Early Career Investigators (ECIs) in health research: final report of a cross-Canada survey

Executive Summary

Health research funding has become increasingly competitive in Canada. Between 2005-06 and 2014-15, success rates for full term open operating grants at the Canadian Institutes of Health Research (CIHR) halved from 30% to 15%. Grants deemed fundable by reviewers went from being funded about half the time to about one fifth of the time. Low funding rates undermine health researchers’ ability to generate new knowledge and improve Canadians’ health outcomes.

These falling success rates have had negative impacts on many scientists. Early career investigators (ECIs), defined as those within the first 5 years of their independent careers, have been particularly hard hit. Between 2008-09 and 2014-15, CIHR funding awarded to ECIs declined by 38%. Adding to these concerns, recent changes to CIHR funding programs (‘CIHR reforms’) threaten to remove a full third of total funding awarded to ECIs annually.

The Association of Canadian Early Career Health Researchers (ACECHR) organized and ran an informal survey Mar 17-24, 2016 to gather personal accounts from ECIs about their experiences in the current funding environment. In one week, we received 143 responses from verified early career health researchers in Canada who hold competitive positions and have a history of research success. Highlights of our findings include:

- 84% report that they are delaying starting potentially impactful research. Respondents report scaling back their research and losing competitiveness internationally.
- In total, respondents currently employ 204 staff and supervise 909 trainees but many report firing staff and being unable to fund their trainees or accept new trainees.
- 46% indicate that because of the current funding environment, they are considering leaving research, academia, or Canada.

In respondents’ words:

*I am Canadian and always wanted to come back to Canada after my training but am starting to think that I have made a mistake.* -Respondent 40 (page 37)

*I am falling behind scientists in other countries [...] I am deeply worried that this will end my career in research right as it is meant to be taking off.* -Respondent 7 (page 42)

*There is a feeling among our trainees that there is no future for them in science in Canada. Some leave the country, and others decide to pursue other fields.* -Respondent 113 (page 45)

*Some of my highest quality colleagues are leaving Canada because of the uncertain funding climate. I am considering the same.* -Respondent 42 (page 55)

*If Canada wishes to foster the future of health research in our country, a recognition of this significant ECI disadvantage and a meaningful resolution must be reached immediately or the investment made to train today's most ambitious and successful young researchers in our country will be lost. Time is of the essence.* -Respondent 41 (page 59)
Summary

Health research funding has become increasingly competitive in Canada. In fiscal year 2005-2006, the Canadian Institutes of Health Research (CIHR) funded 30% of submitted grant applications for the full term of the grant. In fiscal year 2014-2015, this rate had fallen to 15%. Perhaps more strikingly, of grant applications scored as fundable by reviewers in these competitions, 48% were funded in 2005-2006 versus 21% in 2014-2015. Reduced funding undermines the efficacy of the health research enterprise and thus the ability of health researchers to generate new knowledge and improve Canadians’ health outcomes. Put plainly: many scientists are spending much of their time writing grants rather than doing the science that could help Canadians now and in the future.

Early career investigators (ECIs) are defined by CIHR as researchers within the first 5 years of their independent careers, the period in which researchers launch their programs. Dr. Alain Beaudet, president of CIHR, reported in a presentation on February 25, 2016 in Ottawa that the number of CIHR grants awarded to ECIs decreased from 1302 grants in fiscal year 2008-2009 to 831 in fiscal year 2014-2015, a decrease of 38%. He also reported that nearly half of CIHR-sponsored Tier 2 Canada Research Chairs hold no CIHR operating funds.

In an effort to address problems stemming from both funding scarcity and operational aspects of peer review, CIHR recently introduced substantive changes to their funding programs. These changes are colloquially referred to as the CIHR reforms. These changes include dividing CIHR funding largely between two programs. The Foundation Scheme is structured to fund proven researchers, with 15% of total grants set aside for ECIs judged as having strong potential. The Project Scheme is structured to fund strong research projects.

In the first Foundation Scheme live pilot, 95% of funds were awarded to 127 established investigators and 5% of funds to 23 ECIs. These 23 ECIs represent 4% of the 559 ECIs who applied to the program. Investigators funded through this competition are ineligible to seek additional CIHR funding during the term of their award. The second Foundation Scheme live pilot and first Project Scheme live pilot are currently underway with results anticipated July 15, 2016.

Concerned about the impact the current funding environment may be having on ECIs, the Association of Canadian Early Career Health Researchers (ACECHR: acechr.ca) organized and ran an informal survey March 17-24, 2016 to gather personal accounts from ECIs about their experiences of the current funding environment. As an informal survey, it was not intended to collect representative data and should not be used to extrapolate quantitative estimates to all ECIs in Canada. Rather, it was designed to collate views and experiences from verified ECIs. ECIs are typically vulnerable due to lack of tenure or secure contract, which may prevent them from speaking publicly about their concerns.

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1 See Table 1 on page 9 for more information.
2 Image of slide presented by Dr. Beaudet, archived at: http://www.webcitation.org/6h6AM2s21
3 Presented by Dr. Beaudet, live tweet by Dr. James Woodgett, director of the Lunenfeld-Tanenbaum Research Institute archived at: http://www.webcitation.org/6h6AOTmGQ
4 http://www.cihr-irsc.gc.ca/e/49270.html
This report describes final results from 143 anonymous respondents whose identities have been confidentially confirmed as ECIs in health research in Canada. Ninety percent are affiliated with a U15 institution. Respondents are 57% men and 43% women with median age 37 (interquartile range 35-39). Seventy-four percent are Canadian citizens and 10% identify as visible minorities. Respondents have been in their positions for a median of 2.5 years (interquartile range 1.6-3.7 years). Respondents are largely (92%) Assistant Professors. Six percent are tenured, 56% are tenure-track and 38% are not tenure-track. In total, respondents employ 204 highly qualified personnel and supervise or co-supervise 110 postdoctoral fellows, 442 graduate students, and 357 undergraduate students.

These researchers represent considerable investments of public and other funding. In total, 62% have received federal salary funding in the form of a CIHR funding as a trainee, a CIHR New Investigator Award or a Tier 2 Canada Research Chair. Forty-eight percent have received funding from the Canadian Foundation for Innovation.

Respondents emphasized that they don’t wish to complain. They were aware that research is competitive prior to beginning their faculty positions. They were prepared to work very hard as independent investigators, and they are doing so (see Theme 9). Yet many ECIs report struggling in the current funding environment. Respondents report negative impacts on the quality and impact of their research, their competitiveness on national and international levels, their ability to offer stable employment to staff, their ability take on postdoctoral fellows and graduate students, and their careers, families and well-being. In total, 46% of respondents reported that they are considering leaving research, academia, or Canada.

Thematic analysis revealed the following 12 interrelated themes:

1. A tougher road than previous faculty
2. A critical and vulnerable career stage
3. Specific concerns about CIHR reforms
4. Holding off on applying to CIHR
5. Scaling back and reducing competitiveness
6. Falling behind peers in other countries
7. Less ability to train and employ highly qualified personnel
8. Funding for research time and equipment but limited ability to make use of them
9. Hard work and strong science may no longer be enough, and they come at a personal cost
10. Extra disadvantages for ECIs who take maternity, parental or other leaves
11. Considering leaving research, academia or Canada
12. Concerns about the future of health research in Canada

Findings from this survey indicate significant concern among responding ECIs about the health research funding environment in Canada. This includes concern for their own careers and the work they have trained for decades to carry out, and concern for the future of health research in Canada.
Selected extracts from personal narratives

Below, we present a selection of extracts from this report for readers who lack the time or inclination to read the full document. Page numbers show extracts’ placements in the report.

**I trained in the best scientific environments in Canada and the United States under outstanding internationally-recognized mentors. I will never have the opportunity to have the career that they have, and I’m convinced that, if they were starting their careers today, neither would they.**

Respondent 46 (see page 22)

**Senior colleagues have never experienced an environment like this, so I’m not sure they appreciate the difficulties or will take it into account for my promotion and renewal.**

Respondent 14 (see page 22)

**When I was recruited 3 years ago (before the funding reforms), there was anxiety about steady declines in funding but I was impressed at how early- and mid-career investigators were productive and doing impactful research. […] This research culture in Canada had enabled newer investigators to build on their unique research questions and cutting-edge approaches, and make important discoveries early in the career. But the situation has declined dramatically in the last few years.**

Respondent 117 (see page 23)

**I am Canadian and always wanted to come back to Canada after my training but am starting to think that I have made a mistake. […] If this funding environment continues as it currently stands, I will fail before I even have the possibility to truly start my research program.**

Respondent 40 (see page 37)

**I am falling behind scientists in other countries […] I am deeply worried that this will end my career in research right as it is meant to be taking off.**

Respondent 7 (see page 42)

**There is a feeling among our trainees that there is no future for them in science in Canada. Some leave the country, and others decide to pursue other fields. For example: one talented student of mine decided to leave science. This student told me that they saw no future in science, and felt that the huge workload & the stress that the professor was under made science look very unappealing.**

Respondent 113 (see page 45)
I was awarded a CRC2 [Tier 2 Canada Research Chair], and attended a ceremony attended by Science Minister Kirsty Duncan where the investment in young talent by the federal government was heralded. And I sat there and thought: I wish I could turn this salary award into research dollars.

Respondent 93 (see page 49)

My husband, who is not a scientist, is concerned that this job will kill me and wants me to quit. I feel an obligation to my trainees to stick it out and put 110%. I have 4 graduate students that want to graduate and they deserve to. I developed an ulcer over the last 4 months coming up to the P-Scheme.

Respondent 58 (see page 50)

I was recruited from the United States as a Tier II Canada Research Chair shortly before the reforms were announced. [...] If I am not able to obtain funding by Sept. 2016, I will be forced to give up my dream of doing independent research...I will close my lab, fire my students, sell my house and return to the US to look for a job wherever I can find one.

Respondent 10 (see pages 48 and 55)

Some of my highest quality colleagues are leaving Canada because of the uncertain funding climate. I am considering the same.

Respondent 42 (see page 55)

Seeing no practical solutions on offer, and not yet ready to be one of the careers lost, my personal solution was to look for a job elsewhere. I am moving to [country name redacted] to take up a position there.

Respondent 65 (see page 55)

If Canada wishes to foster the future of health research in our country, a recognition of this significant ECI disadvantage and a meaningful resolution must be reached immediately or the investment made to train today's most ambitious and successful young researchers in our country will be lost. Time is of the essence and ECIs don't have time—or funding to buy time—to spare.

Respondent 41 (see page 59)
A cautionary note about extrapolating outside this sample
Some surveys are designed such that one can extrapolate from them with a certain level of confidence. For example, political polls are often done using such methods. Our survey used different methods. The primary way in which our methods differed from those used in polls is that we did not seek a random sample. Random sampling requires time and funding; this is an unfunded project outside our research programs and we wished to complete it efficiently.

Because of this, we have no way to know how closely the views and experiences of the 143 survey respondents represent those of the larger group of all Canadian early-career health researchers. The responses gleaned from our relatively large sample size suggests that the views within this group are widespread, but we do not know whether they are representative. (See Table 3 on page 17 for comparisons of our sample to national statistics.)

Given this potential lack of representativeness, it is important not to extrapolate from the data within this survey. In other words, if 46% of the respondents to this survey are experiencing a specific effect, we don’t know whether that means that 46% of all early career health researchers in Canada are experiencing that same effect. We encourage further study of these issues on a national level with methods that would allow estimation of such frequencies.

What we can tell from this type of survey & sampling

- There are 143 ECIs across Canada who have a history of success, including previous funding success and the ability to obtain a desirable and competitive faculty position, and yet many are finding the current funding environment difficult.
- Among these respondents, there are some common themes in their accounts of their experiences. (See Themes 1-12 on pages 22-59.)
- These respondents employ 204 people and supervise 110 postdoctoral fellows, 442 graduate students, and 357 undergraduate students. (See page 44.)
- These respondents represent significant investments on the part of Canadian and non-Canadian governmental and other funding sources over their years of training and start-up years as new faculty. (See Table 5 on page 18.)

What we cannot tell from this type of survey & sampling

- We do not know how many other ECIs in Canada are experiencing better, worse, or similar effects.
- We cannot know for certain whether these 143 people would have been having better, worse, or similar experiences had the CIHR reforms not occurred, though it is likely that imbalanced funding due to reforms have not improved the situation for ECIs in Canada.
Lead author’s comment
The idea to collect some personal narratives arose out a discussion among members of the Association of Canadian Early Career Health Researchers (ACECHR) and was initially brought forward by Dr. Jason Snyder. I volunteered to administer a survey and to draft this report on behalf of ACECHR because I see many people in my cohort of ECIs struggling, I wanted to help, I have relevant experience in survey methods and thematic analysis, and perhaps most importantly, I was willing to devote some of my limited spare time (or more accurately, time carved out of family time) to this project.

Part of my motivation for being willing to devote time to this project is that in addition to being a health researcher, I am also a beneficiary of health research. As a person who has lived since childhood with a serious chronic autoimmune disease (type 1 diabetes), I am alive because of Canadian health research. It was partly my lived experience as a patient that led me to apply my engineering background to health research. Having perspectives as a patient, a scientist, and a Canadian citizen, I am acutely aware that the entire spectrum of health research has a great deal to offer Canadians, now and in future, in benefits to our well-being and to our economy.

My goal in administering the survey and drafting this report was, to the best of my ability, to accurately and honestly capture, synthesize and present the concerns and experiences of early career health researchers in Canada. Thanks to the many ECIs who responded to the survey, these accounts provide thoughtful reflections and rich narratives that may contribute to informed discussion of health research funding in Canada.

ACECHR members and others provided essential contributions to this project, including revising the survey design and this report. The following ACECHR members reviewed draft versions of this report and provided comments that informed the final version: Dr. Jacqueline Bender, Dr. Michael Hendricks, Dr. Rithwik Ramachandran, Dr. Eléonor Riesco. I am grateful to mid-career and senior colleagues who reviewed and commented on drafts of this report.

All images used in this report have a Creative Commons Zero (CC0) license, meaning they are in the public domain and may be used in any way without attribution.

