

Ending an exodus: how NHMRC gendered funding outcomes are contributing to the lack of retention of women in STEMM

The problem

The “NHMRC considers that gender equity will have been achieved when similar numbers of women and men apply and are funded”¹

Despite this goal, the National Health Medical Research Council (NHMRC), Australia’s largest government run medical research grant funding body, is continuing to award women significantly less funding than men, contributing to the loss of women from academia, and, in turn, their contributions to Australia’s research and innovation future.

- From 2015-2018 women were awarded only 43% of the fellowships, predominantly awarded to early career women, with **fewer mid-career researcher (MCR) and senior women funded compared to men.**^{2,3}
- To improve equity in participation and funding, the NHMRC performed a major overhaul of its schemes in 2019.
- This overhaul has failed to mitigate the problems, with strategic funding required to increase the number of women funded.
- The inaugural round of the Investigator grants (2019) had low success rates, with funding heavily skewed towards senior men, and a worsening gender bias.⁴
- In 2021 the bias in funding continued, as men were disproportionately awarded a staggering **23% more grants than women**, corresponding to an extra \$95 million in funding.^{5,6}
- Only **21% of senior (L3) awardees were women** (2021), with an extra \$66 million of funding awarded to senior (L3) male researchers.^{5,6}
- Overall, in the first 3 years since the implementation of the Investigator grants scheme, the outcomes have worsened compared to 2015-2018 with only 37% of the funding being awarded to women. This has resulted in **men being awarded ~ \$288 million more between 2019-2021 compared to women.**
- The striking reduction in funded women with increased seniority means that many of these women researchers rely on funding from small philanthropic grants, discretionary funding from institutions and other forms of non-government funding. As a direct result, a **disproportionate number of women leave academia.**^{1,7}

Evaluating NHMRC gendered initiatives

Since 2012, the NHMRC introduced mechanisms designed to improve grant holder diversity, including the use of a separate allocation of funding for near-miss high-scoring women applicants (2017-21).

- 2021 Investigator and Ideas Grants outcomes show that **after removing structural priority data, actual funding rates for women were ~2–4% lower** than those for men across both funding schemes.⁸
- Structural priority funding demonstrates skewed funding rates for different career stages and research fields across all genders with **L3 men receiving \$66 million more funding** (2021 data).^{5,6,9}

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Risk of inaction

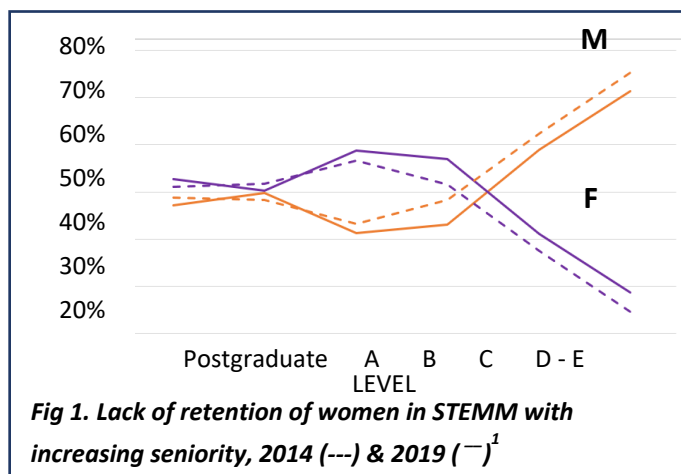


Fig 1. Lack of retention of women in STEMM with increasing seniority, 2014 (---) & 2019 (—)¹

More women are represented at the junior academic levels compared to men (Fig. 1), highlighting that recruitment of women into STEMM is not the issue. It has been suggested that across the NHMRC, funding rates for men and women are nearly equal.⁹ However, our rigorous data analyses of the outcomes of the three major people support schemes open to all investigators have revealed that, since the structural overhaul of the NHMRC funding schemes in 2019, lead investigator men were awarded over **\$398 million** more than lead investigator women. This equates to 20% more funding to men than women. As a consequence of this sustained underfunding, the capacity of women to undertake research is constrained, resulting in reduced outputs which negatively impacts their competitiveness for future funding and promotions. This **directly contributes to reduced promotion and lack of retention of women in academia** (Fig. 1).

