated with each of the “rooms”.

Each activity was followed by a group discussion so that participants could engage with others’ artefacts and further explore ideas that had emerged during each section of the workshop.

### Literature Review

Our work on the systematic literature review is ongoing. We intend to complete the review and submit it for publication in 2025. Our critical review of the literature will include identifying methodological gaps for understanding and addressing attrition and retention of LGBTQ+ people in STEM. We have selected the disciplines to include, the search terms to use, the databases to search, and we have designed the protocols for identifying the relevant existing literature. We are including literature published between 2004 to 2024, exploring twenty years of literature focused on LGBTQ+ experiences in STEM. Additional details of our work so far on the review are discussed later in this report.

### **Participants demographics**

The 34 participants who joined the focus groups for the project between February and December 2024 included 22 individuals in the UK and 12 individuals in the US. We also conducted two workshops, for a total of 4 participants in the UK and 7 participants in the US. In this report, we include only demographic information about focus groups participants.

#### UK focus groups

In the UK, out of 22 participants 9 identified as academics (this includes individuals with teaching/only, research-only, or research-and-teaching responsibilities), 8 as PhD students, and 5 as staff members at STEM research/industry organisations.

Five identified as asexual, 6 as bisexual, 4 as lesbian, 1 as woman loving women, 7 as gay, 5 as pansexual, 9 as queer, and 2 as questioning. Regarding gender, 5 participants identified as women, 10 as men, and 4 as non-binary/genderqueer. Three participants preferred to self-describe their gender identities (this includes a non-binary/genderqueer and agender individual, a non-binary trans man, and an agender person) and one participant preferred not to share this information. Out of 22 participants, 9 identified as Trans.

Ten participants described themselves as White British, 7 as having other White backgrounds, one as Gypsy or Irish Traveller, one as Asian/Asian British, one as Black/Black British, one as a person of Mixed or Multiple ethnic groups, and one participant preferred to self-identify. Six participants identified as disabled, or as a person having a disability or a long-term condition.

In terms of location, 13 participants worked or conducted research in organisations based in England and 9 participants were based in Scotland. 21 participants worked or conducted research for organisations located in urban/suburban locations (for example, large cities like Glasgow or London), and 1 participant was located in a small town/rural location. See Table 1 for a comprehensive overview of participants' characteristics.

**Table 1.** Participants' characteristics – UK Focus Groups (total participants n=22)

	n
<b>Role*</b>	
Academic	9
PhD student	8
Staff member at STEM research/industry organisations	5
<b>Age</b>	
20-29	15
30-39	3
40-49	3
50-59	1
Prefer not to say/No response	0
<b>Gender identity *</b>	
Woman	5
Man	10
Non-binary/Genderqueer	5
I prefer to self-describe <sup>a</sup>	2
Prefer not to say / No response	1
<b>Do you identify as Trans?</b>	
Yes <sup>b</sup>	9
No	13
Prefer not to say / No response	0
<b>Sexuality *</b>	
Asexual	5
Bisexual	6
Gay	7
Lesbian	4
Men loving men	0
Pansexual	5
Queer	9
Questioning	2
Woman loving women	1
Prefer to self-describe	0
Prefer not to say/No response	0
<b>Race/Ethnicity * <sup>c</sup></b>	
Arab or Arab British	0
Asian, Asian British or other Asian background	1
Black, Black British or other Black background	1
Mixed background	1
White British or other White background <sup>c</sup>	18
Prefer to self-describe <sup>d</sup>	1
Prefer not to say / No response	0
<b>Do you consider yourself to be a disabled person, to have a disability or long-term condition?</b>	
Yes	6
No	14



Prefer not to say / No response	2
Do you experience barriers or limitation in your day-to-day activities related to any disability, health conditions (including mental health), physical, sensory or cognitive differences?	
Yes – Substantial barriers or limitations	1
Yes – Some small barriers or limitations	6
No	13
Prefer not to say / No response	2
Social Class	
Working-class	4
Middle-class	7
Prefer to self-describe <sup>e</sup>	2
Prefer not to say / No response	9
Where is your organisation?	
England	13
Northern Ireland	0
Scotland	9
Wales	0
Prefer not to say / No response	0
Location of organisation	
Urban/Suburban location	21
Rural/Small town/Countryside location	1
Prefer not to say / No response	0

\* Participants could select more than one category

<sup>a</sup> This includes two agender participants

<sup>b</sup> This includes: 3 participants who identified as non-binary, 2 participants who identified as trans man, 2 participants who identified as trans woman, and two participants who identified as agender.

<sup>c</sup> Categories (e.g. White British or other White background) are derived and adapted from the British census.

<sup>d</sup> This includes a participant who self-described as "Mediterranean".

<sup>e</sup> This includes one participant who described their social class as "student class" and one participant who described that they couldn't clearly identify their social class.

### US focus groups

In the US, out of 12 participants 5 identified as academics (this includes individuals with teaching/only, research-only, or research-and-teaching responsibilities), 3 as PhD students, and 7 as staff members at STEM research/industry organisations, and one participant preferred not to share this information.

Four identified as asexual, 2 as bisexual, 4 as lesbian, 2 as woman loving women, 1 as gay, and 4 as queer. One participant preferred to self-describe their sexuality as aromantic, and one participant preferred not to share this information. Regarding gender, 5 participants identified as women, 3 as men, and 3 as non-binary/genderqueer. Five participants preferred to self-describe their gender identities (this includes a gender-expansive person, two agender individuals, one transman, one transgender woman, and one participant who described their gender as genderfuck) and one participant preferred not to share this information. Out of 12 participants, 6 identified as Trans.

Eleven participants identified as Caucasian/White and one participant preferred not to share this information. Four participants identified as disabled, or as a person having a disability or a long-term condition.

In terms of location, 6 participants worked or conducted research in organisations based in the Northeast, 2 in the Midwest, 2 in the West, and 2 participants preferred not to share this information. 8 participants worked or conducted research for organisations located in urban/suburban locations (for example, large cities like Boston), 2 participants were located

in a small town/rural location, and 2 participants preferred not to share this information. See Table 2 for a comprehensive overview of participants' characteristics.

