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"I never want to leave part of myself at the doorstep": Experiences of Canadian LGBTQ2S+ postdoctoral scholars in the sciences

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ABSTRACT

Diversity and inclusion in science improves the field for all, but cisheteronormative cultures can make academic science departments difficult for LGBTQ2S+ (Lesbian, Gay, Bisexual, Transgender, Queer, 2-Spirit[1], and other identities) individuals to navigate. Evidence suggests that this cisheteronormativity can contribute to a "leaking" science pipeline, where such individuals are more likely to seek out paths outside of science and academia. Studies also show that postdoctoral scholars have low life satisfaction and trouble finding academic jobs, which could worsen this "leak". However, there is little Canadian data on this topic, and no data on LGBTQ2S+ postdocs. This qualitative study explored the values, beliefs, and experiences of 14 Canadian LGBTQ2S+ postdocs in science. Semi-structured interviews were conducted about coming out as LGBTQ2S+ in science, experiences of mentorship, and their beliefs on staying within science and academia. Interview data was analyzed thematically from a poststructural perspective. The main themes that emerged were: 1) feeling supported and accepted, 2) experiencing cisheteronormativity and discrimination, and 3) the leaking academic pipeline. While some participants experienced their science departments as supportive, many also discussed heteronormativity, cisnormativity, and sexism, which was consistent with previous literature. Many participants considered leaving academia due to lack of job security, competitive job market, and work-life balance issues.

KEYWORDS LGBT, LGBTQ+, LGBTQ2S+, STEM, science, postdoc, Canada

[1] The term 2-Spirit is a self-identifying term that Indigenous people use to resist Western binary constructs of gender that were imposed on Indigenous populations during colonization.

"I never want to leave part of myself at the doorstep": Experiences of Canadian LGBTQ2S+ postdoctoral scholars in the sciences

Diversity in science drives innovation in the field, as people with different backgrounds and perspectives are more likely to find new ways to solve problems (Cech & Waidzunas, 2021; Hofstra et al., 2020). Increasing representation and inclusion of marginalized groups in science would increase opportunities and advance equity. Moreover, increasing diversity and participation can have positive effects on job satisfaction for those who feel involved (Smith et al., 2018). However, the novel contributions of gender and racial minorities to science are disproportionately "devalued and discounted" in comparison to the innovations of majority scientists (Hofstra et al., 2020). Many have written about the "leaky STEM pipeline", a metaphor for the stream of students completing STEM (Science, Technology, Engineering, and Math) education, some of whom complete their education and become STEM professionals, while the rest "leak" from the pipeline to pursue other paths (Doerschuk et al., 2016). Minoritised populations in STEM such as women, racialized persons, and LGBTQ2S+ individuals tend to disproportionately leak from the pipeline (Ellis et al., 2016; Hughes, 2018; Sass, 2015). In recent decades, Canadian universities have been developing strategies to foster equity, diversity, and inclusion through strategic planning, policies, and programming (Tamtik & Guenter, 2020). The question remains whether this has had any tangible effect on the experiences of students, postdoctoral scholars, and faculty, particularly in the sciences.

LGBTQ2S+ (Lesbian, Gay, Bisexual, Transgender, Queer, 2-Spirit[2], and other identities) individuals face marginalization which negatively affects them (Burgess et al., 2007; Kassing et al., 2021; Lehavot & Simoni, 2011). This marginalization stems from a dominant culture of cisheteronormativity in society. Cisnormativity is defined as "A discourse based on assumption that cisgender is the norm and privileges this over any other form of gender identity", and heteronormativity or heterosexism is defined as "A discourse based on assumption that heterosexuality is the norm and privileges this over any other form of sexual orientation" (LGBTQ+ Primary Hub, n.d.). Cisheteronormativity is the combination of cisnormativity and heteronormativity. Adrienne Rich and Audre Lorde were some of the first authors to write about heterosexism and compulsory heterosexuality (Lorde, 1984; Rich, 2003). In her 1980 paper, Rich asserted that "The assumption that 'most women are innately heterosexual' stands as a theoretical and political stumbling block for feminism." (Rich 2003 p.633).

[2] The term 2-Spirit was first introduced at the third annual intertribal Native American/First Nations Gay and Lesbian Conference in Winnipeg, Canada. This term is a self-identifying term that Indigenous people use to resist Western binary constructs of gender that were imposed on Indigenous populations during colonization (Vigneault, 2014).

