

# **The Lindemann Trust Women in STEM Event**

## **25<sup>th</sup> November 2022**

### **A Report on the Roundtable Discussions between the Lindemann Trust Committee and Participants.**

***By Dr. Karen M. Mooney,  
The Science Room***

#### **Introduction**

In the UK, although women make up 47% of the UK workforce, they are only 24% of the UK STEM workforce (Davies, 2021). In Northern Ireland alone, only 7.8% of girls pursue a STEM based career with only 17% in a STEM leadership role (MATRIX, 2018). There are many initiatives to help promote STEM careers and mentors for children and young adults, such as STEM Women, STEMettes, and STEM Ambassadors. However while there is some success getting girls into STEM subjects in school and early career positions, there is a huge issue with retention of women in STEM careers (MATRIX, 2018; Jebson *et al.*, 2022). Industry and academia need focused initiatives such as Women into Science and Engineering (WISE) and its Ten Steps Framework to help businesses improve gender imbalance.

These organisations and their work have had a positive impact, with more young girls starting on the STEM career path, but not all have been successful across the board. The Athena Swan Charter was established to support improvements in gender equality with higher education and research in the STEM fields but it has disproportionately benefitted white middle-class women, while those women who are more marginalized (because of race, disability, sexuality and social-economic status) have been neglected (Graves *et al.*, 2019; Jebson *et al.*, 2022).

There has been a 31% increase in entries from women and girls to STEM A-levels between 2010 and 2019; an increase in the number of young women taking Mathematics (+2.8%) and Further Mathematics (+3.9%), and in 2019/20 women accounted for 11.4% of STEM starts, up from 8.8% in 2017/18 (DfE, 2021). By 2030, on the current trend there will be almost 30% of core-STEM roles being filled by women –1.5 million women in total (WISE, 2019).

However, this is still a long way off being close to a 50% uptake and there is still the problem of the “leaky pipeline” (Pell, 1996; Grogan, 2018). Despite equal achievement between boys and girls in early childhood, systemic imbalances lead to a gradual decrease in the number of women represented in undergraduate and graduate degrees, right through to large

gender disparities in early and late stage career academic positions (Pell, 1996; MATRIX, 2018; Davies, 2021). This leaky pipeline hinders the development of science, the visibility and perceived accessibility of science careers to young women and the career progression of those who do embark on a scientific career, particularly in the physical science fields (WISE, 2019; Davies, 2021; Fulweiler *et al.*, 2021). Some of the key cracks in the career pipeline for women are shown in Figure 1 below (Grogan, 2018 and references within).