**Table 2.** Participants' characteristics – US Focus Groups (total participants n=12)

	n
Role*	
Academic	5
PhD student	3
Staff member at STEM research/industry organisations	7
Prefer not to say/No response	1
Age	
20-29	7
30-39	0
40-49	2
50-59	1
60-69	1
Prefer not to say/No response	1
Gender identity *	
Woman	5
Man	3
Non-binary/Genderqueer	3
I prefer to self-describe <sup>a</sup>	5
Prefer not to say / No response	1
Do you identify as Trans?	
Yes	6
No	5
Prefer not to say / No response	1
Sexuality*	
Asexual	4
Bisexual	2
Gay	1
Lesbian	4
Man loving men	0
Pansexual	0
Queer	4
Questioning	0
Woman loving women	2
Prefer to self-describe <sup>b</sup>	1
Prefer not to say/No response	1
Race/Ethnicity * <sup>c</sup>	
African	0
African American	0
Alaskan Native	0
Asian	0
Asian American	0
Black	0
Southeast Asian	0
South Asian	0
Caribbean/West Indian	0
Caucasian/White	11
Prefer to self-describe	0
Prefer not to say / No response	1
Do you consider yourself to be a disabled person, to have a disability or long-term condition?	4
Yes	5
No	0
Prefer to self-describe	2
Prefer not to say / No response	
Social Class <sup>d</sup>	

Working-class	0
Middle-class	0
Prefer to self-describe	0
Prefer not to say / No response	12
Where is your organisation?	
Northeast	6
Midwest	2
South	0
West	2
US territory	0
Prefer not to say / No response	2
Location of organisation	
Urban/Suburban location	8
Rural/Small town/Countryside location	2
Prefer not to say / No response	2

\* Participants could select more than one category

<sup>a</sup> This includes gender-expansive, agender (x2), transman, transgender woman, genderfuck

<sup>b</sup> This includes aromantic.

<sup>c</sup> Categories are derived from US census categories.

<sup>d</sup> No participants filled this out.

## Research Findings

### Focus Groups: Exploring career pathways and (in)visibility

Overall, our results highlight that progress has been made to remove barriers to inclusion and address discrimination against LGBTQ+ people in STEM. However, challenges remain, they have far-reaching consequences on career journeys, and they increase the risk of attrition.

#### Navigating careers in heteronormative and hostile environments

Results from focus groups paint a complex picture of challenges that LGBTQ+ people face during their career journeys in STEM environments. This includes, for example, transphobia and homophobia, heteronormativity, lack of visibility, gender stereotypes, ableism, lack of opportunities, and lack of understanding of queer issues and intersectionality when it comes to policy and practices.

(In)visibility (i.e. the experiences of visibility, invisibility, and hypervisibility that shape the ways LGBTQ+ people navigate asymmetric power relationships in STEM fields (Reggiani et al., 2024a) remains a key issue in STEM environments that are historically characterised by a lack of diversity and inclusion—although it is hard to account for queer representation in STEM due to the lack of systematic, reliable, and meaningful data (Freeman, 2020). The story of Riley, a transgender academic in the UK with a long experience in both academia and industry, exemplifies the challenges and opportunities that exist around navigating STEM careers and (in)visibility as a queer person:

*“I was probably working in science and engineering for [more than 10] years, also including my degree, then working in industry, and then my PhD. It was [more than 10] years without seeing any LGBT people, openly LGBT people, I should say. ... That lack of visibility ... made me think ... [that] you can't be LGBT in STEM. So, I quit. And I was actually going to move to a completely different field. I only really stayed in STEM by accident.*

*Once I came out I've become quite visible. ... The people around me are really good. There were job offers and some groups that no longer wanted to work with*

*me. ... You can sort of infer from that it has to do with me transitioning. And then I do get targeted. ... I get targeted quite a lot online. I [also] found a transphobic sticker in my department today."*

For Riley and other participants, visibility fostered a sense of empowerment and facilitated the formation of new connections. However, it also came with risks: being visible could lead to harassment and loss of opportunities, such as collaborations or the ability to travel to regions where being LGBTQ+ is unsafe or criminalised.

Navigating visibility does not end with coming out—which, it is worth noting, is not a one-off event but rather a dynamic process that is repeated over time. For many participants, being visible at work was an important aspect of authenticity and self-expression. However, visibility can conflict with normative STEM cultures that implicitly or explicitly discourage discussions of personal identities, framing them as "unprofessional." This can put LGBTQ+ people in STEM at a higher risk of discomfort, stress, and anxiety. Robin, a white, trans, non-binary, early career-academic in the US, discussed this predicament and how the lack of recognition of their queerness and transgender identity made them "invisible" and frustrated:

*"I was never explicitly told that it wasn't okay to be queer but people made comments like, "Oh, you shouldn't wear your nail polish to a group meeting, you're gonna get comments," ... Or: "Don't tell the PI that you're going to Pride or something." I felt like I needed to hide... in the research setting. It was not cool. ... I was assigned male at birth and raised as a boy, and I think in most spaces, I am still viewed in that way. And so, I'm sort of like made invisible because scientists, in my experience, don't really know how to process [identities] like non-binary, homosexual, [or other] forms of queerness."*

Both Riley and Robin experiences show that, overall, navigating (in)visibility in heteronormative and hostile environments can often result in significant emotional labour. This can be regarded as an unfair burden for LGBTQ+ people in STEM and can contribute to the attrition of queer talent, particularly during the early stages of careers as individuals have less access to support.

### Lack of intersectional approaches and compounded experiences of marginalisation

Queer individuals and communities have different experiences at the intersection of systems of oppression and privilege. Data highlight compounded experiences of marginalisation (for example, those of queer disabled individuals) and significantly different experiences across generations—which suggests that one-size fits all approaches are unsuccessful to address issues of attrition and retention.

The lack of intersectional approaches to inclusion in organisations had significant consequences for participants, especially those who experienced multiple marginalisations (Anand et al., 2024). Transgender participants, for example, discussed the financial and personal impact of gender-affirming care. Similarly, disabled participants and those with long-term conditions experienced additional challenges in navigating their careers. Paula, a white agender trans person in an early career staff role in the US, talked about navigating chronic illness:

*“The overarching things that have cost me the most energy and hours I could have been doing science it's at the intersection of a couple different identities, and it's about just dealing with the bureaucracy and logistics of staying alive. I'm chronically ill, and in the US context much more so than the UK context, the hours I have to put in trying to get care just continuing care are astronomical.”*

Paula's quote highlights how the time and effort marginalised individuals must spend navigating intersectional challenges can unfairly detract from their ability to focus on research. Without adequate support from organisations—i.e. support which recognises the intersectional nature of oppression and redirects resources towards individuals and groups which have been marginalised not only in organisations but also when it comes to EDI interventions—this can hinder career progression and increase the risk of attrition among LGBTQ+ scientists and engineers.

