Canadian Association of University Teachers
Association canadienne des professeures et professeurs d'université

CAUT Submission to the **Fundamental Science Review**

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Introduction & summary

The Canadian Association of University Teachers represents 68,000 academic and general staff at more than 120 universities and colleges across the country. Our members play a central role in advancing knowledge through fundamental research.

CAUT welcomes the Fundamental Science Review as an important opportunity to explore ways that we can better provide support for and derive the benefits of fundamental research. We understand fundamental research to refer to experimental and theoretical work undertaken with the primary aim of acquiring new knowledge, and not necessarily with any particular application or use in view. Although fundamental research may not have specific applications as its goal, history has shown that the most important discoveries have typically come from basic research driven by a quest for knowledge. Fundamental research is the foundation upon which many key unanticipated innovations have been developed, such as X-rays, nylon, Teflon, GPS technology, informatics, superconductivity, and medical imaging. In short, applied research cannot thrive when fundamental research is struggling.

To fully benefit from the fruits of fundamental research, we need to ensure that funding levels are adequate, the integrity and independence of research and funding decisions is respected, and that programs are inclusive of all disciplines and researchers.

Summary of recommendations

1. Ensure Adequate Funding for Fundamental Research:

- The federal government should increase the base funding of the three granting councils to support fundamental research. At a minimum, funding should be restored to 2007-08 levels in real terms.
- A longer term funding plan should be developed to provide sufficient resources to ensure a 40% success rate in SSHRC applications; 40% for CIHR; and 75% for NSERC.
- The federal government should implement a multi-year funding plan to increase SSHRC's share of total base funding to the granting agencies to 20%.

2. Protect the Integrity and Independence of Fundamental Research:

- All fundamental research funded through the granting agencies should be subject to peer-review with priorities determined by the research community.
- All federal research programs should provide for robust protections for academic freedom, the free and open exchange of ideas and discoveries, and safeguards against conflicts of interest.
- The three federal granting agencies should be made more arms-length from government and the membership of their boards should include more representation from active researchers.
- The federal government should create a Parliamentary Science Officer as an independent officer of the Library of Parliament reporting to the Senate and the House of Commons.

3. Ensure that Fundamental Research Programs are Inclusive and Respect the Diversity of Canada's Research Community:

- Federal research programs should be subject to a gender and equity impact analysis.
- The Canada Research Chairs and Canada Excellence Research Chairs in particular should be reviewed to ensure institutions are setting and meeting gender and equity targets.
- Federal research programs should be reviewed to identify and rectify any biases against small institutions and regions.
- To boost Canada's fundamental research capacity, the federal government and the provinces should explore ways to increase the complement of permanent faculty, while addressing the increasing employment of contract academic staff who are not paid or recognized for their research contributions.

4. Increase Support for Indigenous Research and Researchers (TRC# 65):

- That the federal government develop a dedicated funding program for Indigenous scholars and research in each of the granting agencies.
- Increase support for Indigenous undergraduate and graduate students through the Post-Secondary Student Support Program and reinstate the Indian Studies Support Program.

Ensure adequate funding for fundamental research

Despite some recent increases, the federal government's support for the conduct of fundamental research has stalled over the past decade. When adjusted for inflation, fundamental research funding is well below levels recorded in 2007 when the previous government adopted its *Mobilizing Science and Technology to Canada's Advantage* strategy. SSHRC funding is down over 10% in real terms; NSERC's funding has fallen by 1.5%; and core support for CIHR is 6% below 2007 levels (Table 1).

One impact of this funding shortfall has been a sharp decline in the number of promising research projects that can be funded. The success rate for NSERC's Discovery Grants has fallen from 73% in 2006-07 to 66% in 2015-16. The success rate for SSHRC's standard research grant, now called the Insight Grant, has dropped from 40% in 2006-07 to just 20% in 2015-16. For CIHR, the percentage of successful applicants was 13% in 2015-16 compared with 29% in 2006-07.

Recommendation 1.a

The federal government should increase the base funding of the three granting councils to support fundamental research. At a minimum, in the short term, funding for each council should be restored to 2007-08 levels in real terms.

Recommendation 1.b

A longer term funding plan should be developed to provide sufficient resources to ensure a 40% success rate in SSHRC applications; 40% for CIHR; and 75% for NSERC.

As noted in Table 1, there has been a particularly sharp decline in SSHRC funding over the past decade. More than half of all faculty and graduate students work and study in the social sciences and humanities, and yet SSHRC's funding gap has grown much more rapidly than the other granting councils. In 2016-17, SSHRC's share of total base funding for all the granting agencies will be less than 15%. In practice, this means that SSHRC cannot offer the same range of programs as NSERC and CIHR.

