Improving the Accessibility of Federal Graduate Research Awards in Canada

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Executive Summary: Canadian federal graduate research awards provide graduate students with support that impacts both their experience during their degree and their future career progression. Obtaining federal funding during graduate education qualifies students for additional awards, provides financial security, and increases their research independence. However, the number and value of awards have remained unchanged for almost two decades and the evaluation and eligibility criteria are not designed to encourage applications from students from historically underrepresented groups (URGs). The three federal research funding agencies (the Tri-Agency) have recently released an Equity, Diversity, and Inclusion (EDI) Action Plan to better support early-career individuals from these groups, with a commitment to "identify and address barriers to equitable participation of members from underrepresented groups" (Initiative 1.2.2) and increase participation of URGs in the post-secondary research system (Objective 2). In this memo, we propose three changes to broaden the eligibility and evaluation of federal student awards, as well as increase and standardize the award values. Ultimately, these recommendations will reduce the barriers faced by URGs in applying for and obtaining these awards in a manner not currently addressed by the Tri-Agency's EDI plan.

I. Introduction

Graduate students are an integral part of research and innovation in Canada. Federal scholarships provide awarded graduate students with financial security and independence, along with greater control over their research direction (SPE 2021; CIHR 2016). In addition, these awards increase a student's chance at future awards (NSERC 2020) and can impact a student's potential in obtaining tenure track positions (van den Besselaar and Sandström 2015).

However, the chances of receiving a federal scholarship are not equal for all applicants. Previous research has found that female and visible minority applicants are significantly less likely to be awarded research funding compared to male and white applicants by the US National Institute of Health and Canadian Institutes of Health Research (CIHR) (Ginther et al. 2011; Witteman et al. 2019). Further, women, Indigenous peoples, persons with disabilities, and visible minorities lack

representation in both award and application rates for several major Canadian funding opportunities (Canada Research Coordinating Committee 2020). Data from the 2006 and 2016 Canadian census shows that women and visible minorities are underrepresented in doctoral programs (Table 1), and the percentage of women, Indigenous peoples, and visible minorities holding university faculty positions is disproportionate to the Canadian population (Government of Canada 2018).

In Canada, major governmental scholarships are managed and distributed by three federal research funding agencies (the Tri-Agency): Natural Sciences and Engineering Research Council (NSERC), Social Sciences and Humanities Research Council (SSHRC), and CIHR (Table 2). The Tri-Agency jointly administers the Canadian Graduate Scholarships at the master's (CGS-M) and doctoral (CGS-D) level, the Vanier scholarship, and agency-specific awards including the Post Graduate Scholarship for doctoral students (PGS-D), SSHRC Doctoral Fellowships (SSHRC-DF), and Doctoral Foreign Study Award (DFSA) respectively.

A comparison of data between the Canadian census and federal scholarship recipients reveals that the distribution of individuals from under-represented groups (URGs) with a master's or doctoral degree, including women, visible minorities, Indigenous peoples, and people with disabilities, is not being proportionately represented in the federal award processes (Table 1).

This discrepancy suggests there are barriers that limit individuals in URGs from applying to Tri-Agency scholarships.

In April 2021, the Tri-Agency released a 2018-2025 action plan to address systemic barriers and increase equity, diversity, and inclusion (EDI) in the postsecondary research ecosystem (NSERC 2021). However, their proposed initiatives are long-term projects and immediate actions are required to increase the equity of graduate student funding for URGs.

We propose three changes to the federal granting process regarding the eligibility, evaluation, and value of the federal graduate awards to make them more equitable for URGs; however, we exclude the DFSA in this analysis because of the large difference in its eligibility criteria (CIHR 2021a). Our proposed changes focus on making federal scholarships more accessible and increasing the participation and retention of URGs in research. These mechanisms ultimately support the Tri-Agency's efforts to redefine research excellence, better support early career researchers from URGs, and address opportunities for action, which were not included in the published plan.

II. Recommendations

i. Broadening eligibility duration for doctoral awards
A key determinant of eligibility for Canadian federal doctoral awards is the length of enrollment in a program. In most cases, the eligibility duration for these awards is limited to the first two to three years of doctoral study (NSERC 2020b). However, there are inconsistencies in the duration of application eligibility between the different Tri-Agency administered awards, as well as agency-specific awards (Table 2).

	NSERC's 2020 Competition Statistics			**2016 census data from Statistics Canada**		
	Women	*Men*	*Other*	*Women*	*Men*	*Other*
Doctoral	39 %	56 %	5 %	56 %	44 %	N/A
Master's	29 %	54 %	17 %	54 %	46 %	N/A
	Visible Minority	*Indigenous*	*Disability*	*Visible Minority*	*Indigenous*	*Disability*
Doctoral	28 %	2 %	4 %	37 %	1 %	N/A
Master's	14 %	1 %	2 %	39 %	1 %	N/A

Table 1: Distribution of graduate student awards by NSERC in 2020 (NSERC 2020c) and percentage of the Canadian population identified as holding a master's and/or doctoral degree from URGs in 2016 (Statistics Canada 2016a, 2016b). N/A indicates the data was not available in the 2016 census.