In addition to homophobia, queer people of colour in STEM reported incidents of racism. Jai, for example, a bisexual academic from South Asia working in the UK, described the impact of bullying, racism, and homophobia he experienced in a previous organisation:

*“One of my biggest challenges when it was happening, all the bullying and racism and attacks of me [for] being Bi[sexual], ... [was that] it was not very easy to explain to people what exactly was going on. ... The second [challenge] was the mental agony [that] comes when you get badly treated, and that was the case for me for quite some time. I had to see medical professionals. I wasn't feeling well. And because this thing continued [for a long time], I had lost complete confidence in myself. ... I still suffer from that. ... [It] was devastating.*

*One thing I noticed is [that] when things are fine, they are all fine. But when things go bad, that's when the support structure is the most important. And that's where you actually want [senior leaders] in the organization to take up responsibility and act. [Through my experience], I noticed that they were not willing to act despite official complaints, so that was mentally, physically, morally, emotionally quite draining for me. But also, for some of my colleagues, who complained in a similar way. So, they all ended up leaving. I was one of the lucky ones in a way that I continued to be in research. ... But early career scientists who left didn't have the same luxury. So, I saw people's lives getting ruined.”*

Jai's account highlights that racism remains prevalent in STEM organisations and professional cultures, and it reveals a significant lack of robust mechanisms to address both direct and indirect forms of harassment and discrimination. Beyond formal policies and procedures, Jai's experience underscores the critical role that senior leaders can—and should—play in fostering more equitable and inclusive environments. Too often, however, this responsibility falls to precarious or marginalised staff, whose labour in this area is both unrecognised and unrewarded (Reggiani et al., 2024b).

### Support is key to retention

Participants described that the presence of positive and affirming factors was key to their retention in STEM. This included: having supportive mentors, supervisors, and colleagues; having role models and/or being a role model for others; having access to supportive networks; and supportive policies and practices in their institution.

Having role models and/or being a role model for others emerged as key to reducing attrition of support participants' careers. This is because role modelling can provide much-needed guidance to navigate STEM careers, help to build confidence, and boost motivation. For others, being out was a way to show others that indeed it is “possible” to be queer and have

a career in STEM. Zara, a white trans person in an established staff role talked about why they had taken the decision to be visible:

*“We need the role models. I mean, it's the possibility. It is possible, right? If you don't see it's possible, you don't, you know what I mean? That's like applying for an NIH [National Institute of Health] grant. If NIH never funded anybody, then you'd say, what's the use? Whereas if they fund say 20%, you say, 'Gee, it's really tough.' But at least it's possible to get funding. So having that hope of possibility raises people. And I think if people remain invisible in higher positions, it is not helpful. It just shows you that, 'Oh, well, the people in power are gonna put you down or you're gonna be second-class citizens.”*

It is worth noting that often participants waited to reach a senior stage in their career or a secure sense of their identity as queer individuals in STEM before they felt confident in being a visible role model—which might be explained, in part, by the risks that exist around visibility.

Other participants discuss the positive impact of diversity and inclusion on climate in their workplaces and research groups. This is the case of Leo, a white, gay man, mid-career academic working in a higher education institution in the US:

*“The department that I ended up being in is just amazing. The chair is a lesbian woman and I would say probably 15% of the faculty is LGBT. It's just so clear that it impacts the atmosphere of the department. The department is just so collegial. There's also a very high proportion of female faculty. It's just really great. ... There is a huge difference between the very old-school institution [I was before] and the department that I'm at now. ... And that really changes a lot.”*

As Leo described, having a diverse faculty body and inclusive leadership created an environment where they felt they could be open about their identities, express themselves more authentically, and have more opportunities—which is in stark contrast with their previous position in a group that, despite being located in a university in a progressive area of the US, was characterised by toxic masculinity and bro culture.

### Performative inclusion vs accountability

Findings highlight that, when addressing EDI issues, institutions often focus on what participants described as “passive inclusion”. The following discussion between Frey, a bisexual, non-binary/genderqueer, and transgender PhD student, and Esme, an asexual, lesbian, queer PhD student — both studying in the UK — well exemplifies this sentiment:

*“Frey: Somebody had their pronouns [in their signature] and then they were still not good at [using other people's pronouns]. It just felt like they're [doing] it because they needed to tick a box ... but then they forget to actually act [inclusively].*

*Esme: It's only half of the thing, isn't it? It's like, well, that's good, you did the first step. Now how about you actually [demonstrate] that inclusion?”*

As highlighted by Rebecca, a woman of colour who identified as lesbian and who was working in industry in the UK, rather than passive and performative inclusion what really matters when it comes to attrition and retention of LGBTQ+ people in STEM is addressing structural barriers and providing tangible support.

*“It's easy enough to just see that things look good on a website or that something in your contract looks okay. But when you see that an authentic safe space is being*

*curated where people like me can actually share who they are, then it makes you feel safer to talk about yourself. And know that it's somewhere that you can excel, that people like you are actually progressing. It gives you more confidence in your own ability and opportunities."*

These quotes suggest that EDI initiatives and commitments must be coupled with mechanisms for accountability. This is not only needed for transformative change to happen but is also key for the retention of queer scientists both in academia and elsewhere.

### Differences across and within countries

We found notable differences across regions, nations, and states within the UK and the US when it comes to the inclusion and well-being of LGBTQ+ people in STEM environments in both higher education and industry. This is well exemplified by the story of Luke, a gay, white man working as an early-career academic in the UK, who describes how the geographical context shaped his search for a postdoc position:

*"I'm from Northern Ireland. I moved to England now for my postdoc, and, I probably will stay here, if not, go further afield. Cause Northern Ireland is...still so behind. ... When I was interested in institutions [for my new role], I would go onto their LGBT page or links [to check information]. I did enjoy my PhD and undergrad. But I was like, you know, I want to like fully thrive in a department where I can see [people like me]."*

In the US, differences in politics and policies across States further complicate navigating careers for queer people in STEM. This is the case of Ellie, a white, lesbian woman and graduate student in the US, who described how attitudes around gender and sexuality in different states shaped both her professional and personal experiences:

*"I've kind of bounced around the US I think more than your average person for work, and my experiences have always been very highly dictated from both the group that I'm in but then also, the kind of place that that group has been located in. So, I've, you know, been in the Northeast and it was, like, totally not a problem, and people are very open about their personal lives. And then I've also been in much more conservative areas of the US. [While I was in a conservative area] there was a conversation that was had with me: "Well, you know, the younger generation of people working here don't mind. You can talk about your personal life. But don't, you know, don't say it in front of these [other] people because they will gate keep certain opportunities from you." ... I did not end up staying with that group because I was like, I'm not, you know, that's not how I'm going to live my life."*

The overall landscape is such that even states with supportive policies. Zara, a white trans person in an established staff role, explained their decision to leave the US:

*"If I had to stay in the United States, then I would. But given a choice, it's like, okay, time to leave. Not a great place to be. [State in northeast US] is in some ways sheltered. But the future, I don't know. I don't know. It's open season for transgender rights right now in the United States."*

While our dataset does not allow to fully explore the influence of politics or wider contextual issues on the experience of LGBTQ+ people in STEM, participants also discussed how the attacks against LGBTQ+ communities and rights in the UK and the US affect them personally and professionally. Different policies across the two countries also affect the protections and support participants had access to in relation to issues of prejudice and discrimination. For example, Jay and Roberto, two academics who had the opportunity to

work in both countries, noted that in their experience in the US there are more stringent organisational policies against hate speech compared to the UK. While whether this translates in better climates remains debatable, better organisational policies contributed to increased awareness and a stronger framework for addressing incidents of bias and discrimination.