Table 1

Granting Council Base Funding, 2007–2017 (constant 2015 dollars, millions)

	SSHRC	NSERC	CIHR	Indirect Costs	Total
2007-08	416.9	1149.6	1106.0	356.3	3028.9
2008-09	389.1	1142.6	1075.6	364.8	2972.2
2009-10	400.1	1163.4	1088.6	359.5	3011.6
2010-11	390.6	1169.2	1115.9	358.3	3033.9
2011-12	386.3	1146.5	1065.5	350.6	2948.9
2012-13	379.0	1119.3	1037.2	345.5	2881.0
2013-14	359.6	1099.7	1028.9	342.1	2830.3
2014-15	359.8	1097.5	1028.7	344.7	2830.7
2015-16	362.4	1119.8	1028.7	340.7	2851.6
2016-17	371.9	1132.1	1040.0	354.9	2898.9
% change 2007-17	-10.8%	-1.5%	-6.0%	-0.4%	-4.3%

Recommendation 1.c

The federal government should implement a multi-year funding plan to increase SSHRC's share of total base funding to the granting agencies to 20%.

Protect the integrity & independence of fundamental research

The challenge facing fundamental research in Canada today is not simply one of reduced funding. It is also about how funding is being allocated and directed. Over the past two decades, governments and the granting agencies have increasingly earmarked and targeted funding with limited consultation with the research community. As a result, funding has been redirected away from fundamental research.

In addition, federal government budgets over the past decade have announced targeted research funding that has bypassed the peer-review process. Rather than allow the scientific community to determine what research is most worth funding, governments have at times required the granting agencies to direct funding toward industrial collaborations, specific disciplines, or topics. However, fundamental research is a search into the unknown and by definition implies that its course and outcome can neither be commanded nor predicted.

As John Polyani, Canada's most prominent Nobel laureate has warned, when governments or industry try to direct scientific inquiry, rather than allowing the scientific community to do so through its rigorous peer-review system that protects the integrity of their work, our scientific horizons shrink and our future is diminished.

Recommendation 2.a

All fundamental research funded through the granting agencies should be subject to peer-review with priorities determined by the research community.

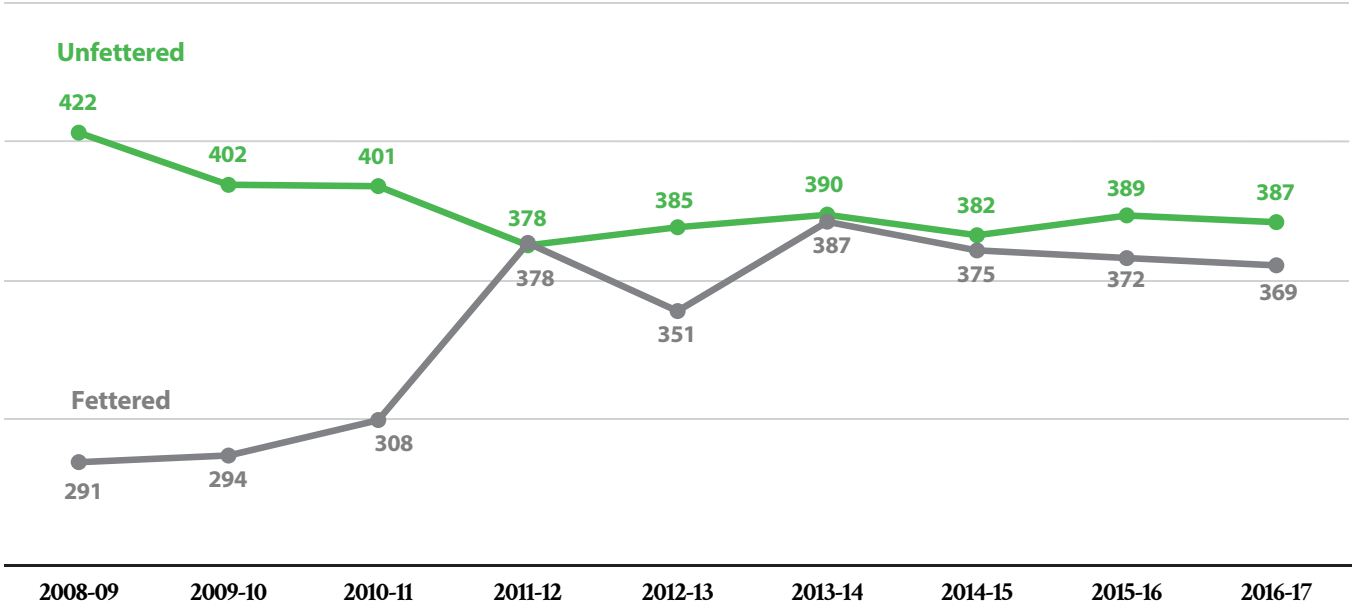
NSERC's shift in funding from fundamental research towards "fettered" and targeted industrial partnerships provides a clear illustration of the trend away from fundamental research. In 2008-09, about 60% of NSERC's research project funding was dedicated to basic or "unfettered" research. In the current fiscal year, "fettered" research receives about the same level of funding as discovery grants. This represents an increase of 30% since 2008-09 when adjusted for inflation. This is compared to a drop of about 8% in the value of discovery grants during the same period (Figure 1).

