

Who we are:

Leila Varghese is an early-career researcher at the Walter and Eliza Hall Institute of Medical Research, and Matt Bird is an early-career researcher at the University of Melbourne Center for Neural Engineering and the Murdoch Childrens Research Institute. Our experiences and opinions are shaped around health and medical research, but are generally relevant to science research more broadly. Our views do not represent those of our host organisations.

Our key recommendations are:

1. Reinstate the science minister to guide structural reforms of the science industry (TorR# a-j).
2. Increase the amount of work experience in science and medical bachelor degrees (TorR# g&h).
3. Enforce the PhD as a 3-year program consistent with funding terms (TorR# g&h).
4. Broaden the scope of PhD training and increase awareness of alternative career pathways for PhD and early-career researchers (TorR# g&h).
5. Oppose the introduction of fees for research higher degree students (TorR# g&h).
6. Increase the duration of grants and fellowships to 5 years (TorR#5).
7. Simplify granting systems (TorR# g&h).
8. Commit research funding to the sector in a long-term nature and not on a cyclical basis (TorR# g&h).
9. Provision for long-term support of research scientists by addressing funding shortfalls for mid- and established-career scientists (TorR# g&h).
10. Provision for 'career scientists' who do not strive to become independent laboratory leaders (TorR# g&h).
11. Better recognition for, and support of, research assistants (TorR# g&h).
12. Promote gender equity by encouraging men to utilise flexible working arrangements (TorR# g&h).
13. Increase the amount of funding available for international travel (TorR# i).

Reinstate the science minister

Research in Australia is big business. The combined government funding of just three of these branches in 2013 – 2014 was nearly \$2 billion (National Health and Medical Research Council¹ (NHMRC), \$858 million; Australian Research Council²(ARC), \$932 million; CSIRO³, \$745 million). It is staggering then that there is no minister who is solely responsible for this sector. Rather, science research in Australia operates as fragmented silos without any overall vision. It is therefore our first recommendation that there be a science minister reappointed to manage this sector. Such a minister would provide a contact point for research and industry to engage with, and could plan and implement long term reforms. Such reforms include those suggested in the McKeon⁵ review into health and medical research, released in 2011 to apparently deaf ears.

ToR g - The effectiveness of mechanisms within Australian universities and industry for developing research pathways, particularly in regards to early and mid-career researchers
AND

ToR h - Policy actions to attract, train and retain a healthy research and innovation workforce

Tertiary science education

Training as a research scientist begins at the tertiary level. In a bachelor degree, the focus is overwhelmingly theoretical with limited practical experience. It is typical for biomedical science graduates to have never worked or volunteered in a medical research laboratory, for example. This presents an opportunity to increase the amount of research experience in science and medical bachelor degrees. This will benefit both students and research institutes. While students would gain practical skills and the chance to evaluate if they enjoy research, research institutes would benefit through by the chance to trial and retain talented students going on to further study.

Research higher degrees

Research higher degree programs (PhD and masters) are incredibly valuable training programs for students considering a career in research, and as a vehicle for entry to alternate career pathways such as teaching, industry, government, patent law, publishing, and science communication. These training programs though could be significantly improved to further benefit students.

Firstly, we suggest that a PhD be more rigorously enforced as a 3-year program, in keeping with the length of an Australian Postgraduate Award (APA). Currently, the average length of a PhD is in excess of 3.5 years, often at the behest of supervisors who request further work, or who do not provide feedback in a timely manner. Frequently students are left without any financial support past 3.5 years, and are further delayed from entering the workforce. This requires a cultural change within research institutes and universities that a PhD program is a 3-year program in the absence of extenuating circumstances.

While we laud the value of research higher degree training, we also recognise that there are in fact many more PhD students graduating each year than there are positions in research. It also needs to be acknowledged that many students will not want to stay in research, and appropriate support should be provided for them to pursue alternative careers. Accordingly, there needs to be more of an emphasis on providing a broader training to PhD students. The traditional PhD has been a research-only approach, or a cloning process whereby students follow the same well-trodden path of their supervisors. PhD training could be broader and include more experience in areas such as management, teaching, and communication. Such skills would benefit both those students pursuing a career in research as well as those seeking out alternative career pathways. The University of Melbourne is for example encouraging students to broaden the scope of their PhD with program like the Graduate Certificate in Advanced Learning and Leadership⁸, and a teaching module for students interested in careers in the tertiary sector⁹. We also support graduate student participating in community programs such as the 3-minute thesis competition¹⁰, in2science¹¹, and CSIRO Scientists in Schools¹². There are also a number of business development traineeships for interested students at some research institutes, however they are not widely advertised or accessible to all research higher degree students. We support the expansion of these programs, and the deployment of additional training programs including: science communication training and media internships as recommended in the 'inspiring Australia report', recommendations 6, 7, 9, & 10¹³; political exchanges, as trialed in 2011 with Dr Krystal Evans being placed with the deputy leader of the Federal Greens MP Adam Bandt¹⁴; as well as internships with industry and government. We also recognise that such training programs are a significant time commitment for students with an already heavy load. Accordingly, such programs should be

optional. Also, the training programs should also be accessible to early- and mid-career research scientists who may also seek to develop skills to benefit their research, or equip themselves for a career change.