### Broader issues within STEM professional cultures and their impact on inclusion

More broadly, the data underscore that promoting equity, diversity, and inclusion for LGBTQ+ people requires addressing long-standing issues within STEM environments, which are still influenced by exclusionary norms around what science and an “ideal” scientist look like. Participants illustrated, for example, the effects of “chilly” climates where discussion around sexuality and gender is inhibited by heteronormativity or toxic professional cultures. Instead of being recognised for the diverse contributions and perspectives they bring to their research, individuals are often evaluated based on biased metrics and outcomes that obscure structural inequities under the guise of meritocracy. As Francesco, a gay man who moved to England for his doctoral studies, describes:

*“[In STEM], people care too much about the engineering and the materials, and the maths and the papers, and the titles and the money. ... What about the people? You cannot be a scientist without being a person.”*

Transforming STEM institutional and professional cultures is urgent to reduce attrition and increase retention for queer scientists and engineers and, more broadly, make STEM more attractive to an increasingly diverse workforce. By reflecting on her experience in industry, for example, Rebecca shared that:

*“Historically, like, we, we kind of just thought of a career in STEM as work through equations or design instruments, or applying science to new things. ... Now, people are expecting that their whole selves will be appreciated in the work that they're doing. ... Institutions need to keep up with what's happening. ... to keep up with our competitors.”*

Rebecca’s quote highlights that addressing professional cultures is not only key to reducing inequities but also to ensuring that STEM workplaces and research environments remain competitive and at the forefront of innovation in the UK and the US—which is key to economic prosperity and technological advancement in both countries.

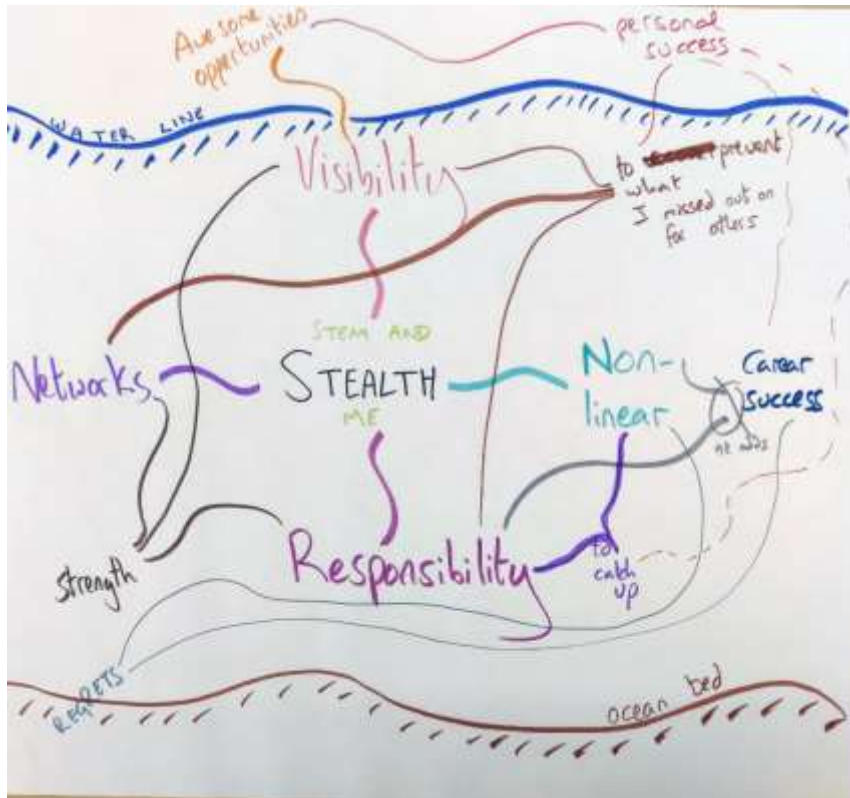
### **Workshop: Creatively exploring Queer (in) STEM**

Despite extensive team planning to organise in-person workshops in the UK and the US to engage participants in exploring Queer experiences in STEM through creative methods, recruiting in-person participants proved challenging. We were able to organise one UK workshop with four participants in September 2024 and one US workshop with seven participants in December 2024, during which we used guided creative activities to produce artefacts and foster discussion between us as facilitators and participants.

Data generated in the workshop includes photographs of the artefacts and notes from the discussions. Figure 1, for example, is a conceptual map where a participant, who identified as a transgender, pansexual, white woman working as an academic in the UK, explored their relationship with STEM using symbols and keywords. While opportunities and personal success are seen “above water”, what is hidden under the surface includes more complex issues and highlights key factors that contributed to shaping the participant's career. This includes networks, visibility, as well as personal strength and responsibility that were needed



to sustain a non-linear career—which is at odd with traditional and normative ideas of success in STEM.



**Figure 1.** STEM and me, conceptual diagram (n.b. Stealth was the workshop pseudonym used by the participant).

Figure 2 represents a collective output from the UK workshops. Participants were invited to reflect on the intersections between STEM and LGBTQ+ communities. The discussion allowed participants to reflect on different aspects that might contribute to creating more inclusive STEM communities for queer people. This includes, for example, ensuring accessibility, trust, visibility, as well as institutional transparency and accountability. Participants highlighted that the time invested to create EDI initiatives should be better recognised and rewarded, and that is important to create environments where exclusionary behaviours are challenged, conversations around gender and sexuality are welcomed, and where multiply marginalised individuals and groups (for example, queer neurodivergent individuals) are valued for their contributions.



**Figure 2.** STEM & LGBTQ+ Communities, UK workshop.

Overall, the workshop provided an opportunity to expand on some of the themes that were articulated in many of the focus groups including which spaces participants feel like they belong and in which spaces they feel like they can bring and be their whole selves as LGBTQ+ people in STEM. Participants also reported that the creative activity was really engaging and affirming. Reflecting on the workshop, we discussed options to redesign it for online or asynchronous participation to broaden accessibility in future research projects.

### Exploring the Literature

As noted earlier in this report, we intend to complete the review and submit it for publication in 2025. Although the literature review is still a work in progress, we have worked to develop inclusion and exclusion criteria for the review and a protocol for identifying and reviewing the literature. One challenge we discussed was the different definitions of which disciplines count as “STEM” in each country, underscoring the political nature of the term. In the US, the National Science Foundation (NSF) includes some disciplines that are not included in the UK definition of STEM (for example, social sciences). In the UK, the Higher Education Statistics Agency (HESA) includes some disciplines that are not included in the US definition of STEM (for example, medicine). As a research team, we decided to include the disciplines that appear on *both* the US-based NSF list and the UK-based HESA list, which includes 20 disciplines as well as the acronym “STEM”.