The focus on business innovation and the commercialization of research, with the emphasis on requiring government scientists and university-based researchers to collaborate with industrial partners, can compromise the integrity and independence of research. In a 2012 CAUT report examining 12 major collaboration agreements involving universities, industry and governments in Canada, we found that seven agreements provided no specific protection for academic freedom, and only one required the disclosure of conflicts of interest. Only five of the agreements gave academic researchers the unrestricted right to publish their research findings and just half provide that the university maintains control over academic matters affecting staff and students.

The influence that corporate funders can exert on researchers is well documented across a variety of academic disciplines. There are a number of examples of how food and agriculture companies have funded academic research to counter health risk claims typically associated with their products. One study, which found that soda consumption was not linked to obesity, had received support from the National Soft Drink Association. Another study, sponsored by the Egg

Figure 1

Discovery Grant versus Targeted Research funding (constant 2015 $, in millions)



Nutrition Center, determined that eating eggs frequently did not increase cholesterol levels. In the economics field, many academic researchers were commissioned by large financial corporations to advocate positions that extolled financial deregulation, which suited the interests of the industry but eventually precipitated the 2008 crisis. Environmental science has also been under pressure. A US study of 10 major sponsored research contracts between large oil companies and universities into alternative energy found serious limitations placed on research independence. Eight of the contracts permitted the corporate funder to "fully control both the evaluation and selection of faculty research proposals."

Financial ties to industry can unduly influence the outcome of research studies. In a now famous study of the matter, Stelfox et. al. revealed that researchers were much more likely to be supportive of calcium channel antagonists for treating cardiovascular disorders if they had a financial relationship with the manufacturers of these drugs. Another landmark study examining what characteristics determined the conclusions of review articles on passive smoking found that the only factor at play was whether the author was associated with the tobacco industry. Three quarters of the reviews concluding that passive smoking was not harmful were written by tobacco industry affiliates. The authors of the report concluded that "the tobacco industry may be attempting to influence scientific opinion by flooding the scientific literature with large numbers of review articles supporting its position that passive smoking is not harmful to health."

Recommendation 2.b

All federal research programs should provide for robust protections for academic freedom, the free and open exchange of ideas and discoveries, and safeguards against conflicts of interest.

Protecting the independence and integrity of fundamental research also requires the granting agencies have the appropriate governance structures to ensure they are independent from government, and representative of and responsive to the research community they serve. Recent controversies at CIHR where flawed reforms were imposed over the objection of the research community highlight the importance of the latter. Unfortunately, the composition of the boards of the granting councils has become less representative in recent years, with more appointments from industry and politics, and fewer drawn from the active scientific and research community.

Not only has representation from the active scientific and research community decreased at the expense of appointments from industry and politics, but only a few disciplines are represented on granting council boards. Representation on NSERC's governing council is skewed towards applied research and commercialization, with the majority of members from engineering and the corporate sector. More than half of the members on SSHRC's board are not in the humanities or social sciences, while a majority of those who do represent the social sciences are in business or economics.

Recommendation 2.c

The three federal granting agencies should be made more arms-length from government and the membership of their boards should include more representation from active researchers.

Other steps can be taken to ensure better governance of research funding in Canada. An independent and non-partisan Science Officer should be independent, and non-partisan. To ensure this, the Science Officer should be appointed by and accountable to Parliament, not to the government of the day. The mandate of Canada's Science Officer should be to advise and report to Parliament on all aspects related to the financial support and state of science and research in Canada in order to ensure that the legislative process is informed by sound evidence.

The primary responsibilities of Canada's Science Officer should be to provide sound information and independent analysis to both Houses of Parliament about federal support for research in government departments, universities and colleges, and the private sector; provide research and analysis of the efficacy of federal science and research policy; assess the state of scientific and research

integrity within federal departments and agencies; and assess the state of scientific and technical evidence, including accepted theories, established findings, and existing uncertainties, relevant to any specific matter or proposal over which Parliament has jurisdiction. Finally, the Science Officer should educate the public about research and the need for evidence-based policies.

Recommendation 2.d

The federal government should create a Parliamentary Science Officer as an independent officer of the Library of Parliament reporting to the Senate and the House of Commons.

Ensure that fundamental research programs are inclusive & respect the diversity of Canada's research community

Biases in research funding can discriminate against women and other equity-seeking groups, depriving the research community and Canadians as a whole of valuable perspectives, experiences, and knowledge. All federally supported research should be inclusive of the diversity within our society.