The effects of these cultural beliefs can be seen in the higher drop out of non-heterosexual students from STEM higher education. In the United States, Hughes (2018) found that sexual minority students were 8% less likely than heterosexual students to be retained in STEM Bachelor's degrees after four years. Similarly, Sansone and Carpenter (2020) found that men in same-sex couples were 12% less likely to have completed a Bachelor's degree in STEM compared to men in different-sex couples. Other researchers illuminate possible reasons for this lower retention. Mattheis and colleagues (2020) described in their qualitative study a heteronormative and impersonal atmosphere in STEM workplaces, where everyone is treated as straight and cisgender, and sexuality is considered a personal topic that doesn't come up. Participants felt they needed to conceal their identities at work. Miller and colleagues (2021) link this heteronormativity to a "bro culture" that centers cisgender heterosexual men in STEM departments. Components of this culture include hypermasculinity, assumed heterosexuality, treatment of LGBTQ2S+ students as inferior or invisible, and objectification of women. Bilimoria and Stewart (2009) reported similar descriptions of heteronormativity and invisibility, and as a result, participants experienced fearfulness, expended labor trying to interpret cues, isolation, and negative career consequences such as not getting a job due to their identity. Cech and Waidzunas (2021) found additional negative consequences; LGBTQ STEM professionals in their sample were more likely than their straight cisgender counterparts to experience professional devaluation (colleagues discounting their STEM experience), social exclusion, health and wellness difficulties, intentions to leave STEM, and fewer career opportunities and resources.

While the aforementioned research illustrates issues with LGBTQ2S+ inclusion in universities, most of this research was conducted in the United States. Canada's different education system and overarching political atmosphere regarding LGBTQ2S+ rights may result in differing academic experiences for LGBTQ2S+ students and other trainees in STEM. For example, a global attitudes survey in 2019 found that 85% of Canadians felt homosexuality should be accepted in society, versus 72% of Americans (Poushter & Kent, 2020). Another report found Canada to be one of the five globally most accepting countries of LGBTI (lesbian, gay, bisexual, transgender, and/or intersex) people and issues (Flores, 2021). In Canada, after high school many students choose to attend undergraduate university programs, which usually have Honours programs for students to gain research experience in their chosen major(s). Then students can apply for graduate or professional programs, such as a Master of Science. Some Master's programs fast-track into a Ph.D., whereas others require students to apply for Ph.D. or other doctoral program after the Master's. After acquiring a doctorate degree, one can apply for academic positions, or can go on to train as a postdoctoral researcher.

A postdoctoral scholar (postdoc) is someone who holds a doctorate or medical professional degree and is affiliated with a university for the purposes of mentored research and advanced training (Jadavji et al., 2016). Postdocs are valuable assets to universities and other research institutions as productive researchers. Post doc positions are usually temporary contracts for two or three years at most, not just in Canada but globally. However, many postdocs seek a tenure-track academic appointment, and these appointments are scarce in comparison to the number of

postdocs, creating a "queue" of postdocs, many of whom do not reach their academic goals (Andalib et al., 2018; Powell, 2015). Moreover, one study finds that postdoc life satisfaction is low, and that atmosphere in the lab is a significant predictor of this reduced satisfaction (Grinstein & Treister, 2018). The lack of career options and low satisfaction is supported by a Canadian survey by Jadavji et al. (2016), and satisfaction with salary and benefits is the lowest. McConnell et al. (2018) found that gender impacts postdoc experience, with a wage disparity between men and women, and a lack of female mentors in STEM. However, there is little research on how other aspects of identity, such as sexuality, can impact the postdoc experience.

There is currently a dearth of information about Canadian LGBTQ2S+ postdocs in the sciences. The aim of this study was to learn about their experiences, values, and beliefs in their science postdoc. The present study used an exploratory qualitative approach, through a poststructural lens.

METHODS

Theoretical Perspective

This project used poststructuralism as a theoretical lens. Poststructuralism is a theory of language and discourse that has been used to illustrate how beliefs, values, experiences, and identities are socially constructed. As Agger (1991) noted, the most important hallmark of poststructural work is its aversion to clean positivist definitions and categories (p.112). In other words, poststructuralist work does not assume there is one knowable truth to find and apply neutrally to work, but that there are many truths that are constructed through historical contexts. Social discourses construct what can be known, what can be said, and what can be thought, as well as what cannot be known, said, or thought. Discourses are the way beliefs, values, experiences, and identities are normalized. In this framework, we are shaped by the societies in which we live and become known by the social and cultural norms constructed through language and discourse. As Perron and Holmes (2011) wrote, "human sciences play a crucial role in the establishment of social norms that help manage individuals, understand their desires, and predict their behaviors" (p. 192).

Poststructuralist thought is ideally situated for research exploring sexual orientation and gender. In his *History of Sexuality*, Foucault (1978) reviewed the way concerns about sex in the seventeeth century gave rise to competing discourses about sexuality, which in turn created new understandings and new categories of sexuality. He traced the production of the "heterosexual" and "homosexual" categories. He deconstructed the way people came to understand themselves within these new distinctions and how the "homosexual" became subversive and pathological to the "heterosexual". Where there is discourse there is also the possibility of resistance (Francis, 2000); in the late twentieth century, with political and social movements of advocacy, people sought to reject such labels and resistant discourses on sexuality, gender, and identities emerged. Alongside this, modern LGBT advocacy movements emerged. By examining the social construction of knowledge and identities, poststructuralist thought offers us a way to further the critical examination of sexual orientation and gender discourses in modern sciences.