Federal funding agency	Award details (title, annual value, duration)	Duration of eligibility for applicants
Tri-Agency	CGS-M, $17,500 per year, 1-2 years	• 0 to 12 months of full-time study in graduate program by December 31 of the application year.
	CGS-D, $35,000 per year, 3 years	• 0 to 24-months of full-time study in doctoral program by December 31, if previously enrolled in a master's program. • 0 to 36-months of full-time study by December 31 if enrolled in a joint program (e.g. MD/PhD) or if enrolled directly from a bachelor's.
	Vanier, $50,000 per year, 3 years	• 0 to 20-months of full-time study in doctoral program by May 1, if previously enrolled in a master's program. • 0 to 32-months of full-time study in doctoral program by May 1 if enrolled in a joint program (e.g. MD/PhD) or if enrolled directly from a bachelor's.
NSERC	PGS-D, $21,000 per year, 3 years	• Same as CGS-D
CIHR	DFSA, $30,000 per year, 3 years	• Same as CGS-D

SSHRC	SSHRC-DF, $20,000 per year, duration varies	• 0 to 48-months of full-time study in a doctoral program by December 31st.
		• The award duration is scaled by the student's enrollment:
		   o 0 to 12-months, 48-month award
		   o 12 to 24-months, 36-month award
		   o 24 to 36-months, 24-month award
		   o 36 to 48-months, 12-month award

Table 2: The value, duration, and eligibility of students for the Canadian Federal Graduate Student Awards (CIHR 2021a; NSERC 2020b; SSHRC 2020; Vanier Canada Graduate Scholarships 2021). Award values are in Canadian dollars.

The Tri-Agency states that one of the intents of these federal awards is to provide students with the freedom in choosing a host institution, independent of funding availability (NSERC 2020b). Limiting applications to early-level Ph.D. students may be to prevent applicants from being outcompeted by experienced doctoral students. However, this may disadvantage students who are less familiar with the funding system when coming into graduate school (CIHR 2016), which reduces their overall window for planning and preparing a competitive application. Restricting eligibility to the first few years of enrollment results in evaluating student excellence on the basis of pre-doctoral academic accomplishments, which can be heavily confounded by systemic barriers faced by undergraduate students from historically URGs. The first few years of graduate studies are often dedicated to defining and developing one's project and its approach, while scientific achievements, such as manuscripts and collaborative efforts, build up over the final years of a doctoral degree (Roach and Sauermann 2017).

We recommend harmonizing the duration of eligibility for federal awards, with the SSHRC-DF serving as the basis for this criterion. This would give doctoral students up to four years to apply, with the award duration scaling based on the number of months of full-time enrollment (Table 2). To prevent awards from being disproportionately given to experienced doctoral students, the number of awarded scholarships should be proportional to the number of applicants from each year of their degree.

ii. Revaluating award criteria

The current evaluation criteria of federal graduate awards vary between award types (Table 3), and the rationale behind this difference is unclear. The selection criteria based on "excellence" favors students with significant academic accomplishments during their undergraduate education. To meet these criteria, students need to work, often unpaid, in a research lab during their undergraduate studies. This disadvantages students who choose paid employment over volunteer experience, and even funded research positions can be insufficient to meet financial needs (Favaro and Hind-Ozan 2020).

The Tri-Agency should broaden its definition of "excellence" in academia by collectively adopting CIHR's commitment to developing a more inclusive concept of research excellence, as outlined in CIHR's Strategic Plan 2021-2031 (CIHR 2021b). Alternative experiences, including non-research work and volunteering within the community, help develop professional skills and should also be considered in applications. As well, NSERC, CIHR, and SSHRC are all signatories on the San Francisco Declaration on Research Assessment (DORA), which makes several recommendations for improving the evaluation of research output. The Tri-Agency has stated that the DORA recommendations align with their EDI Action Plan on reviewing the existing criteria for assessment of research excellence (NSERC 2019). DORA encourages funding agencies to consider the value of non-traditional outputs of research, such as datasets and software, and to measure scientific impact beyond publication metrics, such as its influence on policy (DORA 2021). Implementing these practices may encourage more individuals from URGs to apply to federal graduate awards.

Aligned with the objectives of the Tri-Agency's Action Plan to address this barrier, we recommend equally weighting the selection criteria across federal awards based on 1) Academic excellence; 2) Research ability and potential; and 3) Personal characteristics, interpersonal skills, and leadership. This will also make the eligibility criteria similar to that of the Vanier Award (Table 3).

Moreover, this equal weight of the criteria may encourage candidates (from historically URGs) who may have had numerous commitments outside of academics to apply. This may increase diversity and inclusivity within the pool of candidates.