Risk of inaction:

1. Loss of gender diversity in the way Australia's research community approaches complex health problems
2. Loss of highly qualified scientists and their expertise & skills from academic research
3. Lack of opportunities for academic promotion and senior women in leadership
4. Loss of senior women role models for future generations of women researchers

Case studies: how gendered NHMRC outcomes negatively impact the retention of women

I am one of the repeatedly unsuccessful L2 Basic Science Investigator Grant women applicants. I have had sustained funding via a NHMRC ECF, numerous project grants as CIA (all with budgets reduced!), an ARC Future Fellowship enabling me to lead my own laboratory for well over a decade including supervision of many postdocs and PhD students. In the new scheme I have been unable to secure funding (near miss on several occasions). I am now reduced to year by year contracts with increasing teaching and learning roles meaning my research time is now down to 0.5 FTE. So my ability to compete in a meaningful way is diminished. The toll on one's mental health and family life is considerable. I do NOT want to leave research, but think that the choice will not be mine to make.

- **Level D woman lab head, 15+ years post-PhD**

Funding women below the line is psychologically damaging. It perpetuates the myth that women are less successful and feeds into the women's own internalised feelings of imposter syndrome and stereotypes threat. It also contributes to backlash, with many men perceiving that the women have it easier in securing funding. - **Level D woman lab head**

It is devastating to make the grade for L1 Investigator Grant and still not be able to grow capacity and impact to ensure ongoing competitiveness. When I apply for future grants my outputs will be directly compared to the L1 men who received approximately \$100,000 per year more than me for the duration of this grant. I cannot state that I received less funding than them in future applications, I will be assumed to have received the same amount. Furthermore, I cannot afford to employ a postdoctoral fellow who in turn can apply for their own funding and assist in expanding the lab, and, in turn productivity. This places me in a worse situation to continually be awarded funding. - **Level C Basic Science L1 woman lab head.**

From 2010-2020 I was an NHMRC Senior Research Fellow. I led a team of 24 people including 3 EMCRs with their own NHMRC funding. I was appointed a Fellow of the Australian Academy of Health and Medical Sciences. I have been Chief Investigator on NHMRC grants totalling \$25 million, being CIA on 8 NHMRC grants including a current CRE. I have missed out on an Investigator Grant 3 times. I am fortunate to be funded by my university in a teaching/research academic position, but the demands of this and my carer's responsibilities means I have less time to craft the perfect application, despite spending at least one week of my holiday season leave working on the application. - **Level E woman lab head, 21 years post-PhD (13 years adjusted for career disruptions due to parental and carer's leave and part-time work).**

The Equity in Australian STEMM Working Group have performed a rigorous gendered 3-year analysis of Investigator and Ideas grants schemes using NHMRC publicly available data¹⁰ to assist the NHMRC to identify and mitigate the continuing gender bias in grant outcomes to ensure a gender balanced Australian research workforce.

Gendered inequities of NHMRC Investigator Grant scheme outcomes: a 3-year analysis

- In the first 3 years of the Investigator grants ~ \$288M more funding has been awarded to men (**Table 1**).
- Although there were higher total numbers of women vs men applicants at EL1 and EL2 (early and late postdoctoral stages, respectively), significantly fewer women applied at the L1-L3 levels (**Fig. 2A**).
- Some of the women in the early career levels were pulled over the funding line to achieve similar funding success rates to the men. These women were advised that they otherwise would not have been funded.
- Despite similar success rates for women and men at each level (**Fig. 2B**), the numbers of women recipients strikingly declined at the junior laboratory head level (L1), with a further exponential decrease in the number of women funded as seniority increased, contrasting to outcomes for men (**Fig. 2C**).
- Very few gender non-specified people applied and were funded, and as a result they are not included here with the exception of when we could not remove them from specific analyses due to the inability to identify them.

Table 1. Summary of the Investigator Grant (sole CI) funding outcomes based on gender.

Funding year	Men	Women	\$ Men - \$ Women
2019	\$241,837,733	\$123,395,974	+ \$118,441,759 Men
2020	\$221,581,815	\$143,561,958 [^]	+ \$78,019,857 Men
2021	\$245,147,138	\$153,834,659	+ \$91,312,479 Men
Total \$ awarded in 3 yrs	\$708,566,686	\$416,687,091	+ \$287,774,095 Men

These support the sole CI salary, staff salaries, consumables and ongoing careers of Australian biomedical researchers.