Positionality/reflexivity
In line with poststructuralist theory, in which researchers are not neutral observers (Francis, 2000), we present briefly our positionality. On our team of three researchers, one identifies as a gay man, one identifies as queer and trans, and the third identifies as a gender minority in science in Canada. The research team also has a strong background in applied and life sciences. These lived experiences give us some "insider knowledge" of the topics at hand, which has several advantages, identified by Greene (2014). These advantages include knowledge of the research context, more natural interaction with participants, and easier access to the population of study. Being an insider also holds the researchers more accountable to participants (Wilson, 2008). All three researchers have experience with studying inclusion of marginalized groups in the sciences and other related fields (Franz-Odendaal et al., 2016, 2020). One is a junior researcher (holding a Master of Arts in Community Psychology), one is an early career researcher (within 5 years of their first academic appointment) and one is an established researcher (with greater than 15 years as a professor).

Participants and Recruitment
To recruit Canadian LGBTQ2S+ postdocs, Canadian postdoctoral associations were contacted and shared the study advertisement through email with their members. The advertisement was also posted in LGBTQ2S+ Facebook and Basecamp groups for Ph.D. students and other researchers. Additionally, the researchers shared the recruitment call with a national group of trans researchers. The study information was also shared through other social media and personal connections of the researchers.

The inclusion criteria were as follows: 1) Must self-identify under LGBTQ2S+ umbrella, 2) Must be a postdoctoral researcher, and 3) Must work in the sciences. For the purpose of this study, science included biology, chemistry, physics, math, earth science, environmental science, psychology, and neuroscience. Exclusion criteria were: those who were not currently living in Canada, and those who did not speak English.

Procedure
This study was approved by the Research Ethics Board at Mount Saint Vincent University. As each participant emailed the researcher to express interest, they were asked to complete an online survey to assess eligibility and gather demographic data (age, racial identity, gender identity, among others). Participants signed an informed consent form. The researcher then scheduled a 60-90 minute one-on-one, semi-structured interview based on availability. Interviews were conducted virtually using Microsoft Teams software. The interviews were audio- and video-recorded. Each participant answered questions about their experiences as an LGBTQ2S+ postdoc in Canada, such as their experiences within their research environment, their beliefs on coming out as LGBTQ2S+ in science, experiences of mentorship, and their beliefs on staying within STEM and academia. After the interview, participants were given a list of mental health resources they could access if needed. At this point, they were compensated for their time with a $25

Amazon e-gift card. After the interview, the auto-transcript produced by Microsoft Teams was checked for accuracy by the researcher. Participants were asked in the consent form whether they wanted to review their transcripts, and those who said yes were sent their transcript via email for approval.

Data Analysis

Although participants had different identities (i.e. gay vs. queer), all identified under the LGBTQ2S+ umbrella, and all were sexual minorities, so their data was analyzed together. Thematic analysis was used in MAXQDA software according to the method described by Braun and Clarke (2006, 2012). Thematic analysis is used to find "patterns of meaning (themes)" in a qualitative dataset. The general phases of this method are as follows; 1) familiarize yourself with the data, 2) generate initial codes, 3) search for themes, 4) reviewing potential themes, 5) defining and naming themes, and 6) producing the report (Braun & Clarke, 2012). These phases were followed in an iterative fashion. The research team met periodically to review the data and themes that were being produced, redefining themes as needed.

RESULTS

Sample Characteristics

Sixteen participants completed the screening and demographics survey, and of these, two participants were not eligible due to not identifying within the LGBTQ2S+ community, leaving 14 participants who were interviewed. Sexual identity was a "select all that apply" question: 57% of the sample identified as gay, 29% as lesbian, 21% as bisexual, 7% as asexual, 7% as pansexual, and 29% as queer. Half of the participants were cisgender women, and half were cisgender men. None identified as transgender or Two-Spirit.

At the time of the study, participants were living in Ontario (29%), Alberta (36%), Quebec (29%) and British Columbia (7%). Ages ranged from 28 to 38, with an average age of 32.93. No one in the sample identified as First Nations, Inuit, or Métis, but one participant identified as Native American. Most of the sample was White (71%), with 14% identifying as Latino/Latinx, 7% as Middle Eastern and 7% as mixed race. Only 2 participants were born in Canada, and the rest had come from other countries: Colombia, Ireland, the United Kingdom, the United States, Poland, Scotland, Brazil, Lebanon, and France. Many had come to Canada for their postdoc, and most had been in Canada for 1-5 years. Participants were studying neuroscience (36%), biology (36%), oncology (14%), pharmacology (7%) and psychology (7%). Participant data was analyzed all together rather than split into individual identity categories, as many participants identified under more than one identity label.