This report is a public document and may be used and distributed without any need to seek permission. However, feel free to contact ACECHR (info@acechr.ca) or me, Dr. Holly Witteman (holly.witteman@fmed.ulaval.ca), if you have concerns, comments or questions.
Table of contents

Executive Summary .................................................................................................................................................. 1
Summary ............................................................................................................................................................... 2
Selected extracts from personal narratives ........................................................................................................... 4
A cautionary note about extrapolating outside this sample .................................................................................. 6
Lead author’s comment ........................................................................................................................................... 7
Table of contents .................................................................................................................................................. 8
Introduction ............................................................................................................................................................ 9
  Table 1. Historical CIHR Open Operating Grant Program success rates .............................................................. 9
Methods................................................................................................................................................................ 11
Results .................................................................................................................................................................... 12
  Why ECIs are seeking funding: research visions .................................................................................................. 13
  Survey respondent characteristics ........................................................................................................................ 15
    Table 2. Respondent characteristics .................................................................................................................. 16
  Survey respondents in the context of national statistics ....................................................................................... 17
    Table 3. Survey respondents compared to national data ...................................................................................... 17
Respondents’ previous funding success and recent applications .............................................................. 18
  Table 4. Career award success ............................................................................................................................ 18
  Table 5. Previous funding invested in ECIs .......................................................................................................... 18
  Table 6. Previous funding success ........................................................................................................................ 19
  Table 7. CIHR funding applications since reforms ............................................................................................. 20
Impacts on research ................................................................................................................................................ 21
  Table 8. Effects of the current funding environment on ECIs ........................................................................... 21
Theme 1: A tougher road than previous faculty .................................................................................................. 22
Theme 2: A critical and vulnerable career stage .................................................................................................. 25
Theme 3: Specific concerns about CIHR reforms ................................................................................................. 28
Theme 4: Holding off on applying to CIHR ............................................................................................................ 32
Theme 5: Scaling back and reducing competitiveness .......................................................................................... 35
Theme 6: Falling behind peers in other countries ................................................................................................. 42
Theme 7: Less ability to train and employ highly qualified personnel ............................................................... 44
Theme 8: Funding for research time and equipment but limited ability to make use of them ......................... 48
Theme 9: Hard work and strong science may no longer be enough, and they come at a personal cost ... 50
Theme 10: Extra disadvantages for ECIs who take maternity, parental or other leaves ..................................... 53
Theme 11: Considering leaving research, academia or Canada ........................................................................... 55
Theme 12: Concerns about the future of health research in Canada ................................................................. 58
Discussion ............................................................................................................................................................. 60
Limitations .............................................................................................................................................................. 61
Conclusions ............................................................................................................................................................ 61
Appendix: ACECHR recommendations ............................................................................................................ 62
Appendix: Code for comparisons ........................................................................................................................ 64
Introduction
The Canadian Institutes of Health Research (CIHR) is the major national funding agency for researchers in Canada who study topics to do with health. CIHR funds a broad range of research, including such diverse areas such as basic biomedical science, clinical trials, studies of health system improvement, and research about social, cultural and environmental factors that affect the health of populations.

CIHR’s budget has been constrained for a number of years due to low federal investment in research. Funding has become increasingly competitive during that time. (See Table 1 below.) As in many other countries, it has become difficult for researchers at all career stages to obtain funding to carry out their work. Scientists find themselves spending much of their time writing grants rather than doing science.

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Percent of grants funded out of all grants submitted</th>
<th>Percent of grants funded out of those with fundable scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Funded for full term</td>
<td>Funded with bridge grant</td>
</tr>
<tr>
<td>2005-2006</td>
<td>30%</td>
<td>3%</td>
</tr>
<tr>
<td>2006-2007</td>
<td>27%</td>
<td>2%</td>
</tr>
<tr>
<td>2007-2008</td>
<td>23%</td>
<td>5%</td>
</tr>
<tr>
<td>2008-2009</td>
<td>24%</td>
<td>5%</td>
</tr>
<tr>
<td>2009-2010</td>
<td>23%</td>
<td>8%</td>
</tr>
<tr>
<td>2010-2011</td>
<td>19%</td>
<td>4%</td>
</tr>
<tr>
<td>2011-2012</td>
<td>18%</td>
<td>2%</td>
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<tr>
<td>2012-2013</td>
<td>18%</td>
<td>3%</td>
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<tr>
<td>2013-2014</td>
<td>18%</td>
<td>2%</td>
</tr>
<tr>
<td>2014-2015</td>
<td>15%</td>
<td>3%</td>
</tr>
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</table>


As detailed in Table 1, the overall funding success rate for full-term operating grants at CIHR in fiscal year 2005-2006 was 30% (plus 3% for bridge grants) whereas by 2014-2015 the overall success rate had halved to 15% (plus 3% for bridge grants). Bridge grants provide short-term funding for one year.

Success rates for full-term grant applications scored by reviewers as fundable (score ≥ 3.5 on a scale from 0 to 4.9 in which higher numbers are better⁵) declined even more dramatically. In fiscal year 2005-2006 the success rate was 48% (plus 5% for bridge grants) whereas by 2014-2015 the overall success rate had more than halved to 21% (plus 4% for bridge grants).

Falling success rates created an increasingly difficult funding climate for ECIs. As reported by Dr. Alain Beaudet, president of CIHR, on February 25, 2016, the number of CIHR grants awarded to ECIs decreased from 1302 grants in fiscal year 2008-2009 to 831 in fiscal year

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⁵ [http://www.cihr-irsc.gc.ca/e/44001.html](http://www.cihr-irsc.gc.ca/e/44001.html)
2014-2015, a decrease of 38%.\(^6\) He also reported that nearly half of CIHR-sponsored Tier 2 Canada Research Chairs hold no CIHR operating funds.\(^7\)

It was in this context that CIHR recently changed the way it awards funding. These changes (sometimes referred to as ‘CIHR reforms’) were initiated to help alleviate some of this stress and to address some operational aspects of review in the previous funding system; for example, the fact that certain types of research did not fit well with any one review panel. Dr. Beaudet described the challenges of these reforms for CIHR: “it was a bit like changing the motor of a plane while in flight!”\(^8\) Early anecdotal reports and analyses of funding allocation suggest that these mid-flight changes, though undoubtedly well-meant, may unfortunately be causing problems for health researchers, particularly ECIs.

An ECI is defined by CIHR as an independent researcher who has been in their position less than 5 years at the time of funding application. Being an independent researcher usually requires holding a faculty position. New faculty have typically completed graduate training to obtain MSc, PhD and/or MD degrees, up to 6 years or more of postdoctoral training, and have been selected as the top candidate for their position in open, international searches that often attract well over 100 applicants. In other words, new faculty are typically very competitive candidates who have trained for 1.5 to 2 decades and have been identified as having the capacity to lead important, impactful research programs.

Launching a research program as an independent investigator requires success in obtaining funding. As outlined in an open letter from early career scientists in Canada,\(^9\) based on available data, the recent changes at CIHR may be resulting in a minimum one third decrease in research funding awarded to ECIs. Over 100 early-career researchers have signed the open letter. Many subsequently began discussing what more could be done to address this issue, and formed the Association of Canadian Early Career Health Researchers (ACECHR). One ACECHR member suggested collecting and publishing some stories of early career researchers’ experiences to help humanize the numbers. Another member volunteered to administer a survey to collect such narratives.

Our primary aim in conducting this survey was to capture details about the potential impacts of the current funding environment on ECIs and better illustrate the personal experiences behind numbers for policymakers, institutional administrators, funding agency leadership and others who might be interested in this issue. Personal narratives may offer additional insights into the impact of the funding environment on the current cohort of early career health researchers. Due to the structure of academic research, it can be difficult for new faculty members to speak openly about the challenges they face. This makes it difficult for ECIs to convey their situations to people who might be able to help, and also contributes to a culture of silence that can lead to vulnerable faculty feeling alone. Therefore, a secondary aim was to allow ECIs to read about the experiences of others in their cohort.

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\(^6\) Slide by Dr. Alain Beaudet, CIHR president, archived at: [http://www.webcitation.org/6h6AM2s21](http://www.webcitation.org/6h6AM2s21)

\(^7\) Presented by Dr. Beaudet, live tweet by Dr. James Woodgett, director of the Lunenfeld-Tanenbaum Research Institute archived at: [http://www.webcitation.org/6h6AOTmGQ](http://www.webcitation.org/6h6AOTmGQ)

\(^8\) [http://cihr-irsc.gc.ca/e/49446.html](http://cihr-irsc.gc.ca/e/49446.html)

Methods
To help capture illustrative details of how the current funding environment may be affecting ECI s, we created a survey by drafting and revising questions within a group of ECIs, with additional critique and review by senior investigators. We piloted drafts of the survey to make sure questions were clear and understandable, then invited early career health researchers across Canada to complete the survey.

This was not a formal research study and as such we did not seek Research Ethics Board approval. We launched the survey March 17, 2016 around 9 p.m. ET, distributing it via personal networks and social media. It was more broadly disseminated within at least one university through an email sent to faculty members from McGill University’s Faculty of Medicine. It may also have been distributed by other universities without our knowledge. On March 23, 2016, we invited survey respondents who had indicated that they would like to receive updates on the survey and copies of reports to share the survey invitation with their colleagues, if they wished.

This type of sampling is referred to as snowball sampling. It is a cost- and time-efficient way to reach people who may not be easy to reach. However, surveys distributed in this way are especially prone to selection bias. We aimed to mitigate this bias by seeking a large sample, but it is not possible to completely avoid selection bias in any online survey, let alone a survey distributed largely through informal networks.

We emphasize that the purpose of this survey was not to collect quantitative estimates of event occurrences as though this were a random sample. Rather, its purpose was to illustrate the effects of the current funding environment, which had already been established as being challenging for early career researchers through quantitative analyses of CIHR funding data, including those conducted by CIHR. By recruiting a large number of respondents, we offer a rich, detailed sense of the potential scope of possible concerns, but a reliable assessment of the prevalence of any given effects would require different survey methods and access to data that have not been publicly released by CIHR.

We administered the survey in Qualtrics. A single required question at the beginning of the survey established eligibility; all other questions were optional. Respondents indicated whether they were willing to have their data and comments included in this report publicly, anonymously or only used in aggregate. However, in order to have their data included in analyses and reports, respondents had to provide their real name, affiliation and institutional email address, with the understanding that these identifying details would never be made public without their permission.

We closed the survey March 24, 2016 around 9 p.m. ET, one week after opening it. To establish the final data set, the survey administrator individually contacted each respondent who had: (1) reported that they were an early career health researcher in Canada and (2) submitted a full name, affiliation and institutional email address. To confirm their identity, respondents were required to return the email from their institutional account, verifying that they did, indeed, submit the survey response. The administrator also contacted one respondent who identified as a former early career researcher who had recently left Canada and academia. This person’s
responses were not included in the data presented in this report except for one extract describing the person’s reasons for leaving (see page 57).

We emphasize that this was not a formal research study and we do not claim to have used methods that might qualify it as such. Nonetheless, for readers’ information, we compiled and analyzed data in Microsoft Excel and in R, version 3.2.1. Themes were identified by a single researcher using Braun & Clarke’s (2006) methods of thematic analysis.¹⁰ The researcher in question had previously used these methods in formal research studies involving two independent analysts. We used a single analyst for pragmatic reasons, as most of this project was conducted in one ECI’s limited spare time, with some additional support by other ECIs in their equally limited spare time. Because of this, we present more extracts in each theme than is common in reports of qualitative analysis and we largely leave the extracts to speak for themselves rather than running the risk of over-interpretating or misinterpreting.

Sample extracts from survey respondents illustrate themes observed across responses. We present extracts anonymously and mostly as written, with some minor typographical or grammatical errors corrected and some identifying details removed (e.g., years, locations, exact funding amounts) to further protect identities. Extracts written in French were translated to English by the bilingual survey administrator with translations verified by the original authors.

Following analysis, we conducted member checking. Member checking means presenting study findings to participants or communities and inviting their comments and corrections to help ensure the validity of thematic analyses. Fifty-two ECIs who had responded to the survey reviewed the report and commented on the relevance of themes and accuracy of descriptions. No changes in thematic groupings were required, but we added clarifying notes to tables, some additional preamble text to some themes, and changed the order of some sections.

Most extracts are labeled with respondent numbers, as is standard in reports of qualitative research. However, we have not numbered descriptions of research programs. This is because research programs are often specific to that individual, meaning that readers who know a person’s work may be able to guess the author. By excluding the respondent numbers from these extracts, we aim to prevent identification of authors of other extracts. Respondents whose research program descriptions were included in the report have specifically approved the text to ensure both the accuracy of the description and the respondent’s willingness to have it included.

Results

We received 158 complete survey responses from people identifying as ECIs whose research was eligible for CIHR funding. Fifteen responses were submitted by people who either did not provide identifying information (14) or did not respond to 3 emails attempting to verify their identity (1). This report therefore includes responses from 143/157 (91%) confirmed ECIs. One hundred and four out of 143 respondents (73%) agreed to have their survey responses shared anonymously in this report. Twelve (8%) were willing to have their responses shared publicly with their name and affiliation. Because these people were few in number, we elected to keep all respondents anonymous. Twenty-four people (17%) indicated that they wished their responses to be kept confidential and used in aggregate only. Another 3 people (2%) did not

answer the question and were therefore grouped with those preferring confidentiality. The survey administrator used these confidential responses in aggregate in descriptive statistics and used narratives submitted by these respondents to help inform thematic analyses, but did not include any extracts written by these respondents in this report.

**Why ECIs are seeking funding: research visions**

We asked survey respondents to describe the vision of their research program. The survey administrator selected 16 research visions that represented a broad variety of research and were written such that they were already or could easily be edited to be understandable by non-specialists. She then contacted the respondents who had written the visions to confirm their explicit permission to share them in this report. Of the 16, 14 agreed. The other 2 had concerns about being too identifiable though their descriptions of their work.

We present the 14 research visions below to help illustrate the purposes for which ECIs are seeking research funding. As described on page 12, unlike other extracts, we have removed respondent identification numbers from these statements to prevent readers from linking them with any other extracts in the report.

“My program of research is devoted to **helping children with a chronic illness** and their families better cope with their illness, and ensure the proper services, resources and policies are put into place **so their child may thrive.**”

“My research answers questions about how sleep/wake cycles (called circadian rhythms) affect digestive system health. Although our research will not produce new drugs, we have discovered new factors that affect illnesses of the intestine and colon like inflammatory bowel disease and colorectal cancer. **It's not glamorous, or profitable, but it will help people avoid serious health problems in the first place.**”

“I study a common cancer that is currently incurable. Patients typically die of this cancer shortly after diagnosis. **We need to find new and creative ways of targeting this disease** because nothing is working right now.”