Critically, we consider announcements contained within the 2014 Federal Budget a threat to the quality and accessibility of research higher degree training. Specifically, the 2014 Federal budget introduced student fees for research higher degree students¹. They forecast the measure will raise 173.7 million over 3 years, where the 'savings from this measure will be redirected by the Government to repair the Budget and fund policy priorities'. *vis a vis*, graduate research training is not a priority, and the program does not need to be assessable to all socioeconomic demographics.

This budget measure is in direct opposition to the advice from the Australian Government Department of health and aging that in 2013 released a landmark report in the medical health research arena, the 'Strategic review of health and medical Research'⁵. The report recognises the valuable nature of PhD training to the medical research community, and made the recommendation to increase the value of the APA, report section 8b), currently set at well below the minimum wage (minimum wage⁶ 2013 -2014, pre-tax of \$32 371 and post-tax of \$29 368; APA⁷ 2014, \$25 392).

Early- to mid-career researches

Challenges presented to early- and mid-career scientists include the short-term nature of research funding, and the extreme pressure to publish prolifically. Compounding these challenges is that the granting system through the NHMRC is an expensive and time-consuming lottery process, as detailed by the Queensland health economist Nicholas Graves¹⁵. On this, the McKeon review⁵ (section 9c) suggests increasing the duration of grants and fellowships, allowing applicants to apply for up to 5 years of funding. Our own recent introductions to this granting system could be described as tedious being time consuming, difficult to navigate, and contradictory after reading through the raft of applicant guidelines. We suggest then that the NHMRC Research Grants Management System be replaced with a user-friendlier interface, and the application process be streamlined and simplified.

We also advocate that governments commit to long term funding of the research sector, a pertinent topic given the continuing federal budget cuts to the sector. As Robyn Williams from the ABC declared at the 2014 Australian Academy of Science annual dinner that "science research can't jut be turned off and on".

There is also a disproportionate focus on encouraging students to pursue a career in medical research while failing to budget for long-term career support. Currently, the level of funding falls away steeply at more senior levels. For example, in 2013 NHMRC people support¹ funding was distributed to: early career-postdoctoral fellowships, \$38.1 million or 124 awardees; mid-career fellowships, \$24.4 million for 63 awardees; and established-career awards, \$68.4 million or 125 awardees. Structured so, there is insufficient provision to support the vast majority of early career researchers through to the mid- and established career phases. Furthermore, the funding structure assumes a natural progression of early-career researches to established scientists, also known as laboratory leaders. This is not the aim for many researchers though, and yet no clear alternative career pathway exists. We suggest that funding be made available for these 'career scientists', allowing them to continue doing research without the expectation that they eventually must lead a research group of their own. In a

similar vein, research assistants are accepted as an integral part of the research world, and we would like to see a greater recognition of their contribution to research.

Gender equity

Research institutes have been quite progressive in promoting women in science and encouraging them to pursue careers in medical research. Unfortunately though, while it is now accepted that women can work flexible hours and take extended leave, there are cultural impediments for men to do the same. Although official policies may offer the same flexibility to men and women, realistically men are not utilizing this flexibility the same way as women as it will 'hurt' their careers. Ultimately women are disadvantaged because they are perceived as less competitive than men who are still working full time, and men are disadvantaged because they aren't taking the flexible working arrangements to spend time with family or pursue other interests.

ToR # i - Policy actions to ensure strategic international engagement in science, research and innovation

Both authors have international collaborations. These collaborations were made possible following our attendance at international conferences. Necessary funds were made from numerous sources including by universities, institutes and philanthropic organisations. At no point have we received any government funding for travel. Where university and institute funding continues to dry up, it will become increasingly difficult to make international trips. Government funding in this regard would be very valuable, and indeed the recent budget acknowledged this with 1.4 million over 4 years for this purpose to strengthen linkages with China¹⁶. Ultimately though this is far too limited in terms of funds and linkages sought. As such, travel funding programs need to be extended.

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Kind regards,

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