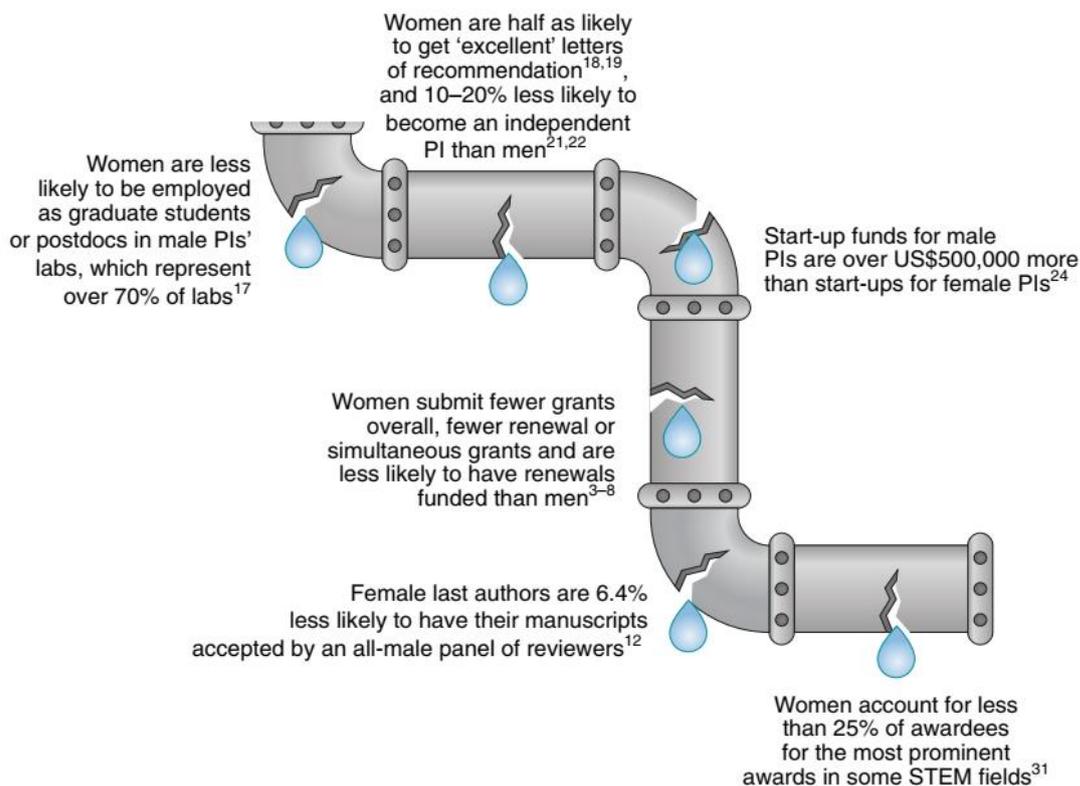


Figure 1. Leaky pipeline of women in STEM (Figure from Grogan, 2018. DOI: 10.1038/s41559-018-0747-4).

This phenomenon is evident to the members of The Lindemann Trust when assessing applications to the yearly Lindemann Fellowship. The Lindemann Fellowship is open to all final year PhD students and early career postdoctoral researchers working in the fields of Physics, Mathematics, Chemistry, Engineering and Geology, and the interfaces of these with Biology. Consistently every year there is a low proportion of female applicants, on average between 15% to 20% of applicants. The year 2022 saw the lowest number of female applicants in at least five years (Figure 2).

The issues around why women in STEM choose to leave are many, varied, complex and also well discussed. Although often explained by women only applying for grants they are confident of winning and therefore applying for fewer and smaller grants than men do, it's also clear that there are many other factors at play. Women are awarded less of the requested grant (UKRI, 2020), consortia led by mostly female PI's are viewed more

unfavourably and less successful (Bianchini *et al.*, 2022); women present fewer invited talks partly due to having to turn down more speaking opportunities (Schroeder *et al.*, 2013); and women were at a significantly greater disadvantage than men during the Covid-19 crisis (Kramer, 2020; Fulweiler *et al.*, 2021). Furthermore, despite producing higher rates of scientific novelty, the contributions from women and people from other marginalized groups are taken up to a lesser extent by senior scholars belonging to gender and ethnic majorities (Hofstra *et al.*, 2020).

