

Women & gender-minorities in mathematics: PhD student challenges

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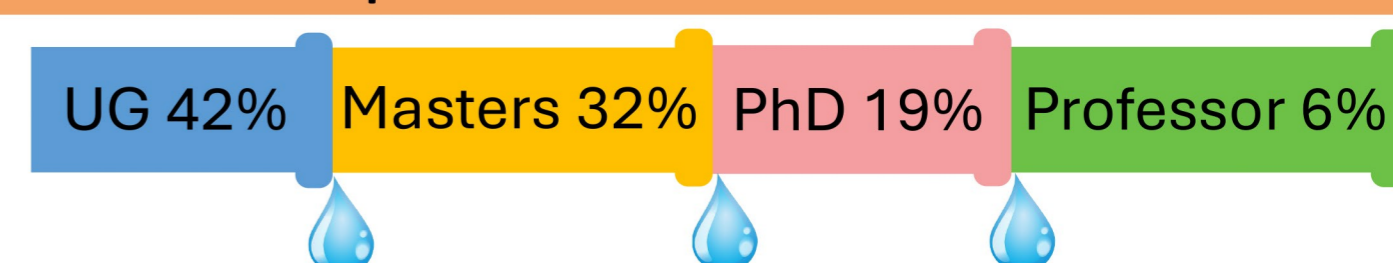
The problem:

Women and gender-minorities are under-represented in mathematics in UK Higher Education. The London Mathematical Society National Benchmarking Study in 2017 found 42% women at undergraduate level, 19% women at PhD level and only 6% women at professorship level, with no equivalent statistics collected for other gender-minorities. This is often referred to as the 'leaky pipeline' (Fig 1). While previous research has quantified and identified some of the structural barriers in place [1, 2] our recent work [3] found little evidence of deep qualitative exploration of the impact of gender on their lived experiences.

Our study:

We aimed to understand how current and recently graduated mathematics PhD students feel their gender may or may not have impacted their PhD experiences. We conducted one-to-one semi-structured interviews with 8 participants to explore their feelings, thoughts, ideas and experiences, covering departmental dynamics, relationships with supervisors and mentors, self-identification as a mathematician and future career plans.

Fig 1: Illustration of the "leaky pipeline" (LMS).



PhD experiences

The good:

- Most (7/8) said they **"enjoyed"** their experience "it was a really nice experience, very tiring but I enjoyed it"
- Participants **value flexible working** (7/8) "I do think it's important, especially for research, because it's more... I don't think you can make your brain work when it doesn't want to work..." and felt this was **well supported** by the school (6/8) "I feel like I can be as flexible as I want as long as I get the work done, which I really like"
- Most answered **yes to "do you trust and respect your supervisors?"** (7/8) and **"do you feel they trust and respect you?"** (7/8)

The bad:

- **Feeling treated differently by some supervisors** (4/8) "I don't know whether they [supervisors] feel more comfortable to be 'pally' with guys" // "I think if I'd been a guy there would have been more in common"
- **Would like more female mentors and role models** (6/8) "You don't need to explain it to a woman because it's already an understanding, whereas some men you kind of have to explain sexism" // "It would have been really nice to see somebody I can think 'that'll be me in 10 years' time"
- **Wary of positive discrimination** (4/8) "I remember getting a talk at a conference, I looked at the talk session I was in, and I was the only woman, so I was like, 'oh well I'm the token woman they've put in their session'" // "It does plant a seed in your head, you're thinking am I here because of my work or am I here because of my gender?"
- **Overcoming imposter syndrome** (4/8) "I think it's common to have imposter syndrome, but I do think being a woman makes it harder" // "I still feel like I'm stupid at what I do day to day" // "I always feel I'm going to be caught out—if I did a talk somebody will ask me a question and I won't be able to answer it, then that's my career done, everybody knows I'm an idiot"
- **Challenges with "femininity" and physical presentation** (3/8) "If a woman wears make-up, or if a woman doesn't just wear jeans and t-shirt, I definitely feel there's almost this... negativity towards that"

The ugly:

- **Experiences of micro-aggressions and sexism, particularly from other PGRs** (7/8) "It makes you feel a bit disappointed in the system and it makes me feel like I should be more outspoken about things like this, when it happens" // "I think insensitive reactions, even if they stem from ignorance... it is sexism"

Post-PhD choices

- **View gender as a barrier to continuing in academia** (7/8) "If I were to stay in my research field, I know it'd be harder for me to succeed than a man" // "When I write pros and cons for leaving academia, most of the reasons to leave come from me being a woman" // "There was always part of my brain being like 'why aren't women making it that far? What's wrong with the career path?' The male representation definitely made me think I probably won't make it"

What we are doing

- Reviewing inclusion of **EDI assessment in PGR recruitment** and developing **more EDI training opportunities for PGRs**.
- **Incorporating the findings into the new Newcastle University Researcher EDI toolkit**, a set of practical resources designed to empower researchers to value and understand diversity and promote inclusivity within their teams.
- The **Inclusive Culture Working Group** will review the findings and use them to **inform the development of new initiatives**, such as enhanced supervisor training and gender-equality focused community events.
- **Continued active listening**. We value the time and honesty from participants in this study, and are planning more opportunities to hear their thoughts (e.g., a display of this poster including a "your ideas and suggestions" letterbox for future EDI events).
- **Expanding the study to other schools in the Faculty** to investigate the breadth of the problem and share initiatives.

References

- [1] N Dasgupta & J G Stout, Girls and Women in Science, Technology, Engineering, & Mathematics: STEMing the Tide and Broadening Participation in STEM Careers, *Policy Insights Behav Brain Sci*, 2014.
 [2] L Howe-Walsh & S Turnbull, Barriers to women leaders in academia: tales from science and technology, *Studies in Higher Education*, 2014.
 [3] R Dhanda & L E Wadkin, Barriers for women in UK mathematics academia: their voices, <https://www.staff.ncl.ac.uk/laurawadkin/files/2022/03/LiteratureReviewPoster.pdf>, 2021