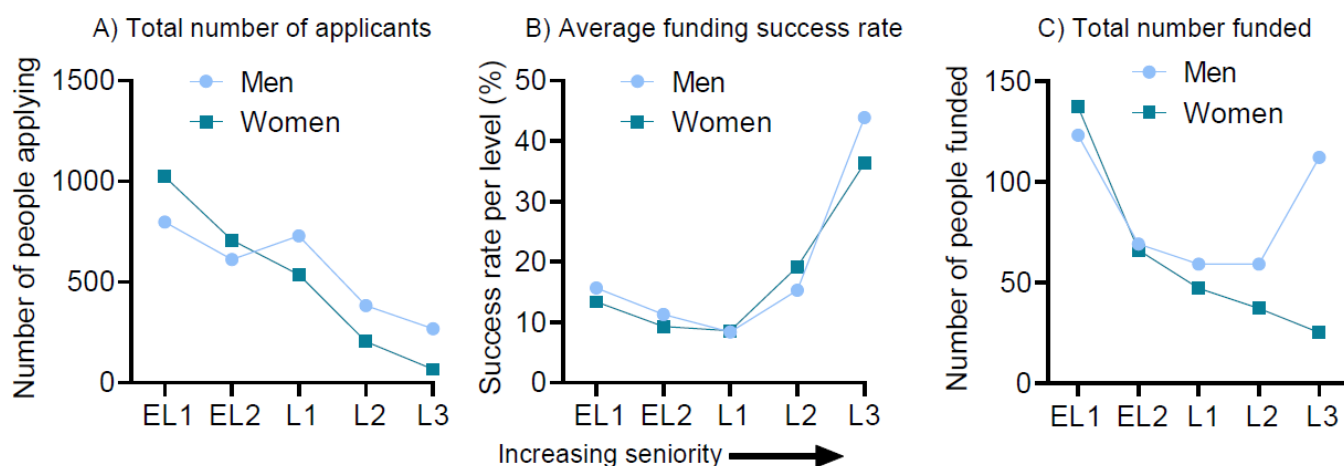


Fig 2. A summary of the outcomes of the 2019-2021 NHMRC Investigator Grant scheme for men versus women. Shown are A) the total number of applicants, B) the average funding success rates in each level and C) the total numbers of people funded at each of the Investigator Grant levels for 2019-2021 outcomes. Note: one woman declined an L3 in 2020 and successfully reapplied in 2021, hence has been removed from the 2020 data.

"I don't think I failed in the system. I think the system failed me."

Dr Dwan Price, ABC Science 5/12/2021⁷

Evidence of gender bias specifically in the Basic Science and Clinical Medicine Disciplines

- Analysis of the numbers of applicants awarded Investigator grant funding (**Fig. 3**) revealed that women in both the Basic Science (**Fig. 3A**) and Clinical Medicine (**Fig. 3B**) disciplines were striking less successful, with fewer women awardees from EL2 and L1 levels and onwards, respectively.
- Analysis of the average amount of funding awarded to each recipient in each Investigator Grant level within each discipline revealed a significant reduction in funding awarded to the L1 women compared to the men in the Basic Science discipline (**Table 2**). This equates to almost \$100K per year for the 5 years and has a detrimental effect on the productivity of the women. Only 1 Basic Science woman at the next level (L2) received funding in both 2020 and 2021.
- All other average funding differences in each level in each discipline for 2019-2021 are reported in **Table 2**, however, none were significantly different between men and women.