### Policy Implication and Recommendations

While the UK and US landscapes are quite different, and vary even internally, participants in both countries had experienced a mixed climate, challenges and overcome obstacles. We formulated these recommendations from the experiences of participants:

**Recommendation 1: STEM organisations must act in concert and synergistically to address inequities and improve retention of LGBTQ+ people in STEM.**

The layered and intersecting experiences of LGBTQ+ people in STEM necessitates policy responses from multiple stakeholders who often need to act in concert and synergistically. Relevant organisations include higher education providers, governmental bodies, policymakers, companies, national laboratories and funding organizations both public and non-profit; we collectively refer to this group as “STEM organisations” for brevity.

As an illustration of how coordinated policy responses are needed, Paula, a white agender trans person in an early career staff role in the US was just one of a number of participants who reported barriers to their equitable participation in STEM around healthcare needs. They talked about how they had struggled with their insurer to access healthcare, both related to their transition and for other needs:

*“That's just like regular, common medical stuff, that could happen to somebody of any different sexuality or gender. And then you bring in, um, I'm in the process of social and medical transition, and it's all of that same level of bureaucracy and logistical effort layered on top.”*

Possible policy responses to these needs could come from their institution through their choice of insurer, as well as non-STEM organisations including the insurer itself, the state or federal government. LGBTQ+ people with such needs are highly attuned and responsive to healthcare policies at both national, local and institutional levels. Participants reported their intentionality in identifying career opportunities in supportive locales and institutions, and were willing to navigate complex manoeuvres, even international moves, to enable access to supportive policies. Healthcare policies, therefore, collectively have a major possible impact on retention.

At the same time, Paula also faced significant barriers to change their name:

*“I could speak about the, uh, unbelievable amount of effort to change name on all my publications. I think my citation count should be inflated by 15%. If you were to actually take into account like what I could have published if I hadn't spent the-the intellectual effort of a single authored or first authored publication just in dealing with all of these publishers to get my name change implemented.”*

Policy responses to address this could come from journal publishers, learned societies and funding bodies, who could act to better facilitate name changes. As we discuss below, such policies must be formulated to protect privacy.

Due to the multiple and interlocking nature of challenges faced by LGBTQ+ people and other marginalized groups, addressing only a subset of these is unlikely to adequately address retention. Further, it is important not to over-rely on quantitative measures of inclusion. Counting the number of LGBTQ+ people, assuming that such counts are reliable, does not mean that well-intentioned policies are successful even where they appear to be so quantitatively; conversely good policies may appear to be unsuccessful due to confounding effects.

We therefore encourage a holistic assessment of the needs of LGBTQ+ people, and particular subgroups, and coordinated policy responses to address these needs. We

recommend policy outcomes to be not simply tracked along representational lines, but also by understanding the effects, limitations and opportunities for policy on the lived experiences of LGBTQ+ scientists.

**Recommendation 2: STEM organisations should continue to develop new policy to address gaps and regularly assess the effectiveness of policy interventions from the perspective of people they aim to support.**

Participants reported a nonuniform experience with policies. Some organisations have enacted supportive policies around LGBTQ+ inclusion, but gaps remain both in missing policies and those where the implementation is deficient. We recommend that organizations regularly audit their policies to identify such gaps and implement new policy to address them. It is essential that policies be evaluated from an intersectional point of view to identify gaps where an individual with multiple identities or needs could be omitted due to the interaction of multiple policies.

While a number of participants had experienced supportive policies, even where these policies were in place they were not always successfully upheld or applied. Further, even where supportive policies were in place, the climatic experiences in individual labs or departments could differ from others, even at the same institution. Some participants reported, for example, an inappropriate workplace culture that persists in some labs. Peter, a white gay mid-career man in the northeast described:

*“Very clearly, the people that were doing the best in the lab where the dudes that were doing locker room jokes with the boss and that were slapping his back, and so very clearly the straightest looking guys.”*

Some participants have also expended significant effort in accessing resources provided by policy but needed to be accessed by complex administrative processes. Further, accessing resources or processes (e.g. name changes in computer systems, or medical leave) involved revealing personal information, requiring LGBTQ+ people to out themselves. Ava’s experience around accessing medical leave as a trans woman working as an early-career academic in the UK is revealing:

*“In the medical leave document there's a bit saying if it's for transgender related stuff. ... [Then] I had to get a document – I had to send them proof. I had to get a letter sort of saying this person, blah, blah, blah, had this surgery, blah, blah. I was like, well, do I actually want to send that to people [in the university]? Why did they have to know that? Is that outing myself in some way? ... You don't have to divulge identity information if you're having another type of surgery.”*

Ava and other participants’ experiences highlights that it is essential to safeguard LGBTQ+ people’s right to privacy by ensuring that such privacy is guaranteed when sensitive information is provided. We therefore recommend that STEM organizations who have enacted policies intended to support LGBTQ+ participation undertake regular assessment of the effectiveness of these policies. This cannot be accomplished simply by counting representation but should centre the voices of the people they aim to support.

**Recommendation 3: STEM organizations should prioritize investment in LGBTQ+ climatic research and fund the development of interventions to address inequities.**

The findings of this study, together with existing literature, underscore the need to continue and broaden research on LGBTQ+ issues in STEM. A portfolio of diversity research, both discipline-based and STEM-wide, is necessary to address the systemic issues identified in this and previous studies. There is and will remain a need to continuously assess the

representation and climate for LGBTQ+ people in STEM and the mechanisms behind these effects. It is also necessary to move beyond the framing of identifying climatic problems to begin developing and testing resources and interventions to address these issues.

An important question is how to adequately resource these needed future studies. Thus far, many studies have been pursued with institutional resources or funded by professional societies—the present study, funded by the Royal Society of Chemistry and the Science and Innovation Network, is an example—with a few isolated examples of studies funded by governmental funding agencies. Such bodies may lack programs that clearly support such studies, or place LGBTQ+ research in competition with important research on other marginalised groups.

There is therefore a need to broaden funding streams available for this work. We recommend funding bodies audit the programs available for participation and workforce development research to ensure that LGBTQ+ research is welcomed. We emphasize the importance of directing funding towards groups that haven't been prioritized in previous studies. Further, new initiatives must not come at the expense of other marginalised groups; rather, new and existing funding initiatives should be directed intersectionally.