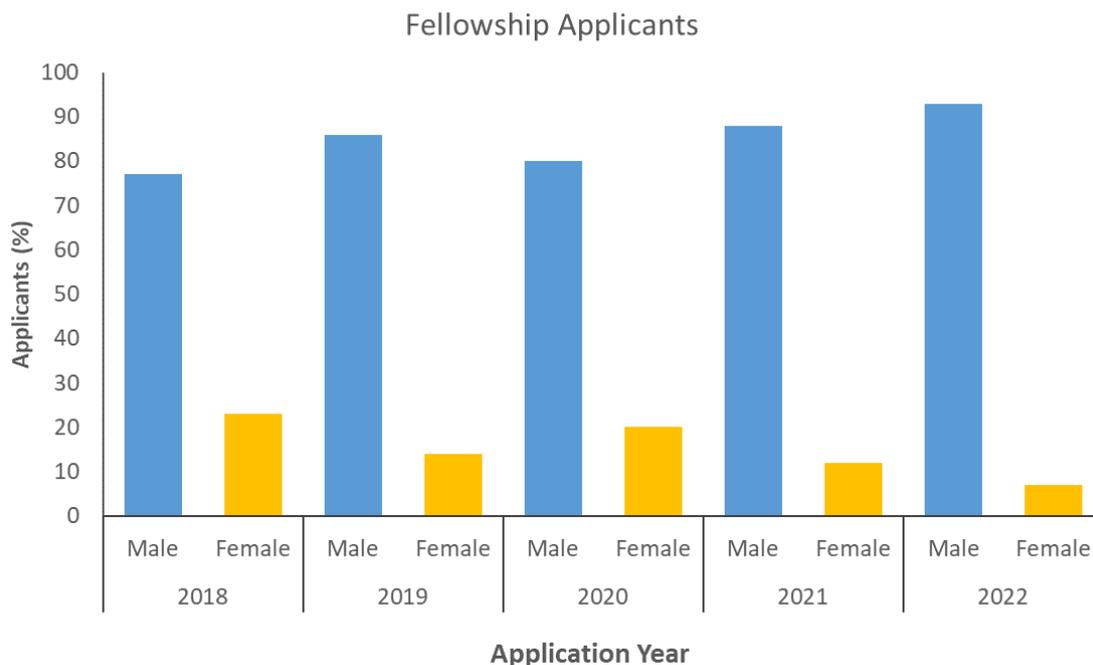


Figure 2. The breakdown of Lindemann Fellowship applicants by sex between 2018 and 2022.

In November 2022, committee members of The Lindemann Trust hosted an event to explore the experiences of women in the physical sciences. This was primarily driven by the low numbers of females who apply for Lindemann Fellowships every year and to determine what societies like the Lindemann Trust could do to improve access to funding for female postdocs. The event was held in London and the invitation was sent out to university departments in the physical science fields, local schools and funding/research agencies. Over the course of two hours, participants and speakers were invited to share their experiences as women working in male-dominated physical sciences.

Invited talks were given by Emeritus Professor Dame Athene Donald, DBE, FRS and Emeritus Professor Mary Rees, FRS, both members of the Lindemann Trust Fellowship Committee. Talks were also given by Dr. Chandrima Ganguly and Dr. Phillipa Cooper, both past Fellows of the Lindemann Trust who spoke about their experiences in STEM and of their Fellowship experiences.

After a brief refreshment and networking break, the participants were organised into three groups for the roundtable panel discussions. Attendees were asked to share any particular barriers or challenges they have faced and especially encouraged to share what they feel has worked well and what would be a beneficial change to the status quo. The facilitated discussion was structured around four questions. A summary of these discussion topics is described below.

## Roundtable Discussion Questions

*Question 1 was based on the topic of Workplace and Environment. The specific questions posed were:*

- 1.1. Considering your Workplace/Environment, what are the key issues and benefits with being a women in STEM?
- 1.2. Are there any improvements that you feel would be beneficial?

There was general agreement that the increase of interdisciplinarity across physical science fields has helped open discussion of the problems. Departments that focus on single disciplines tend to be less open and more traditionally male-centered.

The discussion on this topic opened with some relatively basic practicalities of working in a laboratory environment: in a world usually designed with men in mind, simple things like higher shelves in the laboratory (women tend to be shorter) and sanitation facilities were problematic. Provision of step stools in the laboratory would lessen reliance on taller colleagues; improved toilet facilities with more unisex facilities especially with freely available sanitary provision would go a long way to providing a more inclusive work environment. The social aspect of the workplace is important in building connections and networks between staff and students, particularly so for early career scientists. While flexible working is important and should be facilitated where possible, participants felt that it was also important for people to come into the office to collaborate and build functioning working relationships. While they may seem small, micro-things such as a less physically accessible workspace and lack of social interaction can accumulate and create barriers to inclusivity.