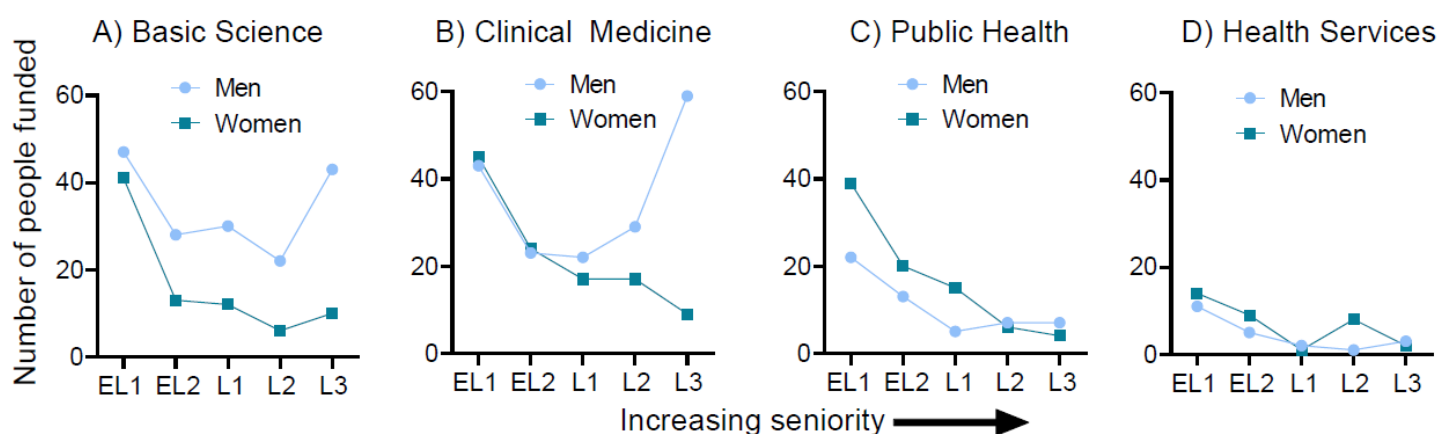


Fig 3. A summary of the outcomes of the 2019-2021 NHMRC Investigator Grant scheme for men versus women in each of the disciplines. Shown are the total numbers of people funded between 2019-2021 for A) Basic Science, B) Clinical Medicine, C) Public Health and D) Health Services Research. Two EL1 gender non-specified recipients were funded (1 in 2019 & 1 in 2021). Both are included within the women demographic due to the inability to identify & remove them from the separate disciplines.

Table 2. Summary of the average difference in \$ awarded based on gender (\$ men- \$ women)

Discipline	EL1	EL2	L1	L2	L3
Basic Science	-\$5,451	\$40,466	\$488,651*	-\$322,421	-\$113,808^
Clinical Medicine	\$1,147	\$915	\$116,517	\$21,079	-\$336,056
Public Health	-\$12,511	-\$99,232	\$32,507	-\$335,739	\$345,263
Health Services	-\$62,228	\$118,230	\$313,724#	\$271,825###	-\$235,403####

* $P < 0.003$ men vs women

2 men and 1 woman in total were funded between 2019-2021; ### 1 man and 8 women in total were funded between 2019-2021; #### 2 men and 3 women in total were funded between 2019-2021; Note ^In 2020 one woman declined a L3 grant & successfully reapplied in 2021 – she was removed from 2020 data. Two EL1 gender non-specified recipients were funded. Both are included with the women due to the inability to identify & remove them from the separate disciplines. \$ were awarded based on peer review with the highest scoring applicants in L1-L3 receiving more \$ and \$ were reduced if the successful applicant had other funding support, including salary from other sources.

As a direct result of these Investigator Grant outcomes data, a petition entitled “Fund women in STEM equitably: support for an overhaul in the distribution of NHMRC funding”¹¹ was started in October. As at 15/12/21, over 6,900 signatures had been collected, demonstrating the urgent need for the NHMRC to act immediately to support Gender Equity in Australian STEMM.

Gendered inequities span across NHMRC Ideas Grants funding outcomes

- Analyses of the outcomes of the first three years of the Ideas Grants (**Fig. 4**) were also performed to determine if this scheme (in which the track record of the applicant holds less weight than the Investigator Grants) was supporting women with more equity. The same success rate was applied to men and women in each year (**Fig. 4C**).
- In the first 3 years of the Ideas Grants ~ \$125M more funding has been awarded to men (**Table 3**).
- Similar to that observed for the outcomes in the different disciplines, there was a striking loss of senior women, particularly in the Basic Science discipline for level D and E women (**Fig. 5A**) and for level E women in Clinical Medicine (**Fig. 5B**).