“I work in a basic research field. I run experiments on worms to understand how the brain develops and functions, and in particular how stress impacts brain development and adult behaviour. The health impacts of this research are potentially significant but are likely many years off. This is part of the natural life cycle of research. Current technological breakthroughs in medical treatments—things like stem cells, immunotherapy, gene editing—are all rooted in basic, curiosity driven research that happened 25-50 years ago, often using simple animals as study subjects. Almost all our knowledge of how animals develop and function came from—and continues to come from—these simpler organisms, and **has been found again and again to relate directly to human biology in health and disease.**”
“I do sophisticated analysis of genetic data, so that we can **give people better medical treatments based on their genes.**”

“The overall goal of my research program is to determine how environmental signals from the whole host of bugs that live in your gut (your microbiome) influence the way your body’s immune system works. Learning how to manipulate or tune these environmentally-derived signals could help make vaccines more effective and could also help reduce problems caused when immune systems are too active. This could **improve the lives of people affected by conditions such as inflammatory bowel disease, multiple sclerosis, allergies, and others.**”

“I am a basic scientist, and the molecular processes I study have important implications for understanding how viruses work and how cancer and inflammation happen. By studying how viruses change the way cells in the body behave, I hope to one day better define pathways that lead to cancer and inflammation so that other scientists can develop more effective treatments for cancer, allergies, atherosclerosis and many other diseases. A **wide breadth of disorders may one day have better treatments because we have improved our knowledge about things that we don’t yet fully understand.**”

“The ultimate vision of my research program is to develop novel and optimal approaches to regenerate the injured and degenerating brain. This will bring **revolutionized changes for the treatment of neurodegenerative diseases like Alzheimer's Disease, Multiple Sclerosis, and many others for which we haven't yet found any cures.**”

“Health decisions should be based on the best available evidence and should reflect what matters to patients and families. Right now, this doesn’t happen nearly as often as it should. Too often, people don’t get health care that could help them, or they end up with care that is ineffective, harmful, or that they don’t need. **This costs people their health—sometimes even their lives—and it also costs our health care system tax dollars.** The vision of my research program is every person in Canada having the information, tools, and support they need to get the right care for themselves and their family.”
“My goal is to find ways to improve how long bone and joint implants last and how well they work, bettering the quality of life of the 5 million Canadians with arthritis.”

“My research is about finding the best ways to help people in Canada—especially seniors—live long, healthy, active lives.”

“The ultimate vision for my research program is to identify how brain circuits control movement. My research could help lead to better treatments for diseases such as Parkinson’s Disease, Multiple Sclerosis and Amyotrophic Lateral Sclerosis (Lou Gehrig’s Disease). For example, people with such diseases may have trouble keeping their hands steady enough to feed themselves. My research aims to help avoid such problems by pinpointing how these diseases affect brain circuits that control body movement.”

“My research program aims to better understand the impact of infectious diseases on pregnancy and to improve their management during this critical period, with the goal of reducing the negative impacts of infectious diseases on mothers and babies.”

“The overarching aim of my research program is to determine the safety and effectiveness of vaccines in patients who clinicians consider to be at high risk of vaccine adverse events, such as those with underlying medical conditions. My goal is to ensure that as many people as possible can be protected from serious diseases with the lowest risk of harm.”

Survey respondent characteristics
Table 2 on the next page summarizes the characteristics of survey respondents.
Table 2. Respondent characteristics (N=143)

<table>
<thead>
<tr>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Median (interquartile range)</td>
</tr>
<tr>
<td>Gender: n (%)</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td>Other personal characteristics associated with potential discrimination: n (%)</td>
</tr>
<tr>
<td>Visible minority</td>
</tr>
<tr>
<td>Person with a disability</td>
</tr>
<tr>
<td>LGBTQIA (lesbian, gay, bisexual, transgender, queer, intersex, asexual)</td>
</tr>
<tr>
<td>Canadian citizenship: n (%)</td>
</tr>
<tr>
<td>Canadian citizen</td>
</tr>
<tr>
<td>Not a Canadian citizen</td>
</tr>
<tr>
<td>Did not respond</td>
</tr>
<tr>
<td>Years in position at survey closing date (March 24, 2016)</td>
</tr>
<tr>
<td>Median (interquartile range)</td>
</tr>
<tr>
<td>Rank: n (%)</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Associate Professor</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Did not respond</td>
</tr>
<tr>
<td>Type of appointment: n (%)</td>
</tr>
<tr>
<td>Tenured</td>
</tr>
<tr>
<td>Tenure-track</td>
</tr>
<tr>
<td>Not tenure-track</td>
</tr>
<tr>
<td>Did not respond</td>
</tr>
<tr>
<td>Institution: n (%)</td>
</tr>
<tr>
<td>U15 institution [Note 2]</td>
</tr>
<tr>
<td>Non-U15 institution</td>
</tr>
<tr>
<td>CIHR pillar: n (%) [Note 3]</td>
</tr>
<tr>
<td>Pillar 1: biomedical research</td>
</tr>
<tr>
<td>Pillar 2: clinical research</td>
</tr>
<tr>
<td>Pillar 3: health services research</td>
</tr>
<tr>
<td>Pillar 4: social, cultural, environmental factors affecting health of populations</td>
</tr>
</tbody>
</table>

[Note 1] Respondents include more women than historical applications to operating grant programs across career stages (32% women, 68% men) but the proportion aligns with the most recent ECI data, specifically, ECI applications to first Foundation Scheme pilot Stage 1 (44% women, 56% men). Data source: CIHR draft report on first Foundation Scheme pilot presented to university delegates Sep 3, 2015.

[Note 2] U15 includes the following universities: Dalhousie, McGill, McMaster, Queen’s, Université Laval, Université de Montréal, Universities of Alberta, British Columbia, Calgary, Manitoba, Ottawa, Saskatchewan, Toronto, Waterloo, and Western University.

[Note 3] Respondents were encouraged to select a single pillar but could select multiple pillars. Historical distribution in Open Operating Grant Program 2006-2013 is as follows. Pillar 1: 67% of all submitted applications, 71% of all funded applications; Pillar 2: 16% of submitted, 14% of funded; Pillar 3: 7% of submitted, 6% of funded; Pillar 4: 10% of submitted, 9% of funded. Data source: see Note 1.

Survey respondents in the context of national statistics

It was outside the scope of this project to conduct full analyses of the comparability of the sample of respondents to national statistics. However, to the best of our ability within the constraints of the project and using data readily available to us, we offer the following comparisons to help inform readers’ assessments of the results presented in this report.

Table 3. Survey respondents compared to national data

<table>
<thead>
<tr>
<th></th>
<th>Survey respondents</th>
<th>National data</th>
<th>Comparisons$^{12}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender and Sex</strong></td>
<td>43% women, 57% men</td>
<td>44% female, 56% male</td>
<td>$\chi^2(1) = 0.00$, $p = .96$</td>
</tr>
<tr>
<td><strong>Pillars</strong></td>
<td>Pillar 1: 77%, Pillar 2: 10%, Pillar 3: 8%, Pillar 4: 5%</td>
<td>Pillar 1: 67%, Pillar 2: 16%, Pillar 3: 7%, Pillar 4: 10%</td>
<td>$\chi^2(3) = 7.98$, $p = .046$</td>
</tr>
<tr>
<td><strong>tOOGP success rates</strong></td>
<td>13/49 (27%), (see Table 7)</td>
<td>500/2682 (19%)</td>
<td>$\chi^2(1) = 1.55$, $p = .21$</td>
</tr>
<tr>
<td><strong>Foundation 2014-2015 ECI success rates</strong></td>
<td>1/49 (2%), (see Table 7)</td>
<td>23/559 (4%)</td>
<td>Fisher’s Exact test $p = .71$</td>
</tr>
</tbody>
</table>

$^{[Note 1]}$ National data are presented in terms of biological sex. Our survey used socioculturally-constructed gender and asked respondents how they identify. National data are the most recent ECI data available, specifically, ECI applications to first Foundation Scheme live pilot Stage 1. Data source: CIHR draft report on first Foundation Scheme pilot presented to university delegates Sep 3, 2015.

$^{[Note 2]}$ Respondent data in Table 2 (page 16) presents pillar choice for all respondents, allowing for selection of multiple pillars. Here, for comparability, we excluded 10 respondents who selected multiple pillars, as this was the approach CIHR used in their data. National data source: same as Note 1, data drawn from all applications submitted to Open Operating Grant Program 2006-2013.

The sample of respondents in this survey is likely comparable to the national cohort in terms of gender and grant success rates but ECIs in pillar 1 (biomedical research) may be over-represented. This is likely due to our use of snowball sampling. A survey distributed through informal networks will naturally have greater reach in larger areas because the networks are larger. This report should be read with this imbalance in mind. It should also be noted that when we examine the full sample of 143, including the 10 respondents who selected multiple pillars, there is no significant difference compared to the national data available ($\chi^2(3) = 3.81$, $p = .28$). However, we do not know how this compares to national data allowing multiple pillar selection.

Within the scope of our resources for this project, we were unable to determine the total size of the Canadian ECI cohort who actively seek CIHR funding. However, we know that all ECIs were eligible for the Foundation Scheme First Live Pilot 2014-2015 and that 559 ECIs applied. We also know that there were ~5529 applications by ECIs to CIHR Open Operating Grants Programs from 2006-2013. Based on these numbers and the fact that 40% to 45% of survey respondents applied to competitions for which they were eligible (see Table 7), we estimate that there may be between 800 and 1500 ECIs in Canada who might apply for CIHR funding. If that estimate is correct, our sample of 143 respondents would be approximately 10% to 18% of the total ECI cohort. This is a rough estimate and may be incorrect.

$^{12}$ All R code (including data and calculations) for these comparisons is presented in an Appendix to this report for readers’ reference.
Respondents’ previous funding success and recent applications
Respondents have previously had success in obtaining funding. Almost half (48%) have received at least one career development award and some have received multiple awards. Table 4 shows details of career awards obtained.

Table 4. Career award success (N=143)

<table>
<thead>
<tr>
<th>Career awards received by respondents</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any career award</td>
<td></td>
</tr>
<tr>
<td>Respondents who have received at least one career award</td>
<td>68 (48%)</td>
</tr>
<tr>
<td>Specific career awards [Note 1]</td>
<td></td>
</tr>
<tr>
<td>CIHR New Investigator</td>
<td>18 (13%)</td>
</tr>
<tr>
<td>Tier 2 Canada Research Chair</td>
<td>19 (13%)</td>
</tr>
<tr>
<td>Provincial Award</td>
<td>32 (22%)</td>
</tr>
<tr>
<td>Other Award</td>
<td>15 (10%)</td>
</tr>
</tbody>
</table>

[Note 1] Some respondents have received more than one career award.

Respondents indicated how much funding had been invested in their careers from Canadian and non-Canadian sources, including governmental, charity and industry sources, both during their training and as an ECI, including start-up funds, salary awards, and any research funds obtained up until now. Median amounts, ranges and the total amounts across all 143 respondents are listed in Table 5 below.

Table 5. Previous funding invested in ECIs (N=143)

<table>
<thead>
<tr>
<th>Estimated direct investment [Note1]</th>
<th>Median</th>
<th>Interquartile range</th>
<th>Full range</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a trainee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Canadian sources (CAD$)</td>
<td>200k</td>
<td>93k-300k</td>
<td>0-1M</td>
<td>28M</td>
</tr>
<tr>
<td>All non-Canadian sources (expressed in CAD$)</td>
<td>100k</td>
<td>0-250k</td>
<td>0-1.2M</td>
<td>21M</td>
</tr>
<tr>
<td>As an ECI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Canadian sources (CAD$)</td>
<td>700k</td>
<td>300k-1.2M</td>
<td>0-3.7M</td>
<td>109M</td>
</tr>
<tr>
<td>All non-Canadian sources (expressed in CAD$)</td>
<td>0</td>
<td>0-0</td>
<td>0-1.5M</td>
<td>6.5M</td>
</tr>
<tr>
<td><strong>Total estimated direct investment</strong></td>
<td>165M</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Note 1] Not all survey respondents kept records of trainee funding. When respondents provided a range as their estimate, we used the midpoint of the range. Due to interdisciplinary variation in how funding amounts are accounted for, respondents in different fields may also have reported amounts of ongoing grants differently, with some reporting full amount awarded and others only the amount used thus far. It was outside the scope of this project to verify all amounts, though the administrator verified some amounts that seemed out of the norm compared to others in the same pillar by contacting respondents. These numbers should therefore be interpreted as rough estimates.

Respondents’ histories of funding success by funding source and role are shown in Table 6. In total, 104 respondents (73%) have received any funding from CIHR as a trainee or as an ECI in a Principal Investigator (PI) role. Specific types of funding are shown in the first row of Table 6.
Thirty-six respondents out of 143 (25%) have received an operating grant from CIHR; 27/36 of these respondents (75%) have been in their position as long or longer than the median time of all respondents. Nearly half of respondents (46%) have received funding from the Canadian Foundation for Innovation (CFI) as an ECI in a PI role. CFI provides grants for researchers to equip their laboratories. It should be noted that not all survey respondents were eligible for all of the same funding opportunities. For example, the 25% of survey respondents who are not Canadian citizens may be ineligible to apply to competitions or sources that have a citizenship or permanent residency requirement.

Table 6. Previous funding success (N=143)

<table>
<thead>
<tr>
<th>Funding source</th>
<th>Received direct funding as a trainee: n (%)</th>
<th>Received funding as ECI in PI role: n (%)</th>
<th>Co-investigator on funded application: n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Institutes of Health Research (CIHR)</td>
<td>72 (50%)</td>
<td>18 (13%) NIA or CRC 37 (26%) operating grant 7 (5%) bridge funding 16 (11%) other funding</td>
<td>41 (29%)</td>
</tr>
<tr>
<td>Natural Sciences and Engineering Research Council of Canada (NSERC)</td>
<td>35 (24%)</td>
<td>54 (38%)</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Social Sciences and Humanities Research Council of Canada (SSHRC)</td>
<td>4 (3%)</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Canadian Foundation for Innovation (CFI)</td>
<td>N/A</td>
<td>68 (48%)</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>Provincial funding agencies</td>
<td>52 (36%)</td>
<td>61 (43%)</td>
<td>16 (11%)</td>
</tr>
<tr>
<td>Other governmental sources</td>
<td>13 (9%)</td>
<td>30 (21%)</td>
<td>17 (12%)</td>
</tr>
<tr>
<td>Foundations</td>
<td>32 (22%)</td>
<td>59 (41%)</td>
<td>16 (11%)</td>
</tr>
<tr>
<td>Academic institutions in Canada</td>
<td>52 (36%)</td>
<td>104 (73%)</td>
<td>20 (14%)</td>
</tr>
<tr>
<td>Non-Canadian governmental sources</td>
<td>23 (16%)</td>
<td>27 (19%)</td>
<td>11 (8%)</td>
</tr>
<tr>
<td>Industry</td>
<td>5 (3%)</td>
<td>19 (13%)</td>
<td>4 (3%)</td>
</tr>
</tbody>
</table>

[Note 1] NIA means New Investigator Award; CRC means Canada Research Chair. Our survey only asked people to report if they had received any form of funding from CIHR as an ECI. For all respondents who reported such funding, the survey administrator used the CIHR funding database to verify and categorize types of funding. Operating grants range from 1-year to 5-year grants with total funds between ~50k and ~900k. The smaller and shorter grants were knowledge synthesis and knowledge to action grants, which are included in CIHR’s operating grants portfolio. Most of the grants awarded were 3- to 5-year grants. Median total operating funds awarded was ~640k. Bridge grants are 1-year grants with total funds 100k. Other funding includes travel awards and prizes with total funds ~1-1.5k, planning and dissemination grants 10-25k, and catalyst grants 80-90k. Some respondents have been awarded multiple grants within and across categories.
One hundred and eighteen out of 143 respondents (83%) have applied to at least one of the four programs associated with CIHR reforms: Foundation Scheme first live pilot, Transitional Open Operating Grant Program (tOOGP), Foundation Scheme second live pilot, Project Scheme first live pilot. Fourteen out of 143 respondents (10% of total, 12% of those who applied to at least one program) have had success at a stage that signifies receiving funding. Thirteen of these received funding in the tOOGP; the other received funding in the first Foundation Scheme live pilot. See Table 7 for more details.

