Strengthening the pathway for early career researchers

Te Ara Paerangi - Future Pathways Submission

Kei te rangatira, tēnā koe,

We are a group of early career researchers working in fixed-term and permanent roles in the University of Otago Department of Psychology. Together we have diverse experience across the research, science, and innovation (RSI) sector, including in universities in New Zealand and overseas, non-government organisations, and government departments.

Our collective experience as researchers in different work environments means we are acutely aware of the limitations of New Zealand's current RSI system and its impact on the equity, capability, and capacity of the research workforce. We commend the government's decision to seek to improve it through the Te Ara Paerangi work programme.

In this submission, we note our support for the introduction of a base grant to research institutions. We also propose two other evidence-based changes to address some of the well-known problems associated with the precarious research career pathway in New Zealand: Proposal 1 is relevant to getting started on the pathway, and Proposal 2 to continuing careers in the RSI sector.

Endorsement of a base grant for research institutions

We support the introduction of a base grant to research institutions. Such a grant should: 1) cover research institution overheads; 2) be structured to encourage the hiring of early career staff; and 3) enable the permanent employment of highly-skilled researchers and technicians who make important contributions to a wider team but may not wish to lead their own research programme. The introduction of such a base grant will help to address several well-known problems:

- The erosion of funds received by the researcher to below workable levels after overheads are taken into account.
- The reluctance of research institutions to hire new (early career) staff who are seeking or have received a research grant with no or 'insufficient' overhead allowance.
- The absence of sustainable career pathways within universities for researchers or highly-skilled technicians who are excellent in their roles but best suited to contributing to a wider research team rather than leading it. The current RSI funding system condemns these highly-skilled individuals to indefinite precarious work.

Proposal 1
Getting started on the research pathway: Postdoctoral funding

Problems

Opportunities for getting started on the research career pathway are extremely limited. New Zealand currently has a dearth of postdoctoral opportunities for our newly-qualified graduates, who are less likely than more established researchers to receive large project-based research grants. Larger grants led by more senior researchers are also encumbered by severe overhead rates, making postdoctoral researchers as part of a wider project typically unaffordable, and often excluded in favour of 'cheaper' doctoral students.

Moreover, the few funding streams limited to early career researchers include a wide pool of eligible applicants from new graduates to Associate Professors, and are often restricted to those who have already made it onto the research career pathway and are employed in permanent salaried roles (e.g., Health Research Council Emerging Researcher First Grant). We believe that addressing the dearth of opportunity to even get started on the research career pathway is a key issue for the Te Ara Paerangi work programme and New Zealand-based RSI.

Solutions

We propose a postdoctoral funding stream that recently-qualified New Zealand researchers could exclusively apply for. A base grant that covered overheads for a certain number of postdoctoral scholars would support this move as the research institute would not consider itself 'out-of-pocket' after hiring successful applicants, and applications would not be encumbered with costs that do not contribute directly to the research or professional development of early career researchers. Such a funding stream should provide a pathway between doctoral study and permanent research roles and have the following features:

1. A **minimum tenure of three years**, to provide sufficient opportunity to develop the research skills required for a permanent role, as well as minimising the impact of employment precarity on postdoctoral scholars' wellbeing.

2. Focus on **supporting top-performing students** as developing researchers (e.g., as for the MBIE Whitinga Fellowships), rather than assessment on fully-formed research plans.

3. Include clear **professional development targets** that are in line with strategic priorities for New Zealand, for example around culturally responsive research and different modes of dissemination (such as public and community engagement or wider science communication). Specific funding allowances should be allocated per individual so that institutions are

incentivised to support professional development opportunities for early career researchers, as is done with European Commission grants.[1]

4. Include **financial support for a supervisor** at the institution, who would be credited with a small proportion of their FTE in recognition of their mentoring role. This would incentivise more senior academics to assist postdoctoral researchers, encouraging collaboration within each department. Resource and equipment sharing between senior and junior academics could also be used to strengthen applications and research output.

5. **Be flexible**, in recognition of the different strengths required within the changing landscape of research in New Zealand. For example, these postdoctoral grants could:

    - Allow academia–industry flexibility through secondments into industrial or public sector positions, to promote cross-collaboration and the direct use of research in industrial and/or public sector innovation in New Zealand. Secondment opportunities to overseas institutions could also be considered, allowing researchers to gain skills overseas that they can bring home and use alongside their communities.