We also see an important role for non-governmental bodies. Longitudinal research, in particular, is difficult to fund in the regular grant cycles of most agencies. The non-profit and foundation sector could play a key role in filling this gap because they possess significant flexibility. Companies that have successfully implemented policies, and have an interest in the STEM workforce could also play a valuable role.

We envision the future of LGBTQ+ studies in STEM will require interdisciplinary teams with expertise beyond what has been represented in climate studies so far: it will require those with expertise in communication with the general public and those with broad understanding of how to design successful intersectional EDI initiatives for other marginalized groups. Further, since much research so far has proceeded in isolation, there's a need for bridges between methodological and disciplinary approaches that can be facilitated by the action of funding agencies, professional societies and the non-profit sector.

**Recommendation 4: STEM organizations should promote the visibility of LGBTQ+ STEM voices and highlight good practices where they already exist. Visibility should be accompanied by robust safeguarding measures.**

Participants experiences reaffirm that visibility of LGBTQ+ people is essential for driving retention. Visibility is important not simply because role models (or “possibility models” as one participant called them) are people for early career people to identify with, but because they also provide an impetus to continue in STEM careers. As Payton, a white lesbian, queer asexual woman graduate student in the Midwest put it:

*“Seeing, like, how [Carolyn Bertozzi] has been able to be successful in her career, has pushed me to want to also kind of keep going.”*

While discussing the importance of role models in STEM environments that are still exclusionary for LGBTQ+ people, Rob, a white queer bisexual man in an early career staff role in the midwest noted:

*“Having passion to pursue science makes you feel like you're rejecting a part of yourself. But then when you see people succeeding [being out and doing science], it's inspiring to not feel like you have to choose one or the other. I hope that by being out, I can also Inspire younger generations starting from like high school level.”*

Government bodies, funding organizations and professional societies should therefore ensure representation of LGBTQ+ STEM professionals across all activities. Particular care should be taken to ensure representation of intersectional identities and that there are publicly visible LGBTQ+ STEM professionals. As we discuss above, it is important for the research community to keep studying LGBTQ+ STEM voices and uplifting them.

A key consideration, however, is that visibility may come at a significant cost for those acting as role models. One late carer participant noted:

*"[We] probably have survivor bias because we managed to survive in the field."*

Visibility takes time, effort and makes the individual subject to additional scrutiny and even hate speech. It is essential that STEM organisations fully account for this labour undertaken by role models, and provide appropriate compensation and safeguarding measures to protect those who are providing visibility to the STEM community.

As discussed above in Recommendation 2, a significant number of good practices already exist in STEM organisations, as well as a wealth of potential experience in implementing such policies. However, there has been little effort to systematically share good practices on LGBTQ+ issues in STEM thus far. There is a potential opportunity to recognise good practices, uncovering valuing and embedding these practices. We envision a key role for cross-cutting bodies, e.g. professional societies, regulatory bodies and funding agencies in facilitating this exchange; we emphasise that conversations must include LGBTQ+ scientists themselves as key stakeholders.

**Recommendation 5: Future LGBTQ+ in STEM qualitative research, especially international studies, should allocate adequate time to understanding ethical and regulatory procedures; employ intersectional, queer and critical approaches; collect data carefully in ways that prioritise participants' anonymity; offer multiple options to engage with data collection; engage with LGBTQ+ communities in STEM and other stakeholders; and share results that tell a whole story.**

This study and other examples from the RSC's funding call represent examples of binational studies on LGBTQ+ issues that are rare in the literature. Therefore, we paid great attention to modelling good methodological practices, so that we could address existing knowledge gaps and provide opportunities to enhance understanding and impact of qualitative methods to address attrition and retention of LGBTQ+ people in STEM.

In the course of conducting the study, the research team learnt about a number of obstacles for such studies, as well as important advice to streamline future work. Some of these are due to differences in government definitions, for example, disciplines included in STEM and identity categories. Each of these underscores the importance of having relevant expertise on the research team to navigate cultural differences. Here we took the approach of using disciplines common to both countries while framing identity expansively by including identities used in either, but alternative choices are possible.

Other challenges emerged from regulatory differences between the USA and the UK, and some were also exacerbated by the unfamiliarity of research support staff with LGBTQ+ work and legal frameworks beyond the borders of the respective country. On the other hand, ethical approval and data-sharing agreements were complicated by concerns raised around the EU GDPR law and the evolving legal landscape around data privacy in both countries. While none of these obstacles were insurmountable, they nonetheless required care to resolve and might dissuade researchers from embarking on valuable bi- or multinational work. In particular, we would encourage studies to develop robust and context-specific protocols around anonymisation and/or de-identification to protect participant anonymity.

When designing international studies, we recommend considering how demographic data are collected (so that categories are context-specific but comparable) and reflecting on what counts as STEM. In line with our application of queer and intersectionality theory, in this study we chose to highlight self-description in the collection of demographic data and found that participants extensively used this option. We therefore recommend this approach for future studies.

To explore more fully queer experiences across systems of oppression, we would recommend incorporating intersectionality theory in the study design and analysis, as well as building relationships and trust with LGBTQ+ communities in STEM. This includes offering multiple options to engage with data collection. Offering multiple options acknowledges diversity within queer communities, reduces barriers to participation, and results in more inclusive, accurate, and ethical research outcomes.

Engaging with LGBTQ+ communities in STEM and other stakeholders is essential for creating research that is both inclusive and impactful. This ensures that diverse voices are heard and that the research addresses real-world needs and challenges faced by LGBTQ+ individuals. Guided by intersectional and queer approaches, we recommend presenting findings in a way that tells a complete, nuanced story. This approach not only situates the results within broader social, cultural, and professional contexts but also helps drive meaningful change by empowering stakeholders to translate data into actionable insights and advocacy efforts.

## Conclusions

This report provides an insight into the research and the activities undertaken by the LGBTQ+ project. While examining the experience of LGBTQ+ individuals in STEM through intersectional and queer lens, we collected evidence that adds to the understanding of the issues of attrition and retention. More broadly, our findings address challenges, support, hostile working culture, bias, and systemic inequalities faced by queer individuals in STEM at the intersection of multiple and interlocking systems of oppression.

Our preliminary findings suggest that, while progress has been made, significant barriers remain for LGBTQ+ individuals in STEM. Qualitative data, as demonstrated by our study, can offer a nuanced and intersectional insight into issues of attrition and retention. This is key to intersectional analysis and to centre the experiences of marginalised and less represented individuals within LGBTQ+ communities (for example, transgender, asexual, or agender people; but also disabled queer individuals or queer people of colour). Additionally, qualitative data provides contextual insights into participants' lived experiences of policies and interventions as well as the limitations of such policies and the impact of a *lack* of policy. This is key to reviewing existing policies and practices and informing future interventions.