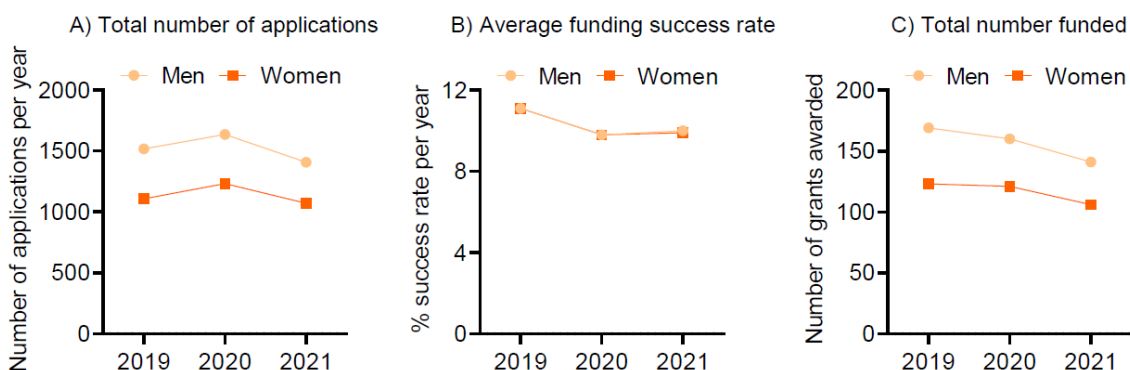


Fig 4. A Summary of the 2019-2021 NHRMC Ideas Grant scheme for men versus women. Shown are the A) Total number of applications, B) Funding success rate and C) Total number funded in each year. No data were provided on how many in each academic level applied and were funded for each gender.

Table 3. Summary of the total amount awarded to men and women in Ideas Grant outcomes 2019 – 2021.

Funding year	Men	Women	\$ Men - \$ Women
2019	\$138,287,766	\$101,898,123	+ \$36,389,643 Men
2020	\$150,235,934	\$107,175,422	+ \$43,060,512 Men
2021	\$142,148,655	\$96,349,869	+ \$45,798,786 Men
Total (2019-2021)	\$430,672,355	\$305,423,414	+ \$125,248,941 Men

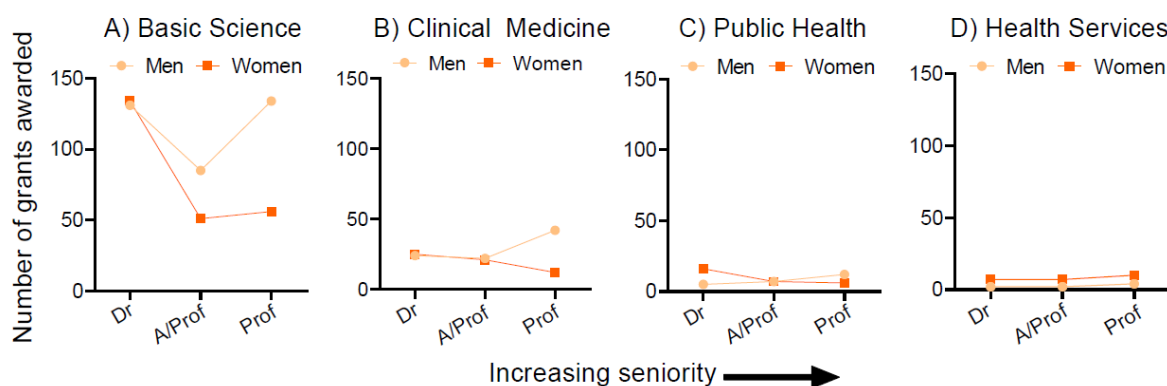


Fig 5. A summary of the outcomes of the 2019-2021 NHMRC Ideas Grant scheme for men versus women in each of the disciplines. Shown are the total numbers of people funded between 2019-2021 for A) Basic Science, B) Clinical Medicine, C) Public Health and D) Health Services Research. Note: In 2020 two gender non-specified were included with the data for the women due to the inability to identify and remove them from all data analyses.

\$398M more awarded to men in the first 3 years of the new main NHMRC funding schemes

Table 4. Summary of the total funding awarded to all[^] major NHMRC funding sources that support salaries and consumables for Australian biomedical researchers based on the gender of the Chief Investigator A.

Funding year	Men	Women	\$ Men - \$ Women
2019	\$400,125,499	\$255,294,097	\$144,831,402
2020	\$371,817,749	\$250,737,380	\$121,080,369
2021	\$427,295,793	\$295,184,528	\$132,111,265
Total (2019-2021)	\$1,199,239,041	\$797,110,505	\$398,023,036

[^]Note: NHMRC funding sources used for this calculation: Investigator Grants, Ideas Grants and Synergy Grants. Overall women CI led Synergy teams (4-10 Multidisciplinary CIs) were awarded more money - \$10 million (2019) & \$5 million (2021) – these are equally shared among all CI team members.