Themes

Overall, many participants described their work environments as accepting of LGBTQ2S+ identities, but many also discussed evidence of cisheteronormative values and practices in their departments. Some individuals in the sample described witnessing and experiencing sexism and misogyny. Participants with multiple

marginalized identities had a harder time navigating certain situations. Some participants considered leaving academia due to this and other problems.

Feeling Supported and Accepted

Generally, many participants described their postdoc environment as supportive toward the LGBTQ2S+ individuals. Some participants struggled to think of any time that they felt uncomfortable in terms of their LGBTQ2S+ identity in their postdoc. Many participants discussed being out to their supervisors and being accepted:

> "Within the lab environment, since he's kind of the head, he really does set a very open accepting environment for everyone too, like students of color have also had really amazing acceptance in conversations with him. So I just feel like I was really lucky to find a faculty mentor that was very like, just super Canadian almost, like this super welcoming, very nice, super understanding. And so within that umbrella like, you know, it sets the tone right?" (P11)

This participant said that not only was her supervisor welcoming, but his attitude created a culture of support in the lab more generally. Some participants also mentioned that their colleagues and the general environment of their workplace was supportive:

> "And then everybody else as well, like fellow postdocs, grad students, like everyone has been really great, and even just kind of the floor I work in, just my general day-to-day work environment, has been really accepting, and it's just a non-issue." (P11)

This participant felt comfortable around their colleagues due to their accepting attitudes toward LGBTQ2S+ identities. More broadly, some participants described initiatives happening in their field that create supportive and accepting environments to LGBTQ2S+ postdoc researchers, such as putting pronouns in email signatures:

> "We can see almost in real time the consequences of people coming out. You know, like because more and more people feel comfortable, I see it with like adding your pronouns to email signatures. It just makes it so much easier for people to do those things. And it costs me nothing, like I don't care, it doesn't cost me anything." (P14)

This participant attributed the use of pronouns in email signatures to the increased number of people coming out in recent years. Pronouns in email signatures could also be a signal that an environment is inclusive toward LGBTQ2S+ identities.

Many participants also discussed inclusive hiring practices in place at most universities, where applicants are given the choice to disclose certain identities, such as being a woman, Black or Indigenous, LGBTQ2S+, or disabled.

> "When I recruited an intern, it was very stated in the form when I was recruiting someone, that I was aware of the importance of considering minority people from here, we talk a lot about the Indigenous people, but also LGBT, and woman, so it was reminding me to be aware of it. I

> was already aware of it, but it was reminding me, so it means it's already embedded, and […] I know if the topic comes out, I will feel safe to behave and say what I think, I will not be having to… hide anything." (P13)

This participant discussed how the hiring policy demonstrated a pre-existing culture of support for minority populations, and this made her feel safer in her work environment. Many participants discussed inclusive hiring policies, and some felt that coming out in the hiring process would not hurt their chances:

> "Sometimes it could be like an advantage, I think. Yeah, I think there's a perception that gay people are dedicated, or very hard working. You know, they're good at what they're doing. So I guess this could be helpful in that regard. Yes, I don't think it will hurt me." (P12)

This participant felt that general positive perceptions of gay people could help him in the hiring process when applying for academic jobs. Even more broadly, some participants said that science and academia in general is more progressive than other industries:

> "My perspective about academy, like professors, scientists, they're really open minded. Professors need to be in touch with so many students with different backgrounds, in any place in the world, like they need to be very close to the humanity of the students, they cannot judge, and then they don't judge, most of them. […] In the university I feel more surrounded by gay people, and other type of sexuality, than other places, like companies or other environments. I find a lot of gay people being assumed in the university. So from my perspective, and my experience, it is very inclusive." (P2)

This participant felt that academia is a non-judgmental environment with lots of different types of people. He had previously worked in the forestry industry and found by comparison that universities are more inclusive and diverse. Overall, many participants perceived supportive and accepting attitudes at the individual level, culturally in departments, at the policy level, and broadly in science and academics as a whole.

Experiencing Cisheteronormativity and Discrimination

While many participants discussed cultures of inclusion in their work environments, many also referenced evidence of cisheteronormativity, sexism, and other discriminatory beliefs in their departments and fields.

Many participants discussed that they witnessed or experienced heteronormativity or homophobia. They discussed this both at a systemic level with hiring and funding, and an interpersonal level. In contrast to the participants who felt hiring practices were inclusive and could benefit them, others felt unsure:

> "You hear so often from heterosexual people like, 'No, no, like you need to use your sexuality because there's this massive push for diversity and inclusion, and if you are not only a female but homosexual female, you're going to check off two of their diversity

> boxes.' And that's great from a heterosexual perspective, I also am still very aware and cautious around the complete opposite happening, that there are still people out there with unspoken- I don't wanna go so far as say, homophobia but like, I dunno, it's always in the back of my mind. Will this help me or will this hurt me?" (P10)

This participant noted that while there is a push in universities toward hiring for diversity, some individuals responsible for hiring may still hold unconscious bias, and this made her unsure about disclosure. Also at the systemic level, one participant noticed that colleagues studying LGBTQ2S+ topics were less likely to get funding:

> "I saw lots of people who are studying queer related topics, not get funding. and it was really hard not to think it was because of the topic, right? Especially when side by side, you compare them with somebody else, and they often had way more accolades. You know, way more publications. Way more, you know, improvement or way more progress with their with their other research right? And so, by all accounts they should have gotten the funding, but they didn't." (P1)

The participant witnessed fellow researchers not receiving funding for LGBTQ2S+ studies in spite of the qualification of those individuals and came to believe that this lack of funding was symptomatic of a system of science in which LGBTQ2S+ related research topics were not prioritized. Others described heteronormativity on a more interpersonal level, such as the onus of coming out:

> "I hate the argument that people say like, oh, straight people don't go around saying 'Hi, I'm [name], I'm straight', and they do! They just don't use the words. They just say things like "Oh this weekend, My wife and I…" If they're a cis male or whatever, and they don't realize that they do it […] Definitely-- coming out, you don't just come out once, you come out a million times, and I would never want to leave part of myself at the doorstep as I walk into the door to my workplace." (P8)

This participant described an environment where heterosexuality is assumed, and because of this assumption, LGBTQ2S+ individuals need to come out not once, but many times. Another participant described subtle exclusion from straight colleagues:

> "It's very subtle exclusion, because they have families and wives, for example, there's lots of straight postdocs, that they get with other straight postdocs who have families, and that's like that is their core group, and they don't exclude you, it's not like a conscious aggressive, it's a very subtle passive. I don't even think that they would be aware of it. Where you're just excluded." (P14)

This participant noticed that his straight colleagues would all hang out together and subtly exclude others. Similarly, some participants described experiences with cisnormativity and transphobia:

> "I have always been in sort of a conservative academic department, and that has always been sort of my main social group, and… I have wondered if that has affected my relationship with my gender, because if I for example decided I wanted to use different pronouns, that would be a really big deal. In my work, it would be a *huge*, it would be a *huge* deal. It would be a thing that they had never heard of before. […] I don't feel like I need to use different pronouns, but I have also wondered if I were in a place where it was easy to use different pronouns, would my perspective on that be different?" (P5)

This participant felt that using different pronouns in her workplace would be a big deal, as she worked in a conservative and cisnormative environment. She pondered whether this work environment was stifling her gender exploration or expression.

In addition to cisnormativity at the department level, participants also experienced it on a broader social level, such as this participant who experienced transphobic comments from a collaborator on an international team:

> "I'm part of something that involves people from around the world. And we were speaking about, what rules do we want to put in place to make sure that we're all respectful and blah blah blah, when working together. And I said, it would be really nice if we could respect people's pronouns and their gender, and not misgender people and just be respectful. And I thought that was a totally legitimate thing to do, and say. And I had someone from a country that is very religious tell me that I was pushing my agenda against their traditional Christian beliefs and against the idea of it being more than a man and a woman. And it was very upsetting and I didn't, I was very upset for the rest of the night, I had a nice little cry in the evening." (P8)

This participant discussed how their colleague asserted that he believed there are only two genders, and any other perspective was opposing his religious beliefs. This affected the way this participant felt about his identity:

> "It was the first time in a long time that I felt, ohh, I might have to not be gay around that person. and by be gay, I mean be me. And it was like whoa, that's a really difficult thing. […] This is the first time in a long, long time that someone's made me feel less than." (P8)

This participant felt pressure to conceal his gay identity around the colleague who made this comment, which felt like hiding a key part of who he is.

People often travel to different countries to do their postdoc, as evidenced by the many home countries of these participants. Some participants recognized that in

many parts of the world, social and cultural norms still view LGBTQ identities as deviant, against God, pathological, or non-existent. Participants discussed their experiences with colleagues from other cultures in their labs and workplaces. Some participants noted how their experiences created feelings of uncertainty about coming out and unsure if their colleagues would be supportive of their LGBTQ2S+ identity:

> "I met someone for the very first time. […] she was like, 'oh, do you think this guy is good looking?' and then someone else was like, 'he's married!' and she's like 'that's OK! I can still ask the question' […] In a room full of people that I had never met. And then going through the conflict in my brain of how to navigate it, like, uh, should I correct her? Do I know these people? Do I want to correct her? […] and that could just be a cultural thing… This woman was born and raised in Pakistan, where maybe people from the gay community is not something she sees very frequently or comes across very frequently. I don't know." (P10)

This participant's colleague seemed to assume that she liked men, and the participant thought it could be the colleague's lack of exposure to diverse sexual and gender identities causing them not to realize she could be gay. This participant then had to make the uncomfortable choice of coming out to a roomful of strangers in a professional setting, or somehow avoiding the question. This participant generally had trouble with "feeling people out" at work to see if they would be a safe person to come out to. Similarly, heteronormative values showed up in other ways:

> "But if I had to like name one thing, I think it would be… The double standard of talking about your spouse. […] If I say anything about my spouse, someone may say something like 'Oh, that's not really professional to talk about your personal life' and yet you hear them, in the same breath, talk about what they did with their wife in the weekend or that their kids. So that that level of microaggression where me doing exactly what straight people do, talking about my personal life, it's seen as political or unprofessional, and having like people sort of get uncomfortable. And instead of saying 'I'm uncomfortable with gay people,' they'll say, 'oh, I don't think it's professional to talk about personal things at work.'" (P14)

This participant explained a double-standard where talking about one's partner or family at work can be seen as acceptable or as unprofessional, depending on whether the partner mentioned is of the same sex. Similarly, some folks discussed their supervisors being neutral or not caring about identity:

> "… 'I don't care like I really don't care. That's cool,' and I feel like some people would view that as dismissive, and to me it doesn't come across like that, because I know so many scientists, particularly male scientists, who genuinely don't care about anyone's relationships. They don't care if you were gay or trans, whatever, they don't care as long as you're good scientists, I do believe that, but I feel that in some

> ways that can appear dismissive to people who kind of want to be acknowledged. You know, I am different. I'm queer and trans or whatever and, 'I don't care, you work hard and I don't care' it can seem a little dismissive." (P4)

While this participant didn't feel upset by the "I don't care" attitude of some male scientists, she said some people may prefer their identities to be acknowledged in a professional setting, as a part of who they are.

Overall, cisnormativity, transphobia, heteronormativity, and homophobia were witnessed and experienced by participants, even if participants also described an overall supportive atmosphere in their department or field.

Gender Construction and Sexism

In addition to cisheteronormativity, participants also discussed sexism and the construction of gender roles in science and in their respective departments. Participants were somewhat split on whether science is generally male-dominated and considered to be masculine in nature. One neuroscience post doc expressed this strongly:

> "Science is a complete boys club. I barely work with any women. Both my supervisors are men, the other postdocs that I work with are men. It's a complete boys club, actually." (P10)

However, this differed between institutions, for example another participant (also a neuroscientist) discussed working with many women, so did not feel that their field was male dominated:

> "Heteronormative, yes, but masculine, I'm not sure. Cause I feel, there's a lot of women in my field. My two previous supervisors were women. My current one is a man but… I never felt that it is very masculinity focused, no." (P9)

However, whether or not the field is male-dominated, multiple participants experienced or witnessed sexism in their workplace or field:

> "People hate women and working with all women. It's so funny, even teaching, we compare teaching evaluations, I can do and say the exact same things as my colleagues, and… my female colleagues get hammered for it." (P14)

This participant, who identified as a man, believed that women in science faced experiences of hatred and misogyny, using an example of witnessing double-standards in teaching evaluations between men and women. More than one participant discussed this, explaining that even when female professors teach the same subjects and use the same course material as their male colleagues, they receive more negative feedback from students.

One participant spoke of sexist microaggressions, and gatekeeping based on her appearance:

> "Going to conferences where you meet literally everyone, like I've had some comments from other- It's usually older men. And like on my appearance, and how like I'm too pretty to be in science? Or too pretty to be smart? […] and one of those was during an interview too, for a Ph.D.-- or Masters, and I was like, I went all the way to [CITY] for this? And they spent the entire interview telling me that I should like, reconsider my career choice, because a girl like me is probably not going to get into a Ph.D." (P7)

She discussed sexist comments not only at conferences, but also graduate school interviews. Another participant explained that she sees masculinity as a rewarded characteristic in her department:

> "It totally is about masculinity, and you know, when I think about the women I know who have been very successful in science, they have taken on masculine traits in terms of social interaction and, and presentation. And you know they may be very feminine presenting, you know, in terms of how they dress, in terms of how they- you know, those sort of personal identity things. But in terms of how you act in a meeting, in terms of how you act in response to a question in a seminar, or what you might say to a student. You know the women, the women who I know who are very successful in science, have taken on a very masculine way of dealing with that. Uh, absolutely. and and I mean I had absolutely noticed that in myself as well. You know, the more, the more masculine I am in my interactions, the more that is like accepted, and you know, oh, you know, it's so wonderful, you know you made such a good point, all that kind of thing." (P5)

This participant described masculine behaviours being rewarded and seen as correct. Interestingly, she said that even feminine presenting women are more successful in science if they behave in a masculine way. The participant did not specify the masculine traits or how such traits made women more successful in science. This, however, suggests that masculinity culture may go beyond simply the ratio of men to women in each department, as will be discussed later.

In sum, many participants experienced or witnessed sexism and a constructed masculine culture in science, and in their departments.