However, some programs have failed to be fully inclusive. For instance, the Canada Research Chairs Program has recently been shown to have fallen short of its equity targets. While the target for the number of women holding CRCs is 30.6%, only 28.9% of the chairs are currently held by women. Similarly, the target for visible minorities is 15%, while the actual number is 13.1%; the target for Indigenous scholars is 1% but they hold just 0.59% of CRCs; and finally, the target for persons with disabilities is 4% but their representation is just 0.59%. More strikingly, of the 27 Canada Excellence Research Chairs, just one is a woman.

Recommendation 3.a

All federally funded research programs should be subject to a gender and equity impact analysis.

Recommendation 3.b

The Canada Research Chairs and Canada Excellence Research Chairs in particular should be reviewed to ensure institutions are setting and meeting gender and equity targets.

The allocation of research funding through the peer-review process should be free of any implicit biases. A recent study of funding success and funding levels of NSERC's flagship discovery grant program has shown an implicit bias against applicants from small institutions. The study forecasts that science funding will drop sharply at small institutions across the country over the next decade if nothing is done. Granting councils should make efforts to ensure that basic research funding is not skewed towards certain types of institutions or regions.

Recommendation 3.c

Federally funded research programs should be reviewed to identify and rectify any biases against smaller institutions and regions.

Government underfunding and institutional management practices has led to hiring increasing numbers of poorly paid, precariously employed contract academic staff. Labour force survey estimates show that one out of every three university professors is now on a temporary or part-time contract. Women and other members of equity-seeking groups tend to be overly represented in the ranks of contract academic staff.

This has significant implications for Canada's scientific capacity. Contract academic staff, although trained as teachers and researchers, are hired only to teach. Their employment status often precludes them from accessing federal research grants. This represents a major under-utilization of research talent and potential.

Recommendation 3.d

To boost Canada's fundamental research capacity, the federal government and the provinces should explore ways to increase the complement of permanent faculty, while addressing the increasing employment of contract academic staff who are not paid or recognized for their research contributions.

Increase support for Indigenous research & researchers

The Truth and Reconciliation Commission has drawn attention to the historic wrongs committed against Indigenous Peoples in Canada. Many of the TRC's recommendations draw attention to the important role that education and research can play to advance the process of reconciliations.

Indigenous peoples and perspectives remain seriously under-represented in universities and colleges. To address this gap, it is important that all federally funded research programs aim to increase the number of Indigenous scholars, and provide more support for Indigenous research across all disciplines.

Recommendation 4.a

The federal government should develop a dedicated funding program for Indigenous scholars and research in each of the granting agencies.

The federal government also has an important role to play in developing the next generation of Indigenous scholars by ensuring greater access to post-secondary education. Since 1977, the Post-Secondary Student Support Program (PSSSP) has provided First Nations and Inuit communities with grants to cover the costs of a university or college education. However, the program's budget has been capped for years while demand and costs have risen. As a result, there has been nearly a 19% decline in the number of Indigenous students funded by the program since 1997. The federal government has a responsibility to honour and enact the Treaty right to education, including post-secondary education.

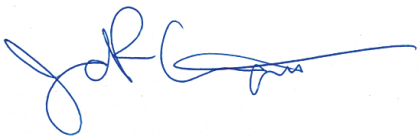
In 2013, the federal government replaced the Indian Studies Support Program (ISSP) with the Post-Secondary Partnership Program (PSPP). The PSPP aligns funding with national government priorities and federal labour market needs, whereas the ISSP ensured that local and regional priorities were addressed. The PSPP also eliminates possibilities for culture- and language-related programming previously available. Post-secondary institutions are now required to have other funding partners to be eligible, while First Nations post-secondary institutions are encouraged "to develop partnerships with eligible post-secondary institutions to enable them to access this funding and take advantage of best practices." Imposing such conditions reinforces federal paternalist practices and undermines the principle of self-determination.

Recommendation 4.b

The federal government should increase the support for Indigenous undergraduate and graduate students through the Post-Secondary Student Support Program and reinstate the Indian Studies Support Program.

Conclusion

Support for fundamental research has suffered over the past decade as a result of underfunding, the redirecting of funding away from basic research, and a host of policy decisions that has undermined the independence and integrity of peer-reviewed research. This Fundamental Science Review represents an opportune moment to ensure that the federal government reinvests in basic research guided by priorities set by the scientific research community. To increase scientific capacity, the federal government needs to collaborate with the provinces to substantially reduce the numbers of academic staff on teaching contracts whose ability to fully contribute to research is hampered. There must be renewed efforts to eliminate biases and barriers to promote an inclusive and diverse research community, while support for Indigenous research and researchers needs to be substantially increased.



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