Our findings highlight that addressing attrition and retention for LGBTQ+ people in STEM in the UK and the US is a complex endeavour, which requires systemic, intersectional, sector-wide approaches. This involves, for example, creating inclusive policies, fostering supportive STEM cultures, providing mentorship opportunities, and addressing barriers related to bias, discrimination, and inequitable access to resources. Collaborative efforts between institutions, employers, LGBTQ+ and other marginalised communities are essential to ensure sustainable progress and improve representation and retention across all levels.

We would therefore encourage organisations to allocate adequate and sustained resources to research and interventions focused on helping to remove barriers for queer and other marginalised individuals and groups in STEM. This might include funding for targeted research into the experiences of LGBTQ+ people in education and in the STEM workforce

and providing targeted support so that LGBTQ+ people can feel valued and empowered to thrive. Long-term commitment to change, redistribution of resources, and accountability are key to transforming STEM and make it more diverse, equitable, and inclusive--which would lead to more innovative and resilient organisations with benefits for economies in the UK, US, and other countries adopting similar approaches.

Research in the past two decades has started to uncover and address the experiences of queer people in STEM. However, wicked questions remain and new problems require attention. Areas for future research include, for example, the impact on increased precarity and mobility on the career trajectories of LGBTQ+ people in STEM, as well as the impact on attrition and retention of contextual factors that exist “outside” or at the “margins” of organisations (for example, geographical location, hostile legislation, or political climates). Cross-country and comparative research would help better illuminate the experiences of queer people in STEM, including how different policies and practices shape well-being and careers. To be relevant and impactful, we believe that future research should develop close ties with LGBTQ+ communities and other relevant stakeholders so that research findings can be translated into policy recommendations and contribute to those transformative changes that are needed to ensure better equity and inclusion for everyone.

As the LGBTQ+ project comes to a close, our research and initiatives will not stop. In 2025, we are planning to collect additional data in the US and complete the analysis of the data we collected, including thematic analysis of focus groups and workshops. We will keep engaging with LGBTQ+ communities in STEM, academics, and other stakeholders through conferences and presentations of results. This includes attending the 2025 RSC Inclusion & Diversity Forum at Burlington House in London in March 2025--during which we will present alongside with other projects funded under the “LGBT+ Inclusion in STEM” initiative.

As our experience can attest, doing research across countries comes with inevitable challenges. However, it also provides an unparalleled opportunity to amplify the voices of LGBTQ+ individuals in STEM, whose experiences often remain invisible. By uncovering the unique barriers and opportunities they face in the UK and the US, and by using qualitative approaches to tell stories that are complex and nuanced, this work not only advances equity and inclusion but also has the potential to inspire systemic change. Addressing equity, diversity, and inclusion in STEM is not only just but also drives innovations. Therefore, fostering inclusive and supportive STEM environments does not just improve the experiences of LGBTQ+ and other marginalised individuals--it can also transform entire fields and society for the better.

## References

Anand, P., Bots, P., Gagnon, J., Appiah, F., Maters, E., Bhagwat, S., Little, S., Riches, A., Chifru, E., Lawrence, A. and Ngwenya, B. (2024) You can't climb a broken ladder: Examining underrepresentation of multiply-disadvantaged groups in secure and senior roles in UK geochemistry. *Earth Science, Systems and Society*.

Apple, Michael W. 2015. ‘Understanding and Interrupting Hegemonic Projects in Education: Learning from Stuart Hall’. *Discourse: Studies in the Cultural Politics of Education* 36(2):171–84. doi: 10.1080/01596306.2015.1013245.

Atherton, Timothy J., Ramón S. Barthelemy, Wouter Deconinck, Michael L. Falk, Savannah Garmon, Elena Long, Monica Plisch, Elizabeth H. Simmons, and Kyle Reeves. 2016. *LGBT Climate in Physics: Building an Inclusive Community*. College Park, MD: American Physical Society.



- Barthelemy, Ramón S., Bryce E. Hughes, Madison Swirtz, Matthew Mikota, and Timothy J. Atherton. 2022. 'Workplace Climate for LGBT+ Physicists: A View from Students and Professional Physicists'. *Physical Review Physics Education Research* 18(1):010147. doi: 10.1103/PhysRevPhysEducRes.18.010147.
- Braun, Virginia, and Victoria Clarke. 2006. 'Using Thematic Analysis in Psychology'. *Qualitative Research in Psychology* 3(2):77–101. doi: 10.1191/1478088706qp0630a.
- Brockenbrough, Ed. 2013. 'Introduction to the Special Issue: Queers of Color and Anti-Oppressive Knowledge Production'. *Curriculum Inquiry* 43(4):426–40. doi: 10.1111/curi.12023.
- Browne, Kath. 2010. 'Queer Quantification or Queer(y)ing Quantification: Creating Lesbian, Gay, Bisexual or Heterosexual Citizens through Governmental Social Research 1'. in *Queer Methods and Methodologies*. Routledge.
- Butler, Judith. 1990. *Gender Trouble: Feminism and the Subversion of Identity*. London: Routledge.
- Cech, E. A., and T. J. Waidzunas. 2021. 'Systemic Inequalities for LGBTQ Professionals in STEM'. *Science Advances* 7(3):eabe0933. doi: 10.1126/sciadv.abe0933.
- Cech, Erin A., and Tom J. Waidzunas. 2011. 'Navigating the Heteronormativity of Engineering: The Experiences of Lesbian, Gay, and Bisexual Students'. *Engineering Studies* 3(1):1–24. doi: 10.1080/19378629.2010.545065.
- Collins, Patricia Hill. 2015. 'Intersectionality's Definitional Dilemmas'. *Annual Review of Sociology* 41(1):1–20. doi: 10.1146/annurev-soc-073014-112142.
- Crenshaw, Kimberlé. 1989. 'Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics'. *University of Chicago Legal Forum* 1989(1):138–67.
- Freeman, Jonathan B. 2020. 'Measuring and Resolving LGBTQ Disparities in STEM'. *Policy Insights from the Behavioral and Brain Sciences* 7(2):141–48. doi: 10.1177/2372732220943232.
- Guyan, Kevin. 2022. *Queer Data: Using Gender, Sex and Sexuality Data for Action*. Bloomsbury Publishing.
- Hesse-Bibber, Sharlene Nagy, and Deborah Piatelli. 2012. 'The Feminist Practice of Holistic Reflexivity'. Pp. 557–82 in *Handbook of Feminist Research: Theory and Praxis*. 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc.
- Hughes, Bryce E. 2018. 'Coming out in STEM: Factors Affecting Retention of Sexual Minority STEM Students'. *Science Advances* 4(3):eaao6373. doi: 10.1126/sciadv.aao6373.
- Institute of Physics, Royal Astronomical Society, and Royal Society of Chemistry. 2019. *Exploring the Workplace for LGBT+ Physical Scientists*.
- McDonald, James. 2013. 'Coming out in the Field: A Queer Reflexive Account of Shifting Researcher Identity'. *Management Learning* 44(2):127–43. doi: 10.1177/1350507612473711.
- Natow, Rebecca S. 2022. 'Policy Actors' Perceptions of Qualitative Research in Policymaking: The Case of Higher Education Rulemaking in the United States'. *Evidence & Policy* 18(1):109–26. doi: 10.1332/174426420X16047229138089.
- Patridge, Eric V., Ramon S. Barthelemy, and Susan R. Rankin. 2014. 'FACTORS IMPACTING THE ACADEMIC CLIMATE FOR LGBTQ STEM FACULTY'. *Journal of Women and Minorities in Science and Engineering* 20(1). doi: 10.1615/JWomenMinorScienEng.2014007429.