Navigating Multiple Marginalized Identities

Some participants had social identities other than being LGBTQ2S+ that were relevant to them in terms of their postdoc experiences. One participant explained her thoughts in navigating teaching as an LGBTQ2S+ woman:

> "People who got the best evaluations are straight white men. Anybody else, you get slammed. I have never gotten so many comments about

> my appearance in my evaluations, and that's like most other women that I know. And that influenced the hell out of what I wore every time I taught. Because I was, you know, just nervous that if my pants were too tight or I showed too much cleavage. […] and I know that people who have-- who are openly out, They also get presumed to be not as intelligent, and not as effective as an instructor." (P1)

This participant explained that the sexist comments about her appearance made her preoccupied with what she was wearing to teach. In addition, her fears about student perceptions of LGBTQ2S+ individuals made her wary of coming out in a teaching environment.

Another participant had a black gay male colleague who was met with scrutiny by others in the department:

> "Yeah, I mean I have a friend who's more femme, and is also black […] I'm a safe gay to some people. and so they message, 'so what's his deal?' it seems like an innocuous question, but it's like 'you're also gay. Please explain why he's more gay than you,' right? […] My experience is very much colored by my background and privilege, but that would be my read on the situation, personally speaking is, they're pretty great environments, part of that has to do with, I don't think I'm a threatening person to the status quo." (P14)

This participant reflected on how being white-passing and less effeminate as a gay man made him more approachable or palatable to his straight colleagues. He explains that this could be part of why he had a positive experience, compared to others in his department with different identities and presentation.

In other instances, when participants had multiple stigmatized identities, they struggled to interpret ambiguous negative experiences:

> "I only had one issue, and it was like an undergrad who was working for me, who… Definitely did not respect me at all, and it was like a weird thing. I don't know if it was because I'm a woman, I don't know if it's because I'm a very outwardly queer person, or like I'm fairly casual. But yeah, was going to my male, you know, cis straight male counterparts in the lab, and talking about how incompetent I am." (P11)

> "I can't say specifically if it's just me being a woman in STEM or if it's a sexuality thing, but I've definitely been in a room with two men, and had one person not even look at me, and I pick up on that. And I point, and I've pointed it out. I reflect on those things, and I think OK, Is this because I'm a woman, is this because I'm gay, or is this just this persons personality?" (P10)

In these instances, participants were unsure if the behaviours of their colleagues were motivated by prejudice against their gender, their LGBTQ2S+ identity, or if they behaved that way for an entirely different reason.

A Latino participant reflected on his personal belief regarding stereotypes about Latinos and gay men:

> "I am a Latino, so it affects positively because of again, Latinos, we have some stereotypes that we are just like, fun, and we like to dance, we like jokes, we like gossip, we like… and so, again, these coordinators are expecting me to be like, very Latino, but somehow, I am not so much Latino. […] Everyone is very happy to have a Latino and Latino gay. So maybe just like a new thing, like a novelty, like, oh it is so fantastic for them to have, like a Latino and Latino gay." (P2)

Although this participant describes a view of being Latino and gay that sounds positive, he felt that his colleagues had false expectations of him and made untrue assumptions about him based on these stereotypes, which bothered him. He also felt his colleagues treated him as a "gay best friend", and he did not wish to take on that role.

Overall, participants who had other marginalized identities in addition to their LGBTQ2S+ identity found certain situations harder to navigate, due to others' perceptions of their identities.

Leaking Academic Pipeline

Many participants reported that they did think about leaving academia, but not due to their LGBTQ2S+ identity. Participants described many issues with working in academia, such as the competitive job market, low pay, lack of job security, and corruption.

> "It has more to do with science, With the, you know, the job prospects and so on in general rather than any sort of problems with me being gay or something, but you know, career in science, you never have any certainty about your future. you don't know how long you're going to, you're going to get the next contract for, you don't know whether you're going to get the money for your research, for your salary, and so on." (P6)

> "I thought about leaving, for sure. for a lot of reasons, Like you know, I mean, I'm yeah, I'm in my 30s, I have no retirement. I have no- you know it's like when you kind of commit to this track, you ha- like you almost have to get this really great tenure track job at the end of it. Or else you're like- I now I'm in my mid 30s with nothing to show and no retirement, no benefits, no nothing." (P11)

However, one participant was seriously considering quitting her postdoc. This was for many reasons, but her relationship with her advisor seemed to be the main

issue. She had several issues with her advisor, one of which being his inappropriate comments and jokes: "He's this sort of old-fashioned conservative guy, he does, you know, make inappropriate jokes about women. And make inappropriate comments about people of color, or about people's you know, country of origin." (P5) Her advisor was making comments and jokes about multiple different marginalized groups, and though the participant called him out for it, the behaviour did not change, and no others in the department spoke up. This led her to stay closeted at work:

> "In terms of my identity, I would say here, which is not what I would have wanted at all, I had just not talked about my identity. […] that's just not a conversation I want to have. It just isn't, I think. I think he wouldn't be homophobic, but I also don't feel like I have the mental energy to deal with, you know, I think he would make jokes, I think he would bring it up. I just don't have the mental energy to deal with that. I just don't have the capacity to deal with that." (P5)