Denominators in the first column of data reflect the number of respondents eligible for a given competition as an ECI (Foundation) or at all (tOOGP, Project) according to their start date as faculty and participation in other competitions. Denominators in other columns reflect the number who applied to the first stage of each competition. The two right-hand columns show each competition’s national success rate for all applications (tOOGP) or for ECI applicants specifically (Foundation). As described on page 17, the proportions of survey respondents funded in these competitions do not differ significantly from national data.

Table 7. CIHR funding applications since reforms (N=143)

<table>
<thead>
<tr>
<th>Competition</th>
<th>Applied: n/eligible (%)</th>
<th>Respondent success rate: n/applied (%)</th>
<th>National competition success rate: n/applied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chose to apply</td>
<td>Accepted to next stage</td>
<td>Funded</td>
<td>Accepted to next stage</td>
</tr>
<tr>
<td>Transitional Open Operating Grant Program</td>
<td>49/122 (40%)</td>
<td>n/a</td>
<td>13/49 (27%)</td>
</tr>
<tr>
<td>Foundation Scheme 1st Live Pilot 2014-2015: Stage 1</td>
<td>49/109 (45%)</td>
<td>6/49 (13%)</td>
<td>87/559 (15%)</td>
</tr>
<tr>
<td>Foundation Scheme 1st Live Pilot 2014-2015: Stage 2</td>
<td>6/6 (100%)</td>
<td>2/49 (4%)</td>
<td>32/559 (6%)</td>
</tr>
<tr>
<td>Foundation Scheme 1st Live Pilot 2014-2015: Final Assessment Stage</td>
<td>2/2 (100%)</td>
<td>n/a</td>
<td>1/49 (2%)</td>
</tr>
<tr>
<td>Foundation Scheme 2nd Live Pilot 2015-2016: Stage 1</td>
<td>33/131 (25%)</td>
<td>9/33 (27%)</td>
<td>79/265 (30%)</td>
</tr>
<tr>
<td>Foundation Scheme 2nd Live Pilot 2015-2016: Stage 2</td>
<td>9/9 (100%)</td>
<td>Results not yet available.</td>
<td></td>
</tr>
<tr>
<td>Project Scheme 1st Live Pilot Spring 2016</td>
<td>92/143 (64%)</td>
<td>Results not yet available.</td>
<td></td>
</tr>
</tbody>
</table>

[Note 1] We do not know the ECI-specific success rate for this competition. For the Open Operating Grant Program 2006-2015, ECI success rate was 18% overall.
[Note 2] Eligible Stage 2 applications were automatically considered.

---

13 For Foundation 2014-2015 and tOOGP, applicants had to choose between the two competitions. This restriction was removed for Foundation 2015-2016 and Project Scheme Spring 2016.
Impacts on research
Respondents report many impacts of the current funding environment on their research, careers and lives. When asked to choose from a list of items (see Table 8 below) a large majority indicated that the current funding environment has negatively affected their capacity to do impactful work that would contribute to their field of research. Most indicated that it has reduced their ability to take on trainees such as postdoctoral fellows and graduate students and to do high quality research.

Table 8. Effects of the current funding environment on ECIs (N=143) [Note 1]

<table>
<thead>
<tr>
<th>As a result of the current funding environment, have you had to ...</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay starting potentially impactful research?</td>
<td>120 (84%)</td>
</tr>
<tr>
<td>Avoid taking on postdoctoral fellows?</td>
<td>112 (78%)</td>
</tr>
<tr>
<td>Scale down your research program; i.e., set less ambitious research objectives?</td>
<td>104 (73%)</td>
</tr>
<tr>
<td>Do shorter-term or less impactful research than you think is needed in your area?</td>
<td>103 (72%)</td>
</tr>
<tr>
<td>Avoid taking on grad students?</td>
<td>81 (57%)</td>
</tr>
<tr>
<td>Attempt to stretch out funding; i.e., asked for extensions for start-up funds or other funds?</td>
<td>78 (55%)</td>
</tr>
<tr>
<td>Put economic considerations of research before quality; i.e., switch from optimal approaches for your research to ones that can be done more cheaply (e.g., using older/outdated technologies) but take longer or are less rigorous (e.g., lower quality methods)?</td>
<td>77 (54%)</td>
</tr>
<tr>
<td>Change the kinds of funds for which you apply?</td>
<td>75 (52%)</td>
</tr>
<tr>
<td>Seriously consider leaving Canada to continue your career elsewhere?</td>
<td>45 (31%)</td>
</tr>
<tr>
<td>Seriously consider leaving academia; e.g., moving to an industry, governmental or other position?</td>
<td>39 (27%)</td>
</tr>
<tr>
<td>Make your research less accessible to the public than you would otherwise; e.g., agree to more restrictive contracts with industry, avoid publishing open access papers?</td>
<td>31 (22%)</td>
</tr>
<tr>
<td>Seriously consider leaving research; e.g., closing your lab and restricting your academic career to teaching or admin?</td>
<td>29 (20%)</td>
</tr>
<tr>
<td>Let staff go?</td>
<td>26 (18%)</td>
</tr>
<tr>
<td>Take on a greater teaching/clinical/service/administration load that you would not have otherwise taken on?</td>
<td>24 (17%)</td>
</tr>
<tr>
<td>Go into deficit?</td>
<td>20 (14%)</td>
</tr>
<tr>
<td>Give working notice to staff?</td>
<td>14 (10%)</td>
</tr>
</tbody>
</table>

[Note 1] Percentages represent the proportion of respondents who selected each option. Respondents could select multiple options.

The themes observable within these data were also reflected in respondents’ written responses about how the current funding environment is affecting them. We present twelve common inter-related themes with illustrative extracts on pages 22 - 59.
Theme 1: A tougher road than previous faculty
It has always been challenging to launch one's research program as an independent investigator. However, many survey respondents noted the difference between the low funding success rates for current ECIs versus the higher success rates that previous cohorts experienced. Survey respondents expressed concern that established faculty and institutional leadership may not yet grasp the scale of the issues faced by the current cohort of ECIs.

I trained in the best scientific environments in Canada and the United States under outstanding internationally-recognized mentors. I will never have the opportunity to have the career that they have, and I'm convinced that, if they were starting their careers today, neither would they.

Respondent 46

Senior colleagues have never experienced an environment like this, so I'm not sure they appreciate the difficulties or will take it into account for my promotion and renewal.

Respondent 14

One of the primary recruiting tools of Canadian universities has been the relatively high success rates and funding stability relative to many other countries, particularly the US. […] During recruitment, it was made clear that most faculty in fields like mine obtain CIHR funding on their second or third try, and this is borne out by funding rates over the last ~10 years.

Instead, I and my cohort find ourselves with far fewer opportunities to apply for in our first 2 years and a huge drop in success rates.

Respondent 32

The current CIHR funding environment has added considerable stress to my experience as a new faculty member. There is a distinct lack of guidance at the faculty level on how to proceed. The general consensus is that new faculty are disadvantaged. However, there has been no change to local expectations for application and funding targets. Colleagues in the same position are similarly stressed and this has contributed to a negative work environment.

Respondent 90

The funding environment is very different from what it used to be when our mentors and more established colleagues started their labs. Not only is the funding scarce but the amount of data and money that goes into a publication in a good journal has simply exploded in the past 10 years or so.

Respondent 51
My mentor took 10 years to publish a high impact paper after taking a faculty position. This is now unacceptable productivity for a young to mid-career investigator.

Respondent 58

I spent 13 years in the US for my PhD and postdoctoral training. I had several generous offers at US institutions to start my own research lab, but I was thrilled to have an offer from a Canadian institution, and to be closer to family. When I was recruited 3 years ago (before the funding reforms), there was anxiety about steady declines in funding but I was impressed at how early- and mid-career investigators were productive and doing impactful research. I saw that they were in a supportive environment, had obtained funding within their first years of independence, and had obtained critical, high-tech equipment to carry out their research. This research culture in Canada had enabled newer investigators to build on their unique research questions and cutting-edge approaches, and make important discoveries early in the career. But the situation has declined dramatically in the last few years.

Respondent 117

Previous generations, even 5-10 years ago, had the opportunity to get their careers moving forward. Why stop this now? I'm quite upset about this; it makes me very cynical about the state of science in Canada. Will I ever be able to do this work? Will I get tenure, which depends on my funding success?

Respondent 11

~10 years ago, when many of my colleagues started their labs […] they were able to secure funds soon after starting their labs, or in some cases even before starting their labs.

Respondent 55

I hear stories about the success rates of new investigators from years past, and contrast that to the unsettled dread that accompanies these CIHR reforms. And I worry and fret, and hope that I'll be one of the lucky few that secures funds to perform the research I was hired to do. Because that's what this is about, promises that I made to develop an innovative research program under the advisement that the funding bodies protect New Investigators. That protection has disappeared, but the pressure to deliver a productive research program has not.

Respondent 93
Perhaps my situation is no different than it's always been ... but I suspect [lower] success rates (vs 25-30% in the recent past) mean there is a whole new level of pressure on many of us. In the CIHR transitional operating grant program, for example, I had a terrific score and rank, but only 4 grants were funded in my review committee! As a result of this type of environment, excellent, world-class science - science that has the potential to make a real difference to health and health care in our country - is not being done.

Respondent 59
Theme 2: A critical and vulnerable career stage

ECIs are at a critical stage in their careers. The first 5 years of a faculty appointment are the years in which one is expected to establish oneself as an independent researcher. Faculty who do not establish themselves early may never have the opportunity again due to reviewers’ expectations and/or due to having lost their position either by being denied tenure or by having their contract not renewed. Those who experience such results have spent roughly two decades of their life pursuing a scientific career that may have now permanently ended. Because of this uncertainty, the early career period has always been challenging for new faculty. However, survey respondents report facing additional challenges during this critical and vulnerable period, including cancelled grant cycles and new grant programs. Respondents expressed significant concern about their future careers, including their ability to recover from the current low funding rates and to achieve tenure or contract renewals.

This has been an incredibly stressful environment. This is the optimal time for my lab to grow and take risks and yet there are no funds to be able to do so. The year gap between my unsuccessful (yet very close to funded) application and being able to re-apply to the project scheme has been long and has almost drained my budget. I've applied to 5 grants since September and still have 3 more to go. This means that I spent most of my time writing instead of truly being able to nurture my new students in the lab and come up with new and exciting ideas. This has also meant that larger scale risky ideas have had to be put on the back burner.

Respondent 13

The current structure of funding programs, recent cancelled competitions, and corresponding success rates at CIHR systematically work against ECIs and are delaying the start of impactful research in my new laboratory.

My recent application received a fundable score, but an ultimately unsuccessful result means I have spent the past year working to generate further preliminary data in the most fiscally-scarce manner possible using start-up funding meant for badly needed infrastructure purchases in order to stay minimally operational and has resulted in research choices that place funding uncertainty considerations ABOVE research quality, undermining the entire concept of a "launch".

Respondent 41

[Because of] the fact that I will most likely not obtain CIHR funding for the first next few years (within 5 years of my appointment) I seriously think that my position is at risk as is the case for coworkers who are currently struggling to obtain tenure.

Respondent 66
Getting into the job, I knew it would be a challenge to have CIHR funding. I have been preparing all the preliminary data to lay the groundwork of a CIHR proposal when the changes occurred at CIHR. With one year without competition and changes in the reviewing process, I feel my application has fallen into a lottery with significantly less chances of getting funded than before.

While after hard work, my lab reached a cruising speed (the students are trained and autonomous, the techniques are routinely ongoing, basic infrastructure is in place and functional), with the current funding climate, I feel very insecure and everything could just collapse in the next year if I do not have funding.

Respondent 48

I have applied for CIHR funding every competition since I started. I received bridge funding 3 years in a row. It has luckily allowed us to stay afloat and maintain pretty good productivity. I am lucky that my institute continued to support me over the years through their new investigator start-up (bridge) program. I don't know if all young PIs had this opportunity in the other institutes. I fear that this program was cut in the new system (I saw no opportunities like this in the P-Scheme).

Although I have technically received funding from CIHR (almost equivalent to a full 3-yr grant), the administration at my institution does not recognize this as success and have advised me to delay asking for my promotion for one year. I am quite sure if I do not get a "full" grant in this P-Scheme, I will not be promoted and my contract will end. I am not tenure-track.

Respondent 58

Having a "gap year" between the end of the OOGP and the Project Grant competition has been very difficult. I'm now at the point where my startup funds are running out and I've had to let staff go and turn down highly qualified students who wanted to work in my lab. If I'm unsuccessful in the Project Scheme Pilot, I'm not sure what I'll do. If I shrink my lab any further, I'll have to put entire lines of research on hold.

Respondent 78

I am fortunate to be tenured but know many of my friends that do not have this chance (at all). These people are struggling and could lose their laboratory within 1 or 2 years if proper funding is not available. Interestingly, most of these researchers either had CIHR or [provincial agency redacted] post-doctoral fellowships. It looks as if support was cut short after they obtained a position in an academic institution.

Respondent 4
Some respondents noted that in addition to changes at CIHR, patterns or recent changes at provincial competitions have also impacted negatively on their ability to conduct impactful research as new faculty.