Future objectives to ensure Gender Equity

The NHMRC has agreed there are clear gender disparities, but state “The single biggest contributor to the investigator grant outcomes is the predominance of male applicants at the most senior level of the scheme”.⁸ The NHMRC has identified that this simply reflects the gender distribution by seniority in the health and medical research sector,⁷ however, the staggering number of men holding well-funded senior positions in STEMM suggests inherent biases are entrenched in the funding system (Fig. 1). Furthermore, our data analyses identify that, although there are reduced application numbers from women in senior positions, the numbers of senior men (L3) applying for Investigator Grants are also lower than the MCR men (L1-L2), yet the L3 senior men are being awarded more grants (Fig. 2). As the largest government run medical research grant funding body in Australia, it is the responsibility of the NHMRC to strategically address the current and ongoing lack of diversity in Australian medical research and invest equitably across all levels within each gender.

The NHMRC have identified ‘clear gender disparity’⁸ due to the skewed ‘gender distribution by seniority’⁷ in grant funding scheme outcomes. We are calling on the NHMRC to normalise the funding outcomes, to achieve similar numbers of successful applicants for each gender and across every career-stage level and discipline. Only through these measures can the NHMRC achieve gender equity in Australian biomedical research.

The Equity in Australian STEMM working group recommend:

Allocating equal amounts of funding to each gender, with an appropriate proportion for non-binary people

Quotas at each of the Investigator Grant levels for each gender and relative to opportunity enforced

Re-introduction of panels to transparently and equitably discuss applications with strict monitoring of bias

Unconscious (and conscious) bias training to implement fairer grant reviews

We offer NHMRC our ongoing assistance to work together to achieve these goals and to help NHMRC advocate for more funding to retain more women in Australian STEMM.

Supplementary information and references

1. Lack of retention of women in STEMM Australia with increasing seniority remains unchanged (2014 - 2019): <https://www.sciencegenderequity.org.au/gender-equity-in-stem/>
2. Mid-career level grants (Leadership level 1) in the NHMRC’s Investigator Grant scheme have the lowest success rate of all five grant levels at around 7% and 9% in 2019 and 2020, respectively. Australian Association of Medical Research Institutes: <https://www.aamri.org.au/resources/aamri-submission-to-the-senate-inquiry-into-the-australian-governments-response-to-covid-19/>
3. There was a 16% loss of personnel (full-time equivalent) supported by NHMRC Project Grant scheme between 2013 – 2016. If reflective of the broader HMR sector, a 16% loss of workforce equates to a \$4.5 Billion reduction in net benefits: https://treasury.gov.au/sites/default/files/2019-03/C2016-052_Australian-Society-for-Medical-Research.pdf
4. Female researchers in Australia less likely to win major medical grants than males: <https://www.nature.com/articles/d41586-019-03038-w>
5. At the most senior academic level of funding, only 21% were women, with an additional \$66 million of funding allocated to support the careers of senior male researchers <https://womensagenda.com.au/latest/is-australias-largest-medical-research-funding-body-doing-enough-to-retain-women-in-stemm/>
6. Men were awarded 23% more grants than women, corresponding to an extra \$95 million in funding: <https://www.monash.edu/medicine/news/latest/2021-articles/stemm-the-flow-more-work-needed-to-support-women-in-medical-research>
7. Gender bias in medical research funding pushing women out: <https://www.abc.net.au/news/science/2021-12-05/medical-research-funding-gender-bias-pushing-women-out/100669586>
8. Removing structural priority data actual funding rates for women were markedly (~2–4%) lower than those for men across funding schemes: <https://www.immunology.org/publications/immunology-news/immunology-news-september-2020/applying-the-gendered-lens-post-covid>
9. Prof Anne Kelso, the NHMRC’s chief executive, agreed that there are clear gender disparities: <https://www.nature.com/articles/d41586-021-03536-w>
10. All NHMRC outcomes data analysed and reported here were obtained from <https://www.nhmrc.gov.au/funding/data-research/outcomes>
11. Fund women in STEM equitably: support for an overhaul in the distribution of NHMRC funding: <https://www.change.org/p/fund-women-in-stem-equitably>