The anticipation of how her advisor would react led this participant to stay quiet about her identity. Most participants, despite thinking about leaving, wanted to give academia a shot, with a few saying they would try for five more years and then move on if they couldn't find a permanent position. Moreover, a few participants had no intentions to leave, and many also discussed their passion for their current work:

> "No, I've never thought about leaving the institution or field… um… I've never felt… That I've needed to. Uh, so I work in a very, very small sort of tight knit field of study, so you get to know people really well, and there's never been a part of me that's ever thought 'I don't want to work in this field, I don't wanna work with these people' or 'there isn't a place for me here.' So no, I've always- I've found something I'm passionate about and I'm sticking with it." (P10)

Overall, the problems in academia led participants to consider leaving, but for most, not imminently, and not due to their LGBTQ2S+ identity. Many participants described a passion for their work, or the benefits of academia as reasons to stay. However, one participant was seriously considering leaving her postdoc, in part due to the discriminatory attitudes and behaviours of her advisor.

DISCUSSION

This study offers an exploratory glimpse into the work environments of LGBTQ2S+ postdocs in Canada. Though some participants experienced an affirming climate in their departments, there is clearly more work to be done to eliminate cisheteronormativity, sexism, and racism in academia.

Firstly, our data provides a new perspective on the beliefs of some Canadian postdocs about the inclusivity of academic spaces. Several participants commented that the attitudes of their advisors and colleagues in the lab were supportive, and that they felt accepted for their LGBTQ2S+ identity. This result was somewhat

unexpected, considering the previous evidence of hostile STEM environments for LGBTQ2S+ individuals (Bilimoria & Stewart, 2009; Cech & Waidzunas, 2021; Mattheis et al., 2020).

Our findings on experiences of heteronormativity and sexism echo the results of Miller and colleagues (2021) on "bro culture", and Bilimoria and Stewart's (2009) discussions of assumed heterosexuality and concealment of identity. There seems to be a link between masculinity culture and homophobia in science departments, and this has negative consequences for both the LGBTQ2S+ community and women. Moreover, women who also identify as LGBTQ2S+ may have a harder time navigating these multiple layers of oppression. Our results suggest that other identities such as ethnicity also come into play in science departments, which is consistent with literature that has found evidence of racial bias toward Black and Latino individuals in STEM (McGee, 2016; McGee & Bentley, 2017).

A particular manifestation of heteronormativity participants discussed was the double-standard with discussing partners and family. Specifically, straight colleagues seemed to be allowed to discuss this at work, whereas individuals with same-sex partners did not feel they had the same entitlement. This is similar to the findings of Mattheis and colleagues (2020) where the impersonal atmosphere of science categorized discussions of identity as too personal. Such impersonal atmospheres may seem neutral on the surface, but can reinforce heteronormativity and make science spaces more difficult for LGBTQ2S+ individuals to navigate. In addition, lack of disclosure of LGBTQ2S+ identity in scientists is associated with reduced scholarly publication rates, so there is potentially a productivity cost of having a heteronormative departmental culture (Nelson et al., 2022).

Findings of postdoc dissatisfaction and trouble finding academic positions are supported by our data (Grinstein & Treister, 2018; Jadavji et al., 2016). While participants liked the freedom of academia, there were downsides such as low salary, job insecurity, and competitive job markets for academic positions. This is supported by Jadavji and colleagues (2016) who found that 40% of survey respondents were somewhat or completely dissatisfied with their salary. Additionally, they found that 50% of respondents were not satisfied with career options due to lack of tenure-track positions, and 30% left Canada to find a position. Many participants in this study were considering leaving for industry positions, but most expressed an intent to stay in scientific research. The postdoc can be seen as the last step in the STEM pipeline before becoming a STEM professional, and our results suggest that even at this stage there is risk of leaving the field and "leaking" out.

This unique study provides an in-depth and nuanced look at LGBTQ2S+ postdoc experiences, and as such cannot be used to make broad claims about the inclusion of LGBTQ2S+ individuals in science in Canada. However, this exploratory look yields interesting results and shows a need for further research on this topic. The research team made efforts to recruit transgender individuals, people of colour, and 2-Spirit people, but this sample was predominantly white and from other countries, and none of the participants identified as transgender. Future research should

develop deeper connections with BIPOC (Black, Indigenous, and People of Color) groups and organizations to ensure meaningful participation from those communities. This may be a reflection of the historical exclusion of these groups from higher education and STEM due to institutional barriers, racism, and colonialism (Cross et al., 2022; Pidgeon, 2018). Future research could focus on intersections of LGBTQ2S+ identity with other identities, and the unique experiences of transgender people in science. Additionally, future research could examine the earlier points in the Canadian "pipeline" such as undergraduate and graduate education, to see where there may be other leaks of LGBTQ2S+ people from STEM fields. Finally, it would be interesting to explore the beliefs and values about gender and sexual orientation of STEM faculty or senior researchers who hire postdocs.

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