*While not CIHR funding, I personally spent over 100 hours as part of teams submitting to the Ontario HSRF [Health System Research Fund] competition which has now been cancelled at the time notices of decisions were expected. So, I now have to lay off additional staff. The actions of the MOHLTC [Ministry of Health and Long Term Care] have been completely disrespectful to the research community yet everyone is afraid to make noise for fear of being blacklisted later.*

Respondent ID redacted to preserve anonymity

*Coming from a smaller institution, it is extremely difficult to get CIHR funding and in the province of BC we are equally challenged to get funding from the Michael Smith Foundation for Health Research. Coupled with being new faculty makes things even more challenging. […] I feel CIHR systematically disadvantages new investigators.*

Respondent ID redacted to preserve anonymity
Theme 3: Specific concerns about CIHR reforms

Respondents report some concerns specifically associated with the CIHR reforms, including the loss of previous programs’ features that they deemed particularly valuable to ECIs, including continuous regular cycles, clarity around rules, reviewers’ detailed comments that enabled ECIs to improve their research proposals, and the ability to respond to reviewers over grant cycles. A number of respondents expressed concerns about the lack of reviewers who demonstrated expertise in the applicant’s field. Concerns included both topic expertise and knowledge of field-specific norms such as authorship order. Respondents in pillars 3 and 4, which historically accounted for 6% and 9%, respectively, of funded CIHR operating grant applications (see Table 2, Note 3 on page 17) raised concerns about the lack of reviewers who demonstrated familiarity with their field, let alone expertise.

Due to the CIHR reforms, one Operating Grant competition was dropped in 2015, which affected my lab greatly.

Respondent 20

The quality of my Foundation reviews was laughable (or would be, if my career didn’t depend on it), and there was not one piece of information in them that would enable me to submit a higher quality grant in the next competition.

Respondent 65

The procedures used in applying for CIHR funding are up in the air, so it feels like I am working hard on applications that are readily dismissed by non-experts with minimal feedback. High quality feedback will enable me to improve my ideas and applications, but I am afraid that I will never get it in the current system.

Respondent 14

The old format CIHR program was, despite rhetoric sent out by CIHR, very feasible and resulted in the funding of most ECI scientists, especially those that were at the top of their game. The old format also allowed for real scientific reviews of grants so feedback you received was helpful in structuring revisions or learning for future grants, issues that would be relevant.

Respondent 34

In the previous system of face-to-face reviews, I received thoughtful feedback after each grant submission and owe a great deal to my colleagues and the review panel - that I felt despite the ups and downs, was shepherding me through a process.

Respondent 60
As an ECI, the CIHR Foundation Scheme competition really feels like a bit of a farce. And I hate to characterize it that way. The stage 1 application is not structured in a way that will allow most ECIs to be competitive, the review process is not conducive to improving one's chances of success in the subsequent competition (minimal feedback, non-expert review), and the budgets, if you are one of the few who are successful, do not provide enough funds for most researchers to operate their program at bare minimum (plus you are then out of the CIHR game for the next 5 years!)

Respondent 59

I have very little confidence that the new review process at CIHR has the capability to select the best research projects for funding. One look at the standard deviations across reviewers' scores suggests that a random number generator would produce similar results. When dealing with the careers of Canada's most promising scientists, this capriciousness is unacceptable. I urge a full review of the new schemes.

More specifically, by eliminating the face-to-face panel of experts in favour of an online-only review, each application was reviewed by a different set of reviewers, and each reviewer reviewed a different set of applications. This led to unacceptably low reliability in rankings across reviewers, with standard deviations often larger than the rankings themselves. Multiple times, the same applicant was deemed in the top 10% by 3 reviewers and in the bottom half by 2 reviewers. Such low test-retest reliability indicates that CIHR's current evaluation scheme is unable to assess merit accurately.

[...]

There are multiple instances of fundamental reviewer error. I recognize the incredible demands placed on reviewers, and I am grateful for the time they put into the review process. But no one is perfect. Without the collective effort of a panel of invested reviewers communicating together, these errors went uncorrected.

For example, the following errors were made in evaluating my application: [...] “Publications modest considering the applicant has been 4 years of post doc”. My postdoc was only 2 years in duration, information which was clearly available from my CCV. [...] I was criticized for having “25 peer-reviewed publications in the last five years but is first author on only 3.” In point of fact, I was first author on 6 of the publications. Moreover, the reviewer seems to be implicitly penalizing me for being last author on 8 of the 25 publications. Perhaps the reviewer is from a field with a different authorship convention, but in almost every academic sphere I have encountered, the last author position is reserved for the senior author. Multiple senior authorships are generally taken as evidence that the PI is leading a functioning lab.

I am concerned that our grants were not reviewed by experts. This was reflected in basic misunderstandings, but also in comments that dismissed my field altogether.

Respondent 42
The sheer number of changes in such a short period is concerning and the focus on established investigators and lack of support and initiatives for new and mid-career investigators is quite scary.

In addition, the confusion and the lack of consensus around how applications are prepared and review is done (and the many changes to the scheduling and rules) have only amplified fears and sparked a lot of confusion.

Respondent 64

Although I understand this is a transition time for CIHR, I don’t think they are listening to scientists in Canada. They have decided to change their funding model which in this time of limited funds makes people understandably anxious. I personally don’t feel like I understand why or to what ends the changes were made (something was said about saving costs, which I don’t see working out. Also, other countries have tried and tested some of the changes implemented here and shown them to fail to improve the system).

My family has been extremely supportive as I was writing my CIHR - it helps that my husband is also a PI and could take care of our young daughter when I needed the extra time. However, the fact that the forms were released so late and changes were made so late meant that I could not prepare for this grant as much as I would have liked earlier on to spare my family the last minute mad dash to the finish. […]

All in all, I think that CIHR could do a lot more with its communications and organization to ensure that scientists understand the rationale behind the new system (with data to back it up) and can write their grants in a timely manner rather than in a mad rush at the end.

Respondent 142

I have had many senior, successful PIs read my grants. I have paid consultants to read my grants. All said that the revised versions were very competitive and should be funded. All were surprised at the result […] Reviewers on my grants have commented (in writing) that I will likely be a victim of the CIHR reforms.

Respondent 58

[The constant change in funding mechanism (Open Operating Grants to Foundation Scheme to Project Scheme) since I began my faculty appointment has not allowed me to take advantage of revising my applications to address reviewers’ comments. I have also faced comments from reviewers in both of my Foundation Scheme Stage 1 applications that I believe would not have occurred if the reviewers were held accountable in a face-to-face meeting.

Respondent 10
Obviously more money in the system would be helpful, but it is the shocking lack of transparency and actionable consultation with scientists around the changes to the Open programs and peer review at CIHR that are most troubling. There has been extensive consultation of course, but apparently no appetite or ability to actually take action to heed the warnings and advice of scientists. That the real concerns of respected scientists have been summarily dismissed by administration at CIHR is truly depressing and a real threat to science and innovation in Canada.

[...]

Specific criticisms: The format of the Project scheme, presumably the major vehicle for ECI funding going forward, is inappropriate. The new format looks like an essay contest, and does not give the space or the weight to the details of what a researcher is actually proposing to do and whether or not they can feasibly do it. It favours 'spin' instead of substance. This will lead to the wrong grants getting the research dollars.

The changes to peer review will reduce the quality of reviews, leading to the wrong grants getting research dollars. There are many documented reasons for this that have been ignored. Some are: (1) without a face to face meeting the reviewers are unaccountable to their peers and some lazy reviews will sneak through; (2) the smaller than promised number of reviewers seeing Project grants fails to support the statistical power needed for the ranking process to work; (3) Not allowing review by applicants removes too much Canadian expertise to the process, leading to inappropriate skills matching. [Ed.: Since the survey was run, CIHR has reversed its decision on this respondent’s point 3: applicants are now allowed to review. There have been no changes relevant to points 1 and 2.]

Respondent 91

The present situation, with changes in programs/rules/evaluation criteria further increases uncertainty; it is hard to reconcile what the program is asking with the insights provided by more experienced researchers (for example, regarding the necessity/extent of preliminary results).

Respondent 134

I can imagine how difficult these changes are for CIHR as well and I don’t expect them to get everything right on the first try. I think some of the changes are interesting and may lead to a better funding environment, particularly for researchers whose work did not fit well into the previous panel structure.

However, I am concerned that the standard answer to our concerns is, “Well, it’s a pilot. If it doesn’t work, we’ll change it next year.” These are not our pilot careers.

Respondent 47
Theme 4: Holding off on applying to CIHR

Some respondents reported that their faculty appointments were so recent that they hadn’t yet had a chance to apply to CIHR. Others reported deliberately holding off on applying to CIHR and looking elsewhere for funds while, “waiting for the dust to settle.” (Respondent 39) A number of respondents reported operating on start-up funds or CIHR funds obtained prior to the reforms and expressed worry about what they will do once those funds run out.

I’ve avoided the foundation and new project schemes and am waiting for the dust to settle. I’ve pursued grants and partnerships with other sources. As a result, I’ve pursued more work that is somewhat shortsighted and less scientific.

Respondent 39

[I have had to] divert and gear my time towards applying to multiple smaller funding opportunities, rather than larger opportunities with bleak success rates for new investigators. This has decreased my time in the lab.

Respondent 126

I started my lab last year so I still have the bulk of my startup funds. I also have a two-year charity funded grant so that has provided me with a cushion. I am however not taking on post-doctoral fellow or graduate students since they require longer term commitments from the lab which I cannot provide on my current funding. I am also delaying the start of more expensive in-vivo experiments till I have more stable funding.

Respondent 63

I have delayed my application to see how the system evolves. I am focusing on getting my new lab working well using my start-up funds.

Respondent 137

I’ve only recently started my research lab. As such, the project scheme 1 is the first CIHR funding opportunity I am applying to.

Respondent 134

Because I just started my research program and because the success rate is so low, I did not apply to CIHR Project/Foundation Scheme yet.

Respondent 57
I have been fortunate to secure research funding through a research network grant, which has allowed me to conduct two major projects. However, I delayed applying to CIHR's open grant programs due to the low success rates and I worry about where I will find funding for projects outside of the scope of the research network.

Respondent 9

I have been able to fully equip my lab and built a strong basis for my future research program with two senior author papers published within the first three years of my independent career. However, with my three-year start-up fund close to finished, the extremely low success rate for Early Career Investigators to receive CIHR funding puts my research program at risk.

Respondent 133

Since I opened my lab only 6 months ago, I am still running on my start-up funds. However, if I am not able to secure a CIHR grant within the next two years, I will have to let go my fully trained research assistant and my career will be greatly endangered.

Respondent 36

I was lucky enough to obtain a CIHR operating grant early in my career and prior to the restructuring. I have seen and heard a lot of negativity surrounding how the change is likely to affect early career investigators. I did not apply for foundation funding because I wanted to use my existing research funding rather than battle with a new system with a lot of inherent confusion and uncertainty surrounding the process.

Respondent 75

When I started, CIHR was just revising all of its funding schemes so this is my first time applying. I did not apply for a Foundation Grant since it was made clear by the statistics that someone in my position (just one year in) has an almost 0% chance of success even if you had a stellar CV.

Respondent 86

I have not applied for [CIHR] funding because I've felt that the chances of success are so low that it is not worth it […] I have spent considerable time and effort pursuing other funding opportunities, with some success. However, these funds are often for very specific projects and are generally a lot less money than a CIHR grant.

Respondent 113
It took me 3 years to finally obtain a CIHR operating grant. Because of that, I do not have to renew it until 2018 so I'm not as affected by what's going on at the moment at CIHR. In hindsight, not being successful for such a long time was actually a good thing. I do plan on submitting a project grant application this Fall though in the hope of covering my bases in case I have a hard time renewing the one I hold now.

Respondent 109

I started my faculty appointment quite recently. I have had to piece together many smaller funding opportunities and delay taking on graduate students. Luckily I was successful in receiving a 3-year grant from a non-tri-council agency which will let me expand and get going on work I want to do. I have held back on hiring a research associate/technician as I am unsure I will be able to obtain longer term funding. I worry a lot that my program will collapse in 3 years if I can't obtain CIHR funding.

Respondent 14
Theme 5: Scaling back and reducing competitiveness
Respondents described a number of ways in which the current funding environment has negatively affected their ability to do high quality research, including choice of research topics, methods, and approaches to knowledge translation, including dissemination to stakeholders. Respondents expressed concern about how this would affect their future competitiveness.

*To increase the likelihood of getting funds, my lab has to be involved in more and more team grants. While this is not a bad thing in general, it diverts us from our very own research, which is suicide for early investigators.*

Respondent 43

*I was fortunate enough to secure a small open operating grant from the CIHR shortly after beginning as a new investigator. While this grant has been central to the successes I have enjoyed so far, the low value of the grant has created numerous challenges including a large reduction in my planned research scope and size of my lab and it has prevented the hiring of permanent staff (e.g. technician or research associate). Moreover, the lack of funding from other agencies and uncertainty of what is occurring vis-a-vis CIHR funding process has made me highly reluctant to take on anyone in a long-term position as I am highly dubious that sustainable funding will be in place in the future for new and mid-stage career individuals.*

This has led to a significant amount of difficulty in managing my lab, and even led to the scale-back on my research plans and methods, as the lack of funding and lack of funding security limits my ability to engage in longer-term projects or use more expensive research models.

Respondent 62

*There are multiple intersecting ways in which this environment has impacted my research, research staff, grad students, etc. One of the effects of the limited funding (i.e. having less money for a multi-site research project than what is needed) means that I, my research coordinator and my research agents have to micro-manage every single aspect of the research. It means spending incredible amount of time shopping for the cheapest research material. It means negotiating for countless hours with institutional partners (i.e. data collection sites) so that they reluctantly agree to provide as much in-kind resources as possible. It means deciding not to do a presentation of findings for community stakeholders out of town, because it would just cost too much for transportation. It means the time my team and myself spend on micro-management, plus the time looking around for potential funds and applying for funding everywhere, I'm not doing my actual job as a researcher. I'm not taking new grad students because I don't have the time to supervise them. [...] I'm very doubtful about my ability to obtain tenure.*

Respondent 22
With the current funding problems, it doesn't seem I will be able to do the research I planned when I moved back to Canada (I did my postdoc in the US). The irony is that, without the funds to perform these important first experiments, each application to the CIHR becomes more unlikely to get funding. The longer I am a leading the lab, the more the person reading the application expects. Over the years, it becomes increasingly important to show you can do your work and publish high quality papers. But there is no way to do this work unless you have funding in the first place!

Respondent 11

The low funding rate of operating grants at the CIHR has put a lot of pressure on successfully completing/generating data within a very short period of time. This means that a PI can not afford to take on a non-productive graduate student/postdoc, because there is no room for error, and there is great pressure to perform. This also means that PIs must go the easy route and do less impactful work, and diversification of the study area within the group is kept to a minimum. Taken together, the low success rate of grants forces PIs to be less creative.