    - Recipients could have the option to focus on developing skills in alternative dissemination modes such as teaching, engaging with communities, or various science communication outputs, rather than on producing only high-impact peer-reviewed publications. This may be especially important for Māori or Tangata Moana-focused research where appropriate and useful dissemination includes community engagement in addition to traditional peer-reviewed publications.

    - Funding people with the potential to develop into strong researchers without necessarily expecting them to become an ‘independent researcher’. The complex problems that we are facing in today’s world rely on teams of people to work together, yet the funding system for early career researchers typically operates at an individual level. New Zealand needs to encourage collaboration to maximise limited funding opportunities, drawing on different strengths across individuals. One possibility is to allow joint postdoctoral applications from people with complementary skills who together can produce more impactful research.

To avoid overburdening early career researchers, who are already experiencing greater workloads than previous generations of scholars,[2] these solutions should be formally incorporated into the expectations of the postdoctoral fellowship, rather than in addition to existing expectations.[3]

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[1] For example, the Marie Skłodowska-Curie Postdoctoral Fellowship: ec.europa.eu/research/mariecurieactions/actions/postdoctoral-fellowships

[2] Powell, K. (2016). Young, talented, and fed-up: Scientists tell their stories. *Nature, 538,* 446-449. doi.org/10.1038/538446a

[3] Browning, L., Thompson, K., & Dawson, D. (2016). It takes a village to raise an ECR: Organisational strategies for building successful academic research careers. *International Journal for Researcher Development, 7,* 192-197. doi.org/10.1108/IJRD-11-2015-0031

Proposal 2

Continuing on the research pathway: Changing competitive funding

Problems

After starting on the research career pathway, most likely by completing one or more postdoctoral fellowships, early career researchers face the next major challenge of how to continue on the research pathway and maintain career momentum in the face of the well-documented limitations of our current research funding system.[4] These limitations include that:

- **Permanent research roles at universities are extremely limited.** The majority of publicly-funded research in New Zealand is carried out at universities, yet there is very little opportunity for researchers to obtain permanent roles in those institutions. As a result, many highly-qualified individuals remain on precarious fixed-term contracts for very long periods of time, or attempt to cobble together multiple part-time roles to make up a full-time job, leading to lost productivity, poor wellbeing, and career stunting.[5,6]

- **The current competitive funding system is inefficient**. Researchers, particularly early in their career, spend too much time writing grants, taking away from research time and ultimately impacting their productivity and later career prospects.[5] Writing grant applications takes up a substantial proportion of time and money, with estimates suggesting that the cost of writing applications in New Zealand is around 20-35% of the fund size.[4] Cumulatively, many years of researcher time are being lost preparing applications that are ultimately not funded.

- **The current system places a significant burden on those who are asked to formally peer review others' grant applications**. Recruiting reviewers has become increasingly difficult due to the sheer volume of grants they are required to examine, the reality that reviewing often falls over the holiday period, and the fact that this work is often unrecognised and unpaid.[4,7] Rushed reviewers may make decisions based on quantitative metrics such as number of publications or prior grant successes, further disadvantaging early career researchers compared to more senior faculty.[8]

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[4] Gluckman, P. (2012). *Which science to fund: Time to review peer review?* Report prepared for the Office of the Prime Minister's Science Advisory Committee.
[5] Stringer, R., Smith, D., Spronken-Smith, R., & Wilson, C. (2018). "My entire career has been fixed term": Gender and precarious academic employment at a New Zealand university. *New Zealand Sociology*, *33*(2), 169-201.
[6] Simpson, A. B., Jolliffe Simpson, A. D., Soar, M., Oldfield, L. D., Roy, R., & Salter, L. A. (2022). The elephant in the room: Precarious work in New Zealand's universities. Auckland, New Zealand. https://www.teaga.co.nz/elephant-in-the-room.
[7] Guthrie, S., Ghiga, I., & Wooding, S. (2017). What do we know about grant peer review in the health sciences? *F1000Research*, *6*. doi: 10.12688/f1000research.11917.2
[8] Bol, T., de Vaan, M., & van de Rijt, A. (2018). The Matthew effect in science funding. *Proceedings of the National Academy of Sciences, 115,* 4887-4890. doi.org/10.1073/pnas.1719557115