The collegiate workplace environment was also highlighted. Chemistry was a field which has a particular problem in numbers of women dropping off at postgrad level. This is exacerbated by the problem that if few women work in a particular site, fewer women are going to be encouraged to apply for a role there. Role models in a workplace are important as is the attitude of the group leader which is important for establishing a respectful environment where women and their ideas can be taken seriously. Suggestions for how students are inducted into a new environment were given, which would be beneficial for all students: (i) opportunities at the new institution presented to them at the outset and made openly available; (ii) ensuring students feel welcome to attend events - invites from existing members can be very impactful here (iii) organise mentorship programmes between existing and new staff members (iv) give new scholars preparation opportunities for those coming from a different culture/field/laboratory to alleviate culture shock.

When asked for positive workplace practices or suggested improvements, there were several key suggestions echoed across all groups. If group leaders and mentors can establish a collaborative rather than competitive environment this would aid with developing deeper networks and collaborations, furthering research advancements and

interdisciplinarity. Making space for everyone to speak, no matter the make up of the research group, will ensure that any underrepresented individuals feel comfortable. Supporting each other by actively acknowledging sexism when it happens even when unconscious or unintentional will make it easier for everyone to see the everyday sexism and take steps to avoid it. On an individual basis, as women tend to take on more of the admin roles and organisational service tasks (committees, pastoral support and recruitment), they must be supported in saying “no” and dividing these tasks more equally amongst the department or group. This applies also to teaching loads and other activities that, although important, don’t directly advance research careers as they aren’t assessed by funding bodies during applications.

*Question 2 was based on the topic of Career Progression. The specific questions posed were:*

- 2.1. How do you feel your career has been impacted by specifically being a women in your field?
- 2.2. What are your barriers to career progression?
- 2.3. Are there any specific practices that have been beneficial in supporting you as a woman in STEM?

There were two main issues faced by our participants which they felt had impacted their progression so far. Both issues were related. Firstly there was the employers assumption of the extra cost in supporting a woman who might have children and the assumptions that priorities would be more divided for staff who were mothers rather than fathers (who were assumed would prioritise work more). These assumptions were there regardless of whether or not the participants were single, married, had children or no plans to have any. Secondly, there was a CV gap issue owing to having children and taking a research break, whether intentionally or not. As funding applications are assessed on track records, this puts women with a CV gap for childcare at a disadvantage before the science is even tested. Furthermore, women who had made a late decision about what to do in life and entered a science career later found it more difficult to forge networks and advance in their careers.

There were many positive suggestions put forward by participants from experience or what they thought would be helpful.

Advertising supportive events more widely and links between industry and academia to ease transition between the two were beneficial. For those who have the social conditions/confidence to go out there resources might come to you and this should be supported by mentors and institutions. Mentorship is important to develop knowledge of opportunities and build networks. Mentors make a huge difference in supportive environments, especially in hearing “you can do this!” from role models; seeing various career paths/options during conferences; opportunities for mock interviews and career

support; and making people aware of what is required to progress (mentors as well as project supervisors).

Ensuring leaders understand their influence on workplace culture can have a massive impact on career progression. Leaders should educate about imposter syndrome, how to recognise and fight this, and leaders themselves should be evaluated. A good leader should focus on teaching and collaboration along with publication records and the time commitment for these should also be recognised by funding agencies. Participants felt that leadership skills should be part of scientific education, owing to the importance of a good team/group or department leader for research and workplace environments.

The appearance of linearity of career “paths” is unhelpful, and employers should be more flexible, with researchers able to change fields without essentially “starting again” in a new field.

*Question 3 was based on the topic of Funding and Grants. The specific questions posed were:*

- 3.1. What are your experiences as a woman applying for funding and grants?
- 3.2. What have been the barriers to successful funding?
- 3.3. What have been good or supportive experiences?