This equal emphasis between the three main criteria would recognize the need for well-roundedness in a candidate. As well, over a third of graduate students do not pursue a full-time career in academia (Reithmeier et al. 2019), hence, demonstration of excellence in leadership and involvement in professional development and community engagement opportunities should reflect the diversity of goals and career outcomes of graduate students.

iii. Standardizing award values

Canadian federal graduate student awards vary greatly in value and length across disciplines (Table 2). A survey of Canadian astronomy graduate students on tuition and funding clearly depicted how graduate students throughout the country are facing various financial strains. In almost all cases, domestic students spend 90% of their income on tuition, housing, food, internet, and ancillary fees (Lavoie 2010). A second survey of over 1,100 graduate students and postdocs found that 79% wanted to increase the value of existing awards (SPE 2020).

We recommend increasing award values across disciplines, and increasing the number of awards available, to better align with the current standard of living and increasing the number of awards available.

CGS-M		CGS-D / PGS-D / DFSA / SSHRC-DF		Vanier	
Criteria	*Weight*	*Criteria*	*Weight*	*Criteria*	*Weight*
Research potential	30%	Research ability and potential	50%	Research potential	33%
Academic excellence	50%	Relevant experience and achievements obtained within and beyond academia	50%	Academic excellence	33%
Personal characteristics and interpersonal skills	20%			Leadership	33%

Table 3: Overview of the current selection criteria for "excellence" used in the evaluation of applications for selected federal awards. Proposed changes to the evaluation criteria for the CGS-M and CGS-D, PGS-D, SSHRC-DF are similar to what is currently used to assess applications for the Vanier Scholarship.

In agreement with a survey of over 1,000 graduate students and post-doctoral fellows in Canada (SPE 2020), we suggest increasing award values to $21,000 for CGS-M and $35,000 for PGS-D and SSHRC-DF.

While the average tuition cost for graduate programs has increased by 1% annually since 2006 (Statistics Canada 2021), the value of Canadian federal graduate awards has, unfortunately, been stagnant since 2003 (Naylor et al. 2017). Award values should increase on an annual basis with inflation rates and tuition fees to maintain the same level of support for students. For students living in large cities, standard federal awards should provide a top-up to help with the exorbitant costs of rent and housing. For example, the average graduate student at the University of Toronto-St. George Campus starting in 2020 spends $1,711.03 (University of Toronto 2020) and $6,444 (CMHC 2021) more on tuition and housing respectively than a student in 2003. When considering inflation alone, an award in 2003 worth $35,000 is equivalent to $48,000 today. At present, we recognize the impracticality of requesting award values be raised to such an extent; however, this highlights the lack of continued support graduate students have received over the past two decades.

Ultimately, standardizing award values provides increased financial security and stability for graduate student researchers. An annual increase of these awards, in line with inflation and increasing tuition fees, will prevent the awards from being devalued.

III. Discussion
The Government of Canada needs to reexamine graduate student funding through the Tri-Agency to create a more equitable research ecosystem. In turn, the Tri-Agency must develop new eligibility and award criteria and share these changes with students, supervisors, and application reviewers. Academic institutions need to encourage applications from all students, especially members of URGs. In turn, universities will see a direct benefit from well-funded and productive graduate students. Implementing these recommendations would also strengthen the Tri-Agency's signed support of DORA.

Our recommendations are dependent on increased funding to the Tri-Agency. Without a budget increase, the funds required to standardize award values to $21,000 (for master's students) and $35,000 (for doctoral students) might result in fewer numbers of overall scholarships granted. It could also result in a reduction in funding for elite awards including the Vanier Award. While at present, this is the only federal award to which international graduate students are eligible, only 13% of awardees are foreign scholars (CIHR 2014).

If an increase in the budget for Tri-agency scholarships is not provided by the federal government, we recommend the Tri-Agency focuses on revaluating the award criteria. Pursuing recommendation one without a budget increase could mean that scholarships will become even more competitive since there would be more applications for the same number of scholarships. Awards including PGS-D and CGS-D currently operate under a quota system and only a designated number of applications per institution are accepted for the federal competition, with exemptions made for Indigenous scholars (NSERC 2020a). Therefore, if there are more applications to screen and process, the administrative burden would fall on each institution who might be hesitant to shoulder this increased workload.

IV. Conclusion
Canadian federal scholarships provide graduate students with financial and research independence which significantly impacts their future academic careers. The current award system has many limitations, particularly in respect to its ability to adequately support equity, diversity, and inclusion in academia.

To address this, we recommend: 1) increasing the eligibility duration of the Tri-Agency awards to match that of the SSHRC doctoral awards, and distribute awards proportionate to the number of applicants in each enrollment bracket; 2) change the evaluation criteria used to grant these awards by equally weighting academic excellence, research potential, and personal and leadership experience; and 3) increase and standardize award values across the Tri-Agency. These recommendations are a step forward to reducing barriers and ensuring accessibility for all research students, especially for individuals from historically URGs.

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