- **Peer review of competitive funding applications is ineffective.** The inter-rater reliability for grant application reviews is strikingly low, ranging from 0.15 to 0.2 (out of 1).[9] One study showed that when random variability was taken into account, only 9% of grant proposals were always funded (i.e., consistently chosen as among the best).[10] Of the awarded projects, 59% would not have been awarded if they had been evaluated by other reviewers. Moreover, New Zealand and international research consistently shows that peer review is at best only a weak predictor of performance: there is little or no association between peer review ratings at the funding stage and higher productivity or impact of the research.[11,12,13]

- **Peer review of grant proposals is subject to bias.** Characteristics of the applicant and the reviewer influence funding recommendations and outcomes. Evidence shows that peer review for competitive funding is influenced by ethnicity,[14] gender,[15] age,[16,17] discipline,[17] and prestige.[18] Even small biases in the peer review process can affect funding rates.[19]

- **The current competitive funding system impacts researchers' wellbeing.** A majority of researchers find the process of preparing grant proposals stressful, time consuming, and conflicting with responsibilities for children and family.[20] Despite being unhappy with the current system, they must participate in it, as they are effectively submitting a tender for their career progression. The impacts on wellbeing are exacerbated by the structure of the competitive funding system, including that:

    - Most funding opportunities have a single annual deadline–an "all eggs in one basket" situation that leads to incredible pressure, particularly for early career researchers, when the consequence is a delay of another year before the next opportunity to apply.

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[9] Pier, E. L., Brauer, M., Filut, A., Kaatz, A., Raclaw, J., Nathan, M. J., Ford, C. E., & Carnes, M. (2018). Low agreement among reviewers evaluating the same NIH grant applications. *Proceedings of the National Academy of Sciences, 115,* 2952-2957. doi.org/10.1073/pnas.1714379115

[10] Graves, N., Barnett, A. G., & Clarke, P. (2011). Funding grant proposals for scientific research: Retrospective analysis of scores by members of grant review panel. *BMJ, 343,* Article d4797. doi.org/10.1136/bmj.d4797

[11] Danthi, N., Wu, C. O., Shi, P., & Lauer, M. (2014). Percentile ranking and citation impact of a large cohort of NHLBI-funded cardiovascular R01 grants. *Circulation Research, 114,* 600-606. doi.org/10.1161/CIRCRESAHA.114.302656

[12] Fang, F. C., Bowen, A., Casadevall, A. (2016). NIH peer review percentile scores are poorly predictive of grant productivity. *eLife, 5,* Article e13323. doi.org/10.7554/eLife.13323.001

[13] Gush, J., Gaffe, A.B., Larsen, V., & Laws, A. (2015). *The effect of public funding on research output: the New Zealand Marsden Fund*. Motu Working Paper 15-12: Motu Economic and Public Policy Research.

[14] Ginther, D. K., Schaffer, W. T., Schnell, J., Masimore, B., Liu, F., Haak, L. L., & Kington, R. (2011). Race, ethnicity, and NIH research awards. *Science, 333,* 1015-1019. doi.org/10.1126/science.1196783

[15] Bornmann, L., Mutz, R., & Daniel, H.-D. (2007). Gender differences in grant peer review: A meta-analysis. *Journal of Infometrics, 1,* 226-238. doi.org/10.1016/j.joi.2007.03.001

[16] Severin, A., Martins, J., Heyard, R., Delavy, F., Jorstad, A., & Egger, M. (2020). Gender and other potential biases in peer review: Cross-sectional analysis of 38,250 external peer review reports. *BMJ Open, 10,* Article e035058. doi.org/10.1136/bmjopen-2019-035058

[17] Tamblyn, R., Girard, N., Qian, C.J.. & Hanley, J. (2018). Assessment of potential bias in research grant peer review in Canada. *Canadian Medical Association Journal*, 190 (16) E489-E499; DOI: 10.1503/cmaj.170901

[18] Leberman, S. I., Eames, B., & Barnett, S. (2015). 'Unless you are collaborating with a big name successful professor, you are unlikely to receive funding.' *Gender and Education, 28,* 644-661. doi.org/10.1080/09540253.2015.1093102