Respondent 102

Due to sporadic funding, I cannot employ staff in any long-term capacity which means I need to navigate a lot of the administrative components of doing research myself. This increases how long it takes to do everything from preparing publications (which impacts my ability and the time needed to be promoted) to writing new grants.

It also means that I have somewhat limited control over the direction of my research program because I need to significantly adapt my work based on fit with whatever funding opportunity I can find.

All of this takes a personal toll over time because as I approach the end of my first 5-year term, I cannot be confident that I will be renewed despite having had some success.

Respondent 24

One study in my lab focuses on a mouse model of a neurodegenerative disease. While we have preliminary data that points in several interesting directions to understand the brain alterations that underlie this disorder, we have not been able to pursue these in full. Instead, we have partnered with a pharmaceutical company to do some drug testing (which seems to be the kind of work that CIHR wants us to focus on), because of finances. Thus, although we are doing science and appear to tick the industrial partnership boxes that CIHR seems to focus on, we are not pursuing the most exciting, exploration-based science that is likely to drive the field forward significantly. It is frustrating to be unable to pursue promising preliminary results because of lack of funding opportunities.

Respondent 113
I am spending a lot of time writing grants for which I feel I have very little chance of success. It is frustrating, I feel like I am wasting my time. [...] I am thinking that I am better off just scaling down my research and making it less ambitious. Not a good outlook for Canadian Science.

Respondent 83

The high pressure in research and the competitiveness to obtain long-term, sufficient funding from CIHR affects my research and my life beyond research. In terms of research, without having some security of funds for a longer term I spend a lot of time applying for short-term grants with low budgets. This time is taken away from doing research, writing papers etc. [...] I cannot start long-term studies such as creating new mouse models as this again may take more than two years, and if funding is not secured for a longer period of time, I will have to stop in the middle of the process.

Respondent 68

In all honesty, the current CIHR funding environment has prevented me from starting and developing a meaningful and competitive research program in Canada. I have trained all over the world to become proficient in state of the art technologies and methods and have freezers full of stored clinical samples but do not have any money to perform the studies. I am Canadian and always wanted to come back to Canada after my training but am starting to think that I have made a mistake. With the very limited funds available through my startup and the small grants available to ECIs through other sources (e.g. $25,000 for 1 or 2 years), early studies coming out of my lab use dated approaches and are SIGNIFICANTLY less impactful! I am severely limited in my ability to support graduate students and dream of the day that I could recruit even one PDF let alone a competitive, well trained fellow. If this funding environment continues as it currently stands, I will fail before I even have the possibility to truly start my research program.

Respondent 40

The current CIHR funding environment has created a significant amount of uncertainty about my ability to grow my research program to a mature size by the end of my term as an ECI. Worse, the funding environment has cast into doubt my ability to even maintain a small research program in the face of uncertainty about grant programs and funding levels. This has unfortunately led to prioritization of 'safer' projects and therefore hurts the overall potential for innovation and breakthroughs early in my career.

Respondent 91
Perhaps the most significant effect has been on the journals in which I choose to target my work. Under our granting system, there is an understandable yet persistent favoring of applications from those researchers with a track record of publication. This in turn naturally favors more senior investigators. This of course is not a new issue in research funding, and again, it is defensible that reviewers view productivity positively. However, in a context in which success at CIHR may dip well below 10%, this puts enormous pressure on new investigators to generate publications - any publications - even if they are in journals that are not especially well-regarded or impactful.

In the long run, this presents an opportunity cost for Canadian science, as these data could potentially have featured in better-developed manuscripts targeted for higher-impact journals with wider prominence, had early career-stage investigators had the funding security needed in order to allow their research to fully mature.

Respondent 100

Given the current CIHR funding environment, I have been extremely careful and conservative in hiring, and in developing research projects. I have only undertaken projects where I can get "something for free", be it access to equipment, data, etc. I have been very conservative in how I have spent my startup funding. This has led to many compromises in the research questions that get asked, and the scope and ambition of research projects.

Respondent 67

My research is in remote communities in northern Canada and I have very limited funds to travel for my research. I cannot publish in most open access journals in my field because I do not have the funds to pay $2000-$3000 for 1 published paper. This means that I publish in journals that have lower impact factors, or are not open access. This has an effect on my citations and may have an effect on my ability to get tenure and also to disseminate my research properly.

Respondent 16

It is extremely stressful. I have had to make counterproductive decisions. There are times when I regret moving to Canada from [country name redacted]. Things have deteriorated so fast here. Even when funded, researchers struggle. I am lucky enough to be CIHR funded and yet can only afford one postdoc and one PhD student, because my proposed budget was funded at the lower junior level and then cut by 24.5%. I can only imagine what it is like for junior PIs who are not CIHR funded.

Respondent 110
I haven’t felt the impact as severely as some have, because I sought out and was fortunate to be successful in securing funding from other agencies (NSERC, HFSP, CRC), and when I started, the system was a little more hospitable, enabling me to get my CIHR Operating grant on the second try in 2012. However, I haven't been able to grow my program, since I've been limited to one CIHR for now, and have discontinued the employment of a technician because I could not afford the salary and do science the way we need to in my competitive field.

Respondent 35

The public-private partnership is another killer for my research as being more on the fundamental aspects of things, it is very difficult—impossible—to find partners to subsidize part of my research activities. More and more I think biomedical-oriented engineering studies are the ones that have the most success for this type of partnership.

Respondent 66

We reduced our research nurse from full time to 3 days per week. I can no longer fund undergraduate interns nor pay a research coordinator. I am limiting graduate student positions. I was not able to pay the article processing fee for a publication: I have to apply for uncertain internal funding to be able to publish in my journal of choice. I am doing lower quality randomized controlled trials because with fewer funds I cannot afford to collect all my planned outcomes nor can I recruit as many participants to the trial.

Respondent 129

I received a 5-year CIHR grant in 2013. Although I will not have to renew this funding before 2018, the current funding environment is already making me nervous about it. In the last couple of years, I have seen very successful colleagues struggling to get their research funded, some of them for the first time in 20+ years. This has forced me to try stretching-out my current funding, to slow down current projects and to avoid starting new initiatives. It has not significantly affected my personal life as I was lucky enough to get tenure recently, but it certainly leads to a working environment that is difficult for trainees, staff and PIs.

Respondent 118

Because budgets in the Foundation Scheme first live pilot were allocated based on previous CIHR success, ECIs who hadn’t had years to build up a stream of successful CIHR funding received much smaller budgets than established investigators. As detailed in the funding analysis in an open letter from early career scientists in Canada, although ECIs were promised—and indeed received—15% of the grants awarded, they only received 5% of the funds awarded. This gap is partly attributable to the fact that ECIs received 5-year grants while established investigators received 7-year grants. However, if the lengths of grants were the only

difference, ECIs would have received slightly more than 11% of funds, rather than the 5% actually awarded.

One ECI who had success in the new program and was awarded a Foundation Scheme grant expressed concern that the new system will hamper their ability to be competitive in the future. This person already had one CIHR operating grant and had come very close to having a second operating grant funded in a competition prior to the reforms. They followed advice to apply to the Foundation Scheme, only to wind up with less total budget than their ECI colleagues who had success in the Transitional Operating Grant Program. Due to their Foundation award, they are now unable to apply to other CIHR competitions and have had to scale back their research program, reducing their future competitiveness. This, despite being such a high calibre researcher that they received one of the few Foundation grants awarded to ECIs in the first live pilot. Because of the level of detail in this account, the survey administrator sought and received explicit permission from this respondent to share the extract below. Details such as non-essential dates and exact amounts have been removed.

As an ECI, getting the foundation grant was one of the least advantageous things I could have received, and had CIHR been honest up front about what the program would fund, I would have never applied for it.

I received my first operating grant on first submission to the old panel system at CIHR ([competition date redacted]). In March 2014 I submitted a second CIHR grant, I was PI with two senior co-PIs, and it missed funding by 3 slots on first submission. I was advised by everyone I knew to, instead of resubmitting the project grant, collapse the two budgets together and put in a foundation grant. As recommended, I did this and included my budget request on first round of submission. After receiving a good ranking in first round, I decided to submit foundation for second round instead of resubmitting the project grant, which had a very good shot of being funded given the general lack of criticism on the grant and the high score it received.

After making it through round 2 of foundation reviews (which were the most useless grant reviews I have ever seen with no insight into the projects I had proposed), when I now had no option to go back to the project grant, I was then informed that the budget request I had made was far too high and was offered an annual budget of my current grant. As having a foundation would mean that I was now locked out of all further funding opportunities from CIHR, this budget was ridiculous and completely untenable for maintaining my research program, let alone allowing for growth of my program. Given that I had been identified as a strong ECI, since I had already received one project grant and was now pegged for a foundation grant, it seemed outrageous to me that I was being offered barely enough money to function, or in other words, I felt was having the ground under me kicked out.

I wrote a very detailed letter to CIHR explaining that the level of productivity I had had thus far was not a reflection of the small budget I had received in my first project grant, but was due to the additional funds I had from my startup package, which was now finishing, and so if this was the only funds I was offered I would actually have to constrain and cut back on my actual research productivity. I explicitly told CIHR that there was very little ability for me to be able to even maintain, let alone grow, my research program at the budget they had offered and that I would have to either release current staff, remove developing technologies from my lab or not
take on anyone new in my lab, because of how tight funds were. In response, I was offered [amount redacted]. ECI colleagues I knew got their first project grant in the same round as my foundation, and many of them had greater budgets than I did, and were not cut off from other CIHR funds because they were not in the foundation program. So it was very hard for me to not view this as me being penalized for being productive.

Because of the impending disaster that was coming with the new project scheme at CIHR, I reluctantly accepted the foundation grant just so I could have funds to continue my research and not gamble. Because of the limited budget I have, I have not been able to accept anyone into my lab unless they have external funding; have had to temper the development of novel technologies into my research program given the cost associated with this, thus rendering me less competitive in future to either renew my foundation or shift to the project scheme; and lastly, I have now had to begin submitting grants to NIH in the United States, as a co-PI with colleagues I have down there, so that I have some ability to gain extra funds to be able to keep my lab afloat. Had CIHR been honest up front (as they tried claiming post-hoc) and said that no ECI will get funds greater than 200,000, I would never have applied in the first place given the limitations this has put on me.

Also, and potentially more relevant, I am not clear how I am to move forward in the new system. As I was awarded a foundation as an ECI, my competitors were other ECIs, which made it a level playing field. When this expires, and I go to renew my foundation (if I choose to do that), I will now be competing against much more senior and experienced colleagues in the field, where I have a much greater chance of not being funded. If this occurs, what is my fall back? Do I attempt to shift into a project scheme? Am I able to begin applying for projects one year in advance so that I can secure funds in place for when my foundation expires? I have no confidence that CIHR has taken any of these considerations into account when developing these programs, and frankly, the current set up is absolutely dismal.

Respondent 34
Theme 6: Falling behind peers in other countries
Researchers compete on an international level, not only nationally. Survey respondents reported concerns about their ability to conduct research in Canada that would allow them to compete with investigators in other countries.

I am falling behind scientists in other countries because I cannot afford to spend money on everyday equipment and reagents that would enhance my research but which are too expensive.

As a result of the financial uncertainty, I cannot hire any students other than the one I already have, and I cannot hire postdocs to train. My technician has been given working notice, which is very stressful, and means that he will likely leave the lab soon even if I do eventually get funding. So the training this technician received will be wasted.

Since I cannot afford any more people, the work in my lab runs on talented undergrads who each perform small pieces of research. The fragmented nature of using undergrads to do research in their spare time profoundly slows down the pace of discovery.

Overall, I am sad that the reduced funding opportunities for new investigators really means that although I know how to do good science, I cannot do the experiments I need to be successful because of the funding uncertainty. I am deeply worried that this will end my career in research right as it is meant to be taking off.

Respondent 7

I am in a research program with strong international competition. I have anxiety about funding my research program to the levels that I know are needed to be competitive in our field. I also have anxiety about whether our research program, which relies on a strong base of fundamental research to be successful, will ultimately be supported by the CIHR.

Our inability to compete is illustrated by the fact that since opening my lab, two of my original ideas that I was unable to incorporate into my research program (due to low funding) have now been reported on in publications by groups overseas. One of these papers is from another newly established principal investigator. These papers allow those groups to establish early leadership in this particular field of research, and I am now behind.

Respondent 84

When comparing to the situation experienced by my ECI colleagues in the US (and given the considerably smaller start-up funds [in Canada]), I believe ECIs in Canada might not have the same resources to "hit the ground running".

Respondent 134
My US colleagues are able to apply to NIH for [funds for] Phase II clinical trials whereas we are asked to already have completed phase II - with what money? […] Instead of high-impact research I am doing small projects with less impact on clinical care and the health of Canadians.

Respondent 130
Theme 7: Less ability to train and employ highly qualified personnel

Survey respondents report that the current funding environment is reducing their ability to fund and appropriately mentor trainees, and to employ highly qualified personnel such as technicians and research associates.

In total, respondents currently employ 204 highly qualified personnel and supervise 110 postdoctoral fellows (83 as primary supervisor, 27 as co-supervisor), 442 graduate students (321 as primary supervisor, 121 as co-supervisor) and 357 undergraduate students (326 as primary supervisor, 31 as co-supervisor).

I will likely have to let go of my research associate (currently only part time) and be unable to take on my undergrad student (who is showing superstar qualities) if my grants don't get funded.

Respondent 13

My post-docs and students know that I can only keep them on if they keep their scholarships or I receive a CIHR. Their work can only be performed if I receive a CIHR. My NSERC grant does not cover their projects. This puts a lot of pressure on them to look for cheap alternatives rather than focusing on doing great science.

Respondent 142

Without secure funding […] I will not be able to commit to training highly qualified personnel and mentoring the next generation of scientists. This worries me more than keeping my lab open and functional.

Respondent 52

A real problem with tight grant funding that I had not anticipated was that it had a way of making me a less effective mentor. It wasn't just the stress that I'm sure they picked up on - it also was the way in which experiments were designed and executed. In retrospect, we spent too much time chasing preliminary results for our grants and not enough time investing in the tools and reagents that we would need for our first few papers. After we got the grant, I noticed that students were too used to doing experiments with the tools they had on hand, rather than taking a step back and gather what they needed to do the experiment that we ultimately would hope to publish. It was like we were used to building houses quickly without investing in a solid foundation first.