The overall feedback varied depending on the STEM field. As in many areas, the funding generally goes to “hot topics” with the less in-vogue research projects less likely to attract funding. There was agreement that there are still barriers related directly to being a woman leading grants and frustration that some departments take the view that there are no problems when a large grant has just been won by a woman PI. These issues are mostly via subtle non-obvious discrimination that also put women off from applying, as well as the more obvious issues regarding how time out of research and maternity leave gaps are perceived in applications and the lack of female expertise in certain fields. Additionally in the UK there are further issues around restrictions on rewards – are there non-UK PhD options where UK funding can be hosted in other non-UK institutions? The frequent requirement to change universities can be difficult for women with caring responsibilities or who are unable to move.

There was plenty of discussion around the lack of advertisement and the difficulty in finding out about the wide range of funding available, including for Lindemann and overall. Key points included the gatekeeping of certain research grants – in situations where advertising is done directly to and within a department, staff may hear about opportunities more than PhD students. This is only effective when women are equally encouraged to pursue postdoctoral research and supervisors/mentors don’t pre-select their favourite candidates to apply (usually male candidates). It should be easier for PhD students to talk to funders directly about grants, rather than going through an advisor. Often grant emails get buried so it was suggested that more grants are advertised directly by funders through social media

such as Twitter and LinkedIn to increase accessibility for PhD students and early career postdocs. This would also be a useful mechanism for funders to open up mentorship opportunities, supporting applicants during the writing process more effectively. The timeline of applications is also problematic. With most grant submissions happening during the write up period, an earlier advertisement and longer application window would be beneficial.

There were some positive moves recorded and welcomed by attendees. Initiatives like minority group support and individual mentoring schemes were helpful (often more so than help from supervisory mentors). It was recognised that funding bodies are recognising the benefit of these schemes and are providing them in some cases but that could be expanded. Likewise, although some funding bodies are clear about welcoming applications from scientists with research gaps, these are relatively few and could be improved upon, such as expanding eligibility (for returners) and flexibility regarding location.

A move to standardise grant application forms would save lots of time especially for those final year PhD students and early career postdocs who will be applying for many grants alongside writing up and publishing as many papers as possible.

Given the fewer funding applications submitted by women in general, attendees suggested that more initiatives to deal with failure would be helpful. It was widely agreed that more established academics who shared and normalised their failures were important to reduce the fear of failure for early career scientists.

*Question 4 was a final catch-all question, designed to allow participants to provide any additional issues, experiences or experiences they felt were necessary to fully evaluate the experiences of early career women in the physical sciences.*

Overall this session built on some key topics that have been touched on previously and highlighted some others. The importance of metrics on recruitment was discussed and participants felt that the full range of workplace responsibilities aren't fully reflected as metrics focus on research output and impact. Particularly the metrics themselves are widely regarded as flawed and this was felt to have a disproportionately larger impact on women scientists.

Overall the topics discussed in this question fall into two main categories: (i) Mentoring and Career development, and (ii) Career-Family balance.

#### *(i) Mentoring and Career development*

There is a need for more opportunities for networking/outward communication of opportunities, with some areas such as Humanities much better at this than the physical sciences. Departments, employers and funders need to share upfront acceptance or positive statements of career breaks.

A pool of mentors across the physical sciences, whether a nationally organised group or within each department is essential, as all have different experiences and the success of mentorship is heavily dependent on the individual relationships between mentor and mentee.

There should be flexibility across mentor schemes to tailor needs appropriately and to allow movement where the relationship doesn't quite "click". One unanswered question was on whether mentors should receive reviews from their PhD students/postdocs? Easier links to Lindemann alumni for mentoring was requested and this will be actioned by the committee.

### *(ii) Career-Family balance*

There was much discussion about family and career balance – is it a choice? As women are usually the majority carrier of family responsibilities and are faced with assumptions about maternity leave and childcare even when without children, this is an essential issue to be resolved. In general it was felt that since the Covid-19 pandemic more and more women are returning to work and more men and partners are open to sharing family responsibilities. The key is finding a balance that is right for the individual, staying focused and organised, and using work/life balance to evaluate postdoc/faculty position offers. There is a general lack of communication on family support in academia, especially with regards to parental leave. While more fathers are taking shared parental leave, it is still far below what can be achieved. A normalisation of parental leave is needed to remove the stigma of taking parental leave, along with flexibility on conditions of shared leave.