Reggiani, Marco, Jessica Dawn Gagnon, and Rebecca Jane Lunn. 2024a. 'LGBT + Academics' and PhD Students' Experiences of Visibility in STEM: More than Raising the Rainbow Flag'. *Higher Education*. doi: 10.1007/s10734-023-00993-2.

Reggiani, Marco, Jessica Dawn Gagnon, and Rebecca Jane Lunn. 2024b. 'A Holistic Understanding of Inclusion in STEM: Systemic Challenges and Support for Women and LGBT+ Academics and PhD Students'. *Science Education* 108(6):1637–69. doi: 10.1002/sce.21899.

Ruberg, Bonnie, and Spencer Ruelos. 2020. 'Data for Queer Lives: How LGBTQ Gender and Sexuality Identities Challenge Norms of Demographics'. *Big Data & Society* 7(1):2053951720933286. doi: 10.1177/2053951720933286.

Sedgwick, Eve Kosofsky. 1990. *Epistemology of the Closet*. University of California Press.

## Appendix

### Engagement and events: Building networks to share results and best practices

During the two UK-US research visits, we organised events to engage with LGBTQ+ people in STEM, policymakers, and other interested stakeholders.

In April 2024, the team organised an online event from Boston during which we introduced the project and showcased findings from our previous research on LGBTQ+ people in STEM. Marco Reggiani and Jessica Gagnon showcased results from the STEM Equals Project in the UK, whereas Tim Atherton and Ramón Barthelemy introduced their work around the APS LGBT+ Climate in Physics Study. This was followed by a panel discussion during which we engaged with the audience to answer questions and share more information about the study.

In September 2024, the team organised a hybrid symposium at the University of Manchester during which we presented findings from the project, featured a presentation from the RSC, a keynote conversation between Prof André K. Isaacs and Dr Clara Barker, and a panel discussion with members of other RSC-funded projects.

**Figure 3.** Posters for the April 2024 event and the September 2024 symposium.



Apart from the events we organised, we joined a number of other events to build networks and share good practices from the project. In February 2024, Dr Marco Reggiani joined the panel “Does Representation Matter? Being Queer and an Engineer” at the University of Manchester. In June 2024, Marco Reggiani was invited to join a keynote EDI conversation at the Power Systems Computation Conference in Paris, and in July 2024 he presented preliminary findings from the project during a webinar hosted by the RSC for Chemistry World. In November 2024, Dr Marco Reggiani was invited to speak at the University of Surrey where he shared findings and recommendations from the project.

### **Other outcomes**

Dr Marco Reggiani and Dr Jessica Gagnon authored a book chapter “Welcome home? Finding your (queer) place in Scotland and in STEM” which includes data from the LGBTQ+ project. The chapter will be published next year in the book 'Queer in A Wee Place: Small Nations, Sexuality & Scotland' (title tbc) edited by Prof Yvette Taylor.

### **Acknowledgments**

This research was funded by the Royal Society of Chemistry (RSC) and the Science and Innovation network (SIN). Any opinions, findings, and recommendations expressed in this paper are those of the authors. The authors wish to thank the participants in this research project.

### **Meet the Team**

We are a team that brings expertise across social sciences and STEM fields, employing multidisciplinary approaches to our collaboration. Our team includes Dr Marco Reggiani, University of Strathclyde (Principal Investigator), Dr Timothy Atherton, TUFTS University (Co-Investigator), Dr Jessica Gagnon, University of Manchester (Co-Investigator), Dr Ramón Barthelemy, University of Utah (Consultant).



Dr Marco Reggiani’s research focuses on issues of equity, diversity, and inclusion in STEM and higher education, as well as on planning and urban development. This has included exploring the experiences of LGBTQ+ people and women in STEM and designing initiatives to remove barriers to inclusion for marginalised and excluded individuals in STEM. He is the co-founder of StrathPride, the LGBTQ+ Staff & PGR Network at the University of Strathclyde.



Prof. Timothy Atherton is a theoretical physicist and physics education researcher, who has been advocating for LGBTQ+ inclusion in Physics since 2009 through organising events at APS meetings, colloquia, talks etc. He was a member of the APS ad hoc committee on LGBTQ+ issues that convened in 2016 to produce a report—the first of its kind—on the status of LGBTQ+ people in Physics. Together with Ramón Barthelemy, and other co-authors, he published the first study of LGBTQ+ climate in Physics. He continues to research these issues, particularly how classroom practices facilitate the participation of marginalised people.



Dr Jessica Gagnon is a sociologist focused on inequalities, including inequalities related to gender, sexual identity, race/ethnicity, social class, and caring responsibilities. She has worked in higher education in the US and UK for more than 20 years. Her most recent research projects are focused on inequalities in STEM, including: the EPSRC-funded STEM Equals project; the EPSRC-funded IGNITE+ project; the NERC-funded E-DIAL project; the SLiC-funded See Yourself in STEM project; the University of Manchester-funded Inclusion for Innovation. Jessica is the co-chair of the Gender and Education Association, an international charity founded in 1997, focused on gender inequalities in education.



Dr Ramón Barthelemy is an associate professor of physics and astronomy at the University of Utah and a fellow of the American Physical Society. Previous to his faculty position Ramón was a Fulbright Scholar in Finland, a Science Policy Fellow in the U.S. Department of Education and a private sector consultant. His work focuses on the lives, educational experiences, and career paths of marginalised students in physics and STEM. This has included work on LGBTQ+ people, graduate Students of Color, and women in physics.

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

Please cite this report as:  
Reggiani, M, Gagnon, J, Atherton, T., (2024) "LGBTQual+: Creating change by telling the whole story: Making the case for qualitative research methods to strengthen LGBTQ+ retention in STEM in the US and the UK – Final Report", Royal Society of Chemistry, London UK.



Department for  
Science, Innovation  
& Technology



UK Science  
& Innovation  
Network



ROYAL SOCIETY  
OF CHEMISTRY