Respondent 60
Low success rates at CIHR have highly limited the scope of my research. I am currently unable to attract the best students since they go towards highly-funded laboratories able to pay for the best analyses and that have the best equipment available.

Respondent 4

To hire PhD students, I have to have confirmed funding for their stipends, which is difficult when living from short-term grants of 2 years and less, on the other hand, MSc students are less efficient in research. […] My students have fewer opportunities to publish high impact papers because of switching to lower risk short term projects with less impact.

Respondent 68

There is no guarantee that I can keep the graduate students I currently have, and this is particularly stressful, as they depend on me to get their diploma and build their future.

I spend more than 70% of my time looking for alternative funding options, writing grants that do not always fit my primary research focus (and therefore delay the establishment of my independent research program, and the preliminary results I need for CIHR funding) to get experiments running and students funded. However, these funding sources are rarely long-term, so it's really tiring to go from one short-term solution to another. I don't feel the CIHR understands that at this stage in my career I need to train students in the lab and generate strong preliminary data, allowing me to establish my lab and build upon this to submit strong applications.

Respondent 18

One of the less appreciated things about this funding situation is how it can poison the atmosphere in the lab. Everyone is worried about funding. Of course the PI is, but these days the postdocs and grad students are too, and there is a feeling among our trainees that there is no future for them in science in Canada. Some leave the country, and others decide to pursue other fields. For example: one talented student of mine decided to leave science. This student told me that they saw no future in science, and felt that the huge workload & the stress that the professor was under made science look very unappealing. I've had many similar interactions with students in my lab or in others, and financial pressure, lack of opportunities, and job stress is a common worry among students. […] Grad school is the one time when students should be free to focus deeply on science and I feel that we are not providing an appropriate environment for students when they are already worrying about money and future prospects.

Respondent 113
**Association of Canadian Early Career Health Researchers (ACECHR)**  
**Report on Early Career Investigators in Health Research in Canada, April 2016**

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**Come July 2016, without a CIHR renewal I will have to let go of my post-doc, lab manager and find new labs for most of my students. My husband, also an early career/early mid-career investigator, is in a similar situation, so of course this would impact our household greatly. If his funding is not renewed he may not receive tenure, if mine is not renewed, my contract won’t be either at the end of 2016. And if that is the case, I would strongly consider dedicating my life and passion to something else, because I do not see the point in training scientists for vast amounts of money just to leave them without support to carry out their research. It’s a gross waste of taxpayer’s money and lives, those of my students, postdoc and lab manager included.**

**Respondent 20**

**I have spent an inordinate amount of time training my core research staff - who are now highly-skilled, highly competent research professionals. In this current environment, however, I constantly agonize about losing these trained, competent staff. (This would be a loss not only for me and the research community at large, but these are people who have families who depend on this income.) I am fortunate that I have not yet had to let one of them go. However, the reality is I am constantly writing grants to ensure I have enough funds to keep them (we all know that writing a successful $10K grant is nearly as much work as writing a successful $500K grant). Unfortunately, this means I have less and less time to do other important things - like supervise grad students, undertake meaningful KTE [knowledge translation and exchange], etc.**

**Respondent 59**

**The stress around funding takes from my ability to provide quality mentorship I give to my students, takes from the creativity and novelty with which I can approach my scientific questions, and make me settle on mediocre experiments because I cannot afford the best ones.**

**Respondent 30**

**I started my lab last year so I still have the bulk of my startup funds. I also have a two-year charity funded grant so that has provided me with a cushion. I am however not taking on post-doctoral fellow or graduate students since they require longer term commitments from the lab which I cannot provide on my current funding.**

**Respondent 63**

**I don’t currently have funds to support any incoming grad students.**

**Respondent 16**
I let my research assistant go. I will soon have to let my post-doc go if I do not obtain an operating grant. These people are the technical and support backbone of the lab. Losing them means that I need to start over from scratch to reestablish the expertise that we spent 5 years developing. This will undoubtedly mean that our lab won’t remain competitive in the coming years.

Respondent 58

Being unable to renew my CIHR in time forced me to let go my only postdoc, put my research assistant to 80% and stop hiring new students.

Respondent 94

I have one technician that I have already told that he will need to find a new job next year.

Respondent 21

My experience as a ECI for the last two years has been very frustrating from the perspective of the financial situation. My team has made a significant progress towards our scientific goals in a short period of time, but we face a reality in which extremely limited funds is preventing us to fully achieve it. Our current funding situation has forced me to let go of my technician, to reduce the work hours of my research associate, to avoid taking new students, and to significantly decrease our research activities.

Respondent 99
Theme 8: Funding for research time and equipment but limited ability to make use of them

Many survey respondents reported receiving salary awards as faculty, including CIHR New Investigator Awards, Tier 2 Canada Research Chairs, provincial and other awards (see Table 4 on page 18) and receiving funds from the Canadian Foundation for Innovation and other sources for equipment (see Table 6 on page 19). However, with limited or no operating funds, they report being unable to make full use of their protected research time and costly equipment.

I received a CIHR New Investigator Award and a provincial salary award, which gave me hope that I would soon be competitive for CIHR operating funds. Unfortunately, this was not the case. Then there was a gap in the funding cycle associated with the reforms and I have used up my meagre startup. The New Investigator Awards get me teaching release but sadly I cannot use any of these awards (which total ~500k) to support my research during this period - they get absorbed by my institution.

To date, my research has progressed as I would have hoped, for the most part. However, I am not taking on students for this coming year and one of my senior trainees will be leaving the lab. Productivity will certainly decline. Our animal husbandry costs are going to increase 3-4x in the coming year due to changes at my institution; without a new source of funds I will have to completely change my research program, for example by performing far fewer experiments and using cheaper and less effective disease models. This could be particularly unfortunate since I received a large CFI infrastructure grant to equip my lab, and changing the program/model could make much of this equipment unusable.

Respondent 55

I was recruited from the United States as a Tier II Canada Research Chair shortly before the reforms were announced. My CRC award provided funds over 5 years to cover my salary. I was also successful in obtaining a CFI and a small equipment grant. Apart from start-up funds, I have no access to operating funds.

As a direct result of the CIHR reforms, my protected research time has been underutilized, as has the state-of-the-art equipment purchased from my CFI and start-up funds.

Respondent 10

CIHR funding has not kept up with CFI infrastructure funding. I got CFI funding for four [specific equipment redacted], but I cannot use all four rigs. One has been left unused for two years now. I try to collaborate to fill the fourth, but few PIs have enough funds to share trainees with me.

Respondent 110
I was awarded a CRC2, and attended a ceremony attended by Science Minister Kirsty Duncan where the investment in young talent by the federal government was heralded. And I sat there and thought: I wish I could turn this salary award into research dollars.

Respondent 93

Some respondents raised concerns about the wasted investment funding training and start-up costs for people who are then unable to do the work they trained for decades to undertake.

What seems particularly problematic in this new funding climate is that CIHR has already invested so much into me - CIHR doctoral scholarship, two CIHR STIHR programs, CIHR postdoctoral fellowship - and if I cannot develop a program as a PI, this will seem like a waste of resources.

Respondent 50

[…] it has forced me to face a real possibility that my lab may not be funded soon, which would force us to stop our research. This would be in detriment not only to mine and numerous other labs in the same situation, but also to Canada's scientific system, which has already invested significant funds to hire us and to equip our labs. The limited funding for science will ultimately damage Canada's power to innovate and face society's health challenges.

Respondent 99
Theme 9: Hard work and strong science may no longer be enough, and they come at a personal cost

Respondents were emphatic that they didn’t want to complain. They know that funding is not guaranteed, that CIHR’s ability to fund research depends on its budget allocation, and that they need to work very hard. New faculty are aware that they hold desirable positions and they knew coming in that they would need to put in a great deal of effort to launch their careers as independent investigators. Nonetheless, many expressed concern that hard work and strong science may no longer be sufficient to launch one’s career. Respondents also noted the personal cost of such relentless hard work for uncertain payoff, including negative impacts on their lives, well-being, and families.

I truly do understand that political policy affects what is going on at CIHR and that you are not able to fund everyone.

Respondent 130

I understand that research has always been competitive and I’m prepared for that. I work extremely hard. I don’t expect anything to be handed to me.

Respondent 47

I am spending less time with family to apply to as many funding competitions as I can to allow my lab to survive this difficult time.

Respondent 15

[T]he uncertainty of not knowing whether my position is secure or not, creates a lot of stress in my life. My wife is in a similar situation. It was already hard to find two positions as PIs and the possibility that we have to go through the same process again to find two positions in the same city is frightening and makes me question my career choice.

Respondent 94

I have worked hard, spent whole weekends and late evenings in the lab for months before deadlines (3-4 times a year). I regularly work everyday over the Christmas holidays. I have a husband and a three-year-old daughter. I am the major earner in the family, but we both work so I still maintain a large domestic responsibility as well. My husband, who is not a scientist, is concerned that this job will kill me and wants me to quit. I feel an obligation to my trainees to stick it out and put 110%. I have 4 graduate students that want to graduate and they deserve to. I developed an ulcer over the last 4 months coming up to the P-Scheme.

Respondent 58
Wow, where to begin.

The current funding environment has affected my research, my family and probably my health. And although I love what I do, it has made me question my chosen career path. 

[...] 

Given the low acceptance rates, I apply to many grant opportunities to increase my odds, resulting in long work hours which is affecting my family. My husband wants me to find another job and I want to spend more time with my daughter. Something has got to give.

Respondent 140

The funding pressures also greatly affect my personal life. I suppose the most succinct way to put this is that I work nearly all the time. I don’t believe this is an overstatement. I get up at 4:30 AM every weekday morning so I can get in an extra 2 hours of work before my kids get up (and, like all of us, I do work for 3-4 hours after they go to bed). I have not taken a family vacation since I began my faculty appointment where I have not spent nearly every vacation evening/night working on a grant application. In fact, I look forward to family vacations as "uninterrupted" time to focus on grant writing. I'm pretty certain my spouse and 2 young girls are less than enthused about my thinking. At the same time, I fully recognize I chose this career and I choose to do this. And I don't want to seem like I am complaining. I love my work and I have no problem working hard. But the current funding environment means that we (ECIs) have to spend an inordinate amount of time applying to funding competition after funding competition in order to secure the funds we need to do our science (which we are all highly trained to do).

Respondent 59

On a family basis, with 2 young kids, I often have to write grants by myself (graduate students are not yet able to really help me, unlike in other big laboratories). [...] This has a clear effect on my family life.

Respondent 4

I am the sole income earner for my family [...] I chose to start my position when my baby was [young] because I was worried about jeopardizing my new job. I currently regularly work 10 hour days (and sleep poorly at night because I am breastfeeding an infant). I take on more new projects and grant applications with my colleagues than I should because I really need grant funding.

Respondent 16
As a woman in academia with an extensive teaching load and significant parenting duties, I never, ever engage in leisure or self-care activities.

Respondent 22

The stress of not knowing if your lab will survive is tough. My family life has certainly suffered. People go through much worse in this world, of course, and I am hopeful and feel tremendously fortunate to have been given this opportunity to do the research I love and contribute something to human health.

Respondent 55

The high pressure in research and the competitiveness to obtain long-term, sufficient funding from CIHR affects my research and my life beyond research. [...] My personal life is affected because I am writing grants until midnight, I am stressed because of insecurities of my position, and I cannot spend time with my family because I always have in the back of my mind that I have to write proposals rather than playing with my children.

Respondent 68

Knowing how devastating the current success rate is along with how much time is required to submit a grant, I have opted to secure other sources of funding. I am on tenure track with 3 children under 5 years old. Despite my rigorous PhD training (funded by CIHR), my chances of tenure and getting a CIHR grant are profoundly reduced. Obviously my personal circumstances are not helpful but even without kids, I really wonder - what is the point? I spent 16 years in university - only to feel that I am just not good enough.

Respondent 61
Theme 10: Extra disadvantages for ECIs who take maternity, parental or other leaves

ECIs are often in their childbearing years and thus may take maternity and/or parental leave. Others may need to take leave for personal health concerns or to care for a loved one such as an aging parent. Leaves are more often taken by women than by men.

Some respondents reported particular concerns relevant to leaves in the context of new program formats and evaluation mechanisms, specifically, the fixed time limits within the Canadian Common CV.

The new Canadian Common CV formats for Foundation Scheme and Project Scheme limit applicants’ ability to list productivity indicators (funding, publications, trainees) to the last 5 or 7 years. The new format does not allow any adjustment if you took one or more maternity/parental leaves during those years, as I did.

This means that if you had a baby, you don’t get to list a full 5 or 7 years’ worth of productivity. I have written to CIHR about this and they said all I can do is explain in the section Leaves of Absence. That section is limited to a 900-character field (about 150 words) which is not enough to list a leave’s worth of productivity.

In other words, formats in these new programs systematically disadvantage people who take maternity, parental or other leaves, many of whom are early career women.

[...]

I was among the 32 ECIs accepted to Stage 3 of the Foundation Scheme in its first pilot but not among the 23 funded. I can’t help but wonder if being able to show a full 7 years’ worth of productivity in my CV could have helped make the difference between close-but-not-quite and funded.

It could be just a coincidence (these are small counts) but I know two other early/mid-career women who made it to Stage 3 and who have children young enough that this CCV rule affected them. They weren’t funded either. Almost 80% of people who were accepted to Stage 3 were funded, including all the early/mid-career men I know.

Respondent 47

My parental leaves were explicitly disregarded by multiple reviewers. For example, my publication record was considered in the context of being an “assistant professor for 5 years and associate professor for one year”, despite the fact that I required two parental leaves during this period. Had I known that leaves would not be considered when evaluating productivity, I would not have shared this personal information.

Respondent 42
Being a woman that had to take a maternity leave, having moved to complete different degrees, my productivity has been greatly affected which is mainly calculated via the papers I published in the past years.

As such, I appear not competitive despite the fact that I went abroad to obtain training that is unique but is in a way penalizing me compared to those that stayed in Canada, and started asking for funding earlier than me.

Respondent 66
Theme 11: Considering leaving research, academia or Canada

Many respondents report that they are considering leaving research, academia, or Canada. Some are actively seeking a new job outside of Canada or have already secured a position elsewhere.