Overall it was noted that these aren't just women's issues, that they affect the productivity of science and scientific achievement overall. It is important to make men more aware of these issues. Otherwise, it may be difficult for male allies to know what is required.

## **Key findings**

There was high level of engagement in all three groups during the discussion, with all attendees engaging and providing experiences and thoughts on each question. The overall themes from the discussion were around the importance of role models and mentors; subtle discriminations; the importance of ensuring funding opportunities are made more openly available to women and candidates in marginalised groups; and the difficulty as a women in STEM in navigating the balance between career development and family. While there were many issues and difficulties discussed, there was a definite feeling of positivity and hope that the situation will improve in the future. Many participants had positive experiences to share, speaking about the value of male advocates in the workplace and suggesting many improvements to the current system. The invited speakers gave inspirational talks and answered many questions about their experiences, and there were many new connections and friends made over the evening. The Lindemann Trust has taken

on board all the issues and are developing improvements to the current funding scheme to make it more inclusive:

- (i) The Lindemann Trust will establish a new Mentoring programme, where past Fellows can agree to be mentors to new Fellows, assisting them through their Fellowship years and into the future.
- (ii) The criteria for applicants will be updated and assessed to be as fully inclusive to women and all other candidates in marginalised groups
- (iii) The members of the Committee have established a new sub-committee focused on increasing outreach and education, to raise the profile and visibility of women in STEM to school children across the UK.
- (iv) The Trustees have agreed to review feedback on this report and monitor progress on an annual basis.

## References

Bianchini, S. *et al.* 2022. Gender diversity of research consortia contributes to funding decisions in a multi-stage grant peer-review process. *Humanities and Social Sciences Communications*: 9(195).

Davies, K. 2021. STEM Women Whitepaper 2019-2021. Understanding the gender imbalance in STEM.

Department for Education. 2021. Women in STEM Week 2021: How we're empowering the next generation. <https://dfemedia.blog.gov.uk/2021/02/11/women-in-stem-week-2021-how-were-empowering-the-next-generation/>

Fulweiler, R. W. *et al.* 2021. Rebuild the Academy: Supporting academic mothers during COVID-19 and beyond. *PLoS Biol*: 19(3).

Graves *et al.* 2019. An impact evaluation of the Athena SWAN Charter. Advance HE.

Grogan, K. 2018. How the entire scientific community can confront gender bias in the workplace. *Nature Ecology and Evolution*. DOI: 10.1038/s41559-018-0747-4

Hofstra *et al.* 2020. The Diversity-Innovation Paradox in Science. *PNAS*: 117 (9284-9291)

Jebsen, J. M. *et al.* 2022. Dismantling barriers faced by women in STEM. *Nature Chemistry*: 14 (1203-1206).

MATRIX. 2018. Women in STEM. MATRIX Position Paper.

Kramer J. 2020. Women in Science may suffer lasting career damage from Covid-19. Scientific American. <https://www.scientificamerican.com/article/women-in-science-may-suffer-lasting-career-damage-from-covid-19/>

Pell, A. N. 1996. Fixing the Leaky Pipeline: Women Scientists in Academia. *J. Anim. Sci.* 74:2843–2848.

Schroeder, J. *et al.* 2013. Fewer invited talks by women in evolutionary biology symposia. *J. Evol. Biol.* 26 (2063-2069)

UKRI. 2020. Diversity Results for UKRI Funding Data 2014-15 to 2018-19.

WISE, 2019. Women in the UK STEM workforce. <https://www.wisecampaign.org.uk/statistics/women-in-the-uk-stem-workforce/>