[19] Day, T. E. (2015). The big consequences of small biases: A simulation of peer review. *Research Policy, 44,* 1266-1270. doi.org/10.1016/j.respol.2015.01.006

[20] Herbert, D. L., Coveney, J., Clarke, P., Graves, N., & Barnett, A. G. (2014). The impact of funding deadlines on personal workloads, stress and family relationships: A qualitative study of Australian researchers. *BMJ Open, 4,* Article e004462. doi.org/10.1136/bmjopen-2013-004462

- The timing of some grants is poor, and can restrict researchers' time on leave and with family. Closing and notification dates in December and January are particularly disadvantageous for early career researchers who are likely to be relying on the grant for continuing employment and cannot readily seek alternative employment over the Christmas/New Year holiday period.
- Often there is a very long period of time (up to a year) between applying for a grant and learning the outcome. Again, this long period of uncertainty is particularly difficult for early career researchers and those on shorter-term grants.

Solutions

To address these problems and help early career researchers continue on the research pathway, we propose the following changes to the funding system:

6. Adopt a **more flexible approach to postdoctoral fellowships** (as described in Proposal 1) so that after completing the fellowship, early career researchers who are not able or do not want to attain a permanent research role at a university are equipped with the skills, confidence, experience, and networks to find permanent employment in other organisations. The current narrow conceptualisation of postdoctoral roles too often fails to equip early career researchers with the skills needed to move outside academia and into public sector or industry roles.
7. Shift the majority of contestable grants away from panel selection and towards **random selection of recipients** (e.g., as for Health Research Council Explorer Grants). Stratification can be employed to ensure equity across disciplines, and for women, Māori, and Tangata Moana (e.g., following the model used by the MBIE Whitinga Fellowships). A brief initial quality screening process can be undertaken by a qualified multi-disciplinary panel and all eligible applicants entered into the pool. Extensive evidence shows that random-selection grant systems are more efficient, effective, and fair than traditional peer-reviewed panel selection.[21,22]
8. Greatly **reduce the amount of detail** required for applications. Random selection of grant recipients will support this move.
9. Greatly **reduce the time** between application closing and notification dates (a maximum of eight weeks) to support employment continuity for early career researchers. Random selection of grant recipients will support this move.

[21] Avir, S. (2015). Funding science by lottery. In U. Mäki et al. (Eds.), *Recent developments in the philosophy of science: EPSA13 Helsinki* (pp. 111-126). Springer International Publishing. doi.org/10.1007/978-3-319-23015-3_9

[22] Vaesen, K., & Katzav, J. (2017). How much would each researcher receive if competitive government research funding were distributed equally among researchers? *PLoS ONE, 12*(9): e0183967. doi.org/10.1371/journal.pone.0183967

10. **Remove requirements to already be in a permanent salaried role** in order to be a grant recipient so that early career researchers looking to enter the workforce or those on fixed-term contracts have an equal opportunity to apply.

11. Taking a **system-wide view of all publicly-funded grants** available to early career researchers so that attention is paid to the collective effect on the researcher of the timing, amounts, and notification dates of all available grants.

12. If random selection from short applications is not adopted, **band application requirements** into different expense levels so that considerably less detail is required for smaller grants. This would bring the research grant system in line with the approach the government takes to other procurement and avoid researchers spending a disproportionate amount of time on applications for small grants.

13. **Widen the range of dissemination modes** that are valued and incentivised through research grants. Researchers should be able to choose whether their predominant dissemination mode is journal articles, publicly-accessible reports, public and community engagement, or teaching students, rather than having to excel in all possible modes of dissemination. This would enable research to have a greater impact in our communities, better help researchers to meet their Te Tiriti o Waitangi obligations, achieve outcomes that are better aligned with the intent of Vision Mātauranga, and contribute to a more diverse workforce.

Together, our proposed changes should help to strengthen the pathways for early career researchers to join (Proposal 1) and continue (Proposal 2) in the research workforce. They will not, of course, solve all the problems in our RSI system, but at least help to improve it. We look forward to hearing the outcomes of the Te Ara Paerangi consultation phase, and to taking opportunities to further engage in the process of redesigning our RSI system.

Nāku noa, nā

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