*Some of my highest quality colleagues are leaving Canada because of the uncertain funding climate. I am considering the same.*

Respondent 42

*Seeing no practical solutions on offer, and not yet ready to be one of the careers lost, my personal solution was to look for a job elsewhere. I am moving to [country name redacted] to take up a position there. It is a research position, roughly equivalent to my current job here. Research funding is not great in [country], but at least the system is not in chaos. It feels a massive, massive relief to walk away.*

*I put my heart and soul into getting up and running here. It has taken years off my life. I desperately wanted it to work out, for my sake, for my science, for my students and my team. But I cannot see a way ahead here, and no one here has been able to give me any answer better than closing my eyes and hoping for the best. That feels irresponsible. By moving, I give my science and my team a chance to survive.*

Respondent 65

*I’m also an American (now a permanent resident of Canada), and I’ve considered moving back to the states because the funding climate is slowly improving there, while deteriorating here. Many colleagues in the same cohort as me in the states have NIH funding, despite having what would be considered basic research programs. In fact, when I came to Canada, everyone’s favorite sentiment was “well, at least the funding system is better here than in the US.” We can’t say this any longer. I had several lucrative offers in the US when I was establishing my lab, and chose to come to Canada because of the many great benefits to junior faculty, and the notion that the system fostered new labs, helping them to get established and enabling them to do outstanding science. I no longer believe this to be true, and am very disappointed in the direction things have gone for Canadian ECIs.*

Respondent 35

*If I am not able to obtain funding by Sept. 2016, I will be forced to give up my dream of doing independent research...I will close my lab, fire my students, sell my house and return to the US to look for a job wherever I can find one.*

Respondent 10
I patent virtually every project and have launched my own company at year 2, but without a strong foundation laboratory with stable funding, I have considered moving the company (and my family) to New Jersey and leaving academia.

Respondent 5

I would like to stay in Canada. However, I am willing to move to regions where there is more support for basic science, if this will allow me to a) pursue my original research program that is rooted in basic biology and b) be more competitive in my field.

Respondent 84

This is a very stressful time. I have managed to get a team of 4 people in my lab that has been very productive. We just recently published a nice high-impact paper and my lab is in full swing, but I fear that all is cut off right now. If I can't renew my funding I need to let go of all my staff as my institution also has no plans to help get me going. [...] I am keeping my eyes open for alternative careers as I have a family to feed.

Respondent 28

I am Canadian but trained in the US. [...] I've been very close to being funded by CIHR but have only had success in getting major funding in US-based funding competitions. I have since been recruited by US universities. So far I've responded that I'm not interested in leaving. I want to stay in Canada. I want to help Canadians get better healthcare. However, if I'm not able to get stable funding here to do meaningful work, I'm going to have to leave.

Respondent 47

This is now a lottery. [...] I will be forced to leave beautiful, progressive, moderate Canada to do science.

Respondent 33

I believe the lack of support that CIHR is demonstrating to young investigators who are supposed to create the Canada of tomorrow is the worst effect [...] Obviously, I am thinking of leaving Canada or leaving academia and going to industry.

Respondent 131
If the funding environment for ECI isn’t addressed I believe Canada will face losing a large pool its young biomedical researchers to other countries or careers.

Respondent 74

This [improving the current system] will likely take 5-10 years, and careers will be lost in that time. […] My sense is that the universities have still not woken up the scale of the problem.

Respondent 65

One person who completed the survey described having already left. This person was not assigned a respondent ID because they were no longer an active ECI in Canada at the time of survey completion and thus did not meet our eligibility criteria. However, their identity as a recent early career health researcher in Canada, including former affiliation and publication record, have been confirmed. Their other responses were not included in the aggregate statistics. In other words, this person is not included in the sample of n = 143. A single extract from this person is presented here as an example of those who have already left academia.

The current CIHR funding environment and grim future outlook was one of a few reasons contributing to my decision to resign from my Assistant Professor position to pursue a career in the pharmaceutical/biotechnology industry outside Canada. This resulted in me laying off one technician, and will result in me laying off another technician once my CIHR open operating grant expires (currently being administered by a colleague in my former institution). I have been able to graduate one Master’s student and with the help of an institutional colleague will continue to mentor my doctoral student until the completion of their thesis later this year. This difficult decision was made after careful consideration of my personal family situation and the career circumstances of myself and my partner.

No respondent ID

In total, 46% of respondents indicated that because of the current funding environment, they are considering leaving research, academia, or Canada. (See Table 8 on page 21 for full details.) Survey respondents provided totals of the amount of funding that has been invested in them thus far, including training awards, salary awards and equipment awards. (See Table 5 on page 18.) The respondents who reported they are consider leaving research, academia or Canada represent a total of CAD$80M ($67M from Canadian sources and $13M from non-Canadian sources) directly invested in these researchers during their training and start-up years as new faculty.
Theme 12: Concerns about the future of health research in Canada

Survey respondents’ concerns include what the funding environment means for them as ECIs individually and also what it means for the future of health research in Canada.

*The prospects for my trainees and those of other investigators in the future are quite grim.*

Respondent 21

*It is also very off-putting for my students who see how their PIs are struggling, and I personally don't know really how I can motivate them to stay in science as there does not seem to be much incentive to follow this path.*

Respondent 94

*The current funding climate and lack of regard for investigators in different stages of their careers discourages me from continuing in this career. I see excellent investigators losing their funding, I see students turning away from research as a career, and I see the excellent salesman and not necessarily the excellent scientist succeeding.*

Respondent 30

*I'm very concerned about the direction of Canadian funding (CIHR) because it is eroding the foundation of science by not funding basic, fundamental research, which yields unexpected results (see CRISPR, RNAi).*

Respondent 35

*Besides the general lack of funding for biomedical research, I am also extremely concerned about the way that the CIHR is seeking to dictate the research priorities of academic departments in Canada. Top-down directives have channeled a lot of precious funding dollars away from discovery research. There will always need to be a balance between discovery/research and application/development projects, but my colleagues and I are very concerned about the sharp shift to the latter at the expense of the former. The work I do includes basic discovery research that drives our other work focused on more obviously clinical questions. With the cultural shift in the priorities of the CIHR, it has not been possible to fund our discovery work, which is already eroding the foundation of the translational branch of our research. I strongly believe that this will be very limiting of the future impact of our work.*

Respondent 46
I sense low morale and growing pessimism about the future of health research in Canada among my colleagues due to low success rates and loss of confidence in the peer review process with the elimination of face-to-face peer review. Researchers participating in the virtual peer reviews have reported wide variability in scores and inadequate or even inappropriate reviewer feedback. As a new investigator, it is disheartening to watch established researchers struggle to obtain adequate funding and having to scale back their research programs. If they are struggling, how am I going to succeed? I also feel that my development as a researcher will be hindered by not having the opportunity to participate in face-to-face peer review grant panels, an experience that many report as an excellent learning and networking opportunity.

Respondent 9

The current CIHR funding climate has quickly resulted in anxiety and frustration among scientists (trainees, full-time staff, and principal investigators). In particular, I'm struck at how this is negatively impacting our bright, creative students and their long-term view about how they can establish successful careers in research. For example, many of our MSc students are opting out of continuing onto their PhD because they don’t see many career prospects in the long-term, both in academic and private sector research, and particularly if they want to stay in Canada.

Respondent 117

While I certainly consider myself very lucky in terms of funding I have received (CIHR, CFI), I do worry about the future prospects of doing high-impact research in Canada.

Respondent 124

It is almost impossible for new investigators (even with a strong and competitive CV) to lead a successful research program in Canada in the current funding environment.

If the government truly believes in a knowledge-based economy, then investing more in the future generation of leaders and thinkers would not be a bad idea.

Respondent 107

If Canada wishes to foster the future of health research in our country, a recognition of this significant ECI disadvantage and a meaningful resolution must be reached immediately or the investment made to train today's most ambitious and successful young researchers in our country will be lost. Time is of the essence and ECIs don't have time—or funding to buy time—to spare.

Respondent 41
Discussion

ECIs who responded to this survey expressed concern about their futures, those of their staff and students, and the future of Canadian health research.

Many responding ECIs noted that previous faculty paths, begun at a time when funding success rates were significantly higher, were no longer available and that their institutions had not adapted to the challenges faced by current ECIs. Nearly all respondents are in a vulnerable career stage: 95% are tenure-track or on a contract that requires renewal. They are competing for CIHR funding at a time when funding rates were already low and grant mechanisms are changing. Some ECIs reported specific concerns and negative experiences associated with the CIHR reforms; others who have been able to do so have adjusted their timing, sought funding elsewhere, and are waiting for the reforms to conclude before applying to CIHR. Many reported scaling back their research, doing less ambitious and lower impact research. Some also noted that they are less able to engage in meaningful knowledge translation, including publishing open access articles and presenting findings to interested stakeholders. As a result of these various reductions, ECIs are therefore concerned about their ensuing reduced competitiveness on both a national and an international scale.

Respondents also reported negative effects of the current funding environment on their ability to employ highly qualified personnel and to fund and appropriately mentor trainees. Some highlighted that operating funding had not kept up with funding allocated for salary awards and equipment, noting the wasted investments. Respondents were aware that hard work is an essential element of a successful research career and did not want to complain, but the personal toll of the current funding environment resonated through responses, including responses that were not able to be shared in this report as the respondent requested that they be kept confidential. Many respondents questioned whether all their effort would ever be enough. Some respondents noted particular challenges for those who take maternity, parental or other leaves; such concerns may be particularly relevant for ECIs who are women. Forty-six percent of respondents indicated that they are considering leaving research, academia or Canada; some respondents reported that they or colleagues are leaving or have left. Many ECIs expressed concerns not only for the their own future, but also for that of health research in Canada.

There is no way to know whether the difficulties currently faced by early career researchers in this sample are a direct result of the CIHR reforms. It is possible that without the reforms, these respondents would be facing even greater difficulties due to the low funding success rates that were already occurring prior to the reforms and problems associated with panels. It is also possible that some of the issues associated with the reforms, including a gap in competition cycles, budgetary shifts, and the loss of peer review features that early career researchers found helpful, such as detailed expert comments and the ability to respond to reviewers over grant cycles, may be contributing to the difficulties currently experienced by ECIs.

This survey was an informal project intended to efficiently collect, synthesize and present some narratives to illustrate the numbers previously presented in an open letter.²⁶ As early career researchers, we cannot devote our limited resources to a more formal study. We look forward to the Canadian federal government’s review of research funding and we hope that it will address the concerns of ECIs raised in this report along with the concerns of our fellow health

researchers in early career, mid-career and senior career stages. A strong health research enterprise—with a healthy research funding environment across all career stages—is essential to improving Canadian health outcomes and to strengthening the Canadian knowledge economy.

**Limitations**
A survey such as this is necessarily prone to selection bias because people who have concerns may have been more likely to respond to the survey. Our survey was not designed to offer conclusions drawn from a representative sample; rather, it collected the views and experiences of 143 active ECIs. This large sample collected in only one week suggests that concerns are widespread. In addition, the characteristics of this sample that we were able to compare to national data are suggestive of reasonable comparability. However, due to the limitations of our sampling methods, we cannot know for certain whether concerns and experiences shared by this large group reflect the concerns and experiences of all ECIs in Canada.

**Conclusions**
Responses to our survey suggest significant concerns and negative experiences amongst a large number of ECIs across the entire spectrum of health research. Although we do not know whether or not respondents are representative, 143 is a large number of ECIs and the common themes are worrisome. Given their sought-after positions, previous successes, and degree of previous investment, these preliminary findings suggest that these ECIs are competitive, capable researchers who may be in the right places but unfortunately at the wrong time.
Appendix: ACECHR recommendations
Following analyses of CIHR funding, early results of this survey and discussion amongst members, and in response to the announcement of an additional funding envelope that will be directed to the first Project Scheme live pilot “with a focus on early career investigators,” ACECHR issued the following statement and recommendations on April 24, 2016.

The original may be viewed here:


PDF version: [https://drive.google.com/open?id=0B9zDbgwWPWK6ZVJ2NmQyTzVqSXc](https://drive.google.com/open?id=0B9zDbgwWPWK6ZVJ2NmQyTzVqSXc)

**Statement and recommendations regarding CIHR’s Project Scheme Pilot**

We are gratified to have the concerns of early-career investigators (ECIs) acknowledged as we enter CIHR’s first Project Scheme Pilot. As key stakeholders, we hope to work with CIHR to determine how to best build research capacity through policies that support sustainable research funding.

Health research is an integral part of Canada’s innovation portfolio and is essential for the continued well-being of Canadians. But this enterprise is in jeopardy as many Canadian scientists face unprecedented challenges posed by an unsustainable funding environment. ECIs and mid-career investigators (MCIs) represent the future of health research in Canada. But without realistic opportunities to obtain operating funds from CIHR, many of these research programs are doomed to fail.

While researchers of all career stages are under tremendous funding pressure, the cohort of ECIs starting independent careers during the reform/transition period have had half the normal number of opportunities to obtain their first operating grant (due to cancelled competitions) while success rates are the lowest in CIHR’s history. Our situation is worsened by just 5% of the funds available in the first Foundation pilot being awarded to ECIs. This distortion means that, even if ECIs do as well in Project as in they did in the OOGP, there will be a large drop in overall funding to this group across the Open Programs. We realize these are pilot programs, but these are not our pilot careers.

Specific recommendations

1. There is an urgent need for increased overall support from the federal government for open programs, an investment that has fallen dramatically in adjusted dollars.

[17](http://www.cihr-irsc.gc.ca/e/49738.html)
2. Project Grant success rates should be equalized across career stages according to unique nominated principal investigator applicant (NPI) numbers (count one per NPI, even if they submit multiple grants) to prevent the distortions caused by Foundation from being exacerbated.

3. The additional $30 million allocated to the first Project Grant pilot should be made available to the populations most in need, either in the form of additional full awards or bridge grants:
   - ECIs who are not currently NPI on a 5-year CIHR operating grant.
   - Previously-funded MCIIs who are experiencing or facing immediate funding gaps.

4. Funds allocated specifically to ECIs or MCIIs in the first Project Grant pilot should be in addition to this equalized success rate in order to partially offset the support lost in the Foundation Pilot.

5. Foundation awards—both in number and in size—represent a hugely disproportionate allocation of funds to established investigators. CIHR should take immediate measures to remedy the current shift and prevent future disproportionate allocation of operating grant dollars. Proportionate allocation across early-career, mid-career, and established investigators will allow CIHR to meet its mandate and respond to demographic changes in the applicant pool.

6. Better incorporation of leaves and career delays into evaluation and eligibility mechanisms, including by adjusting CCV time restrictions for Project and Foundation to allow applicants who took a leave within the 5- or 7-year time window to show a full 5 or 7 years’ worth of productivity. The current restrictions systematically disadvantage those who take leave, many of whom are ECIs taking maternity and parental leaves. Such systematic disadvantage may be particularly harmful to the careers of ECI and MCI women.”
Appendix: Code for comparisons

The following simple lines of R code contain both the data and the commands to run the comparison tests presented in Table 3, page 17 and again on page 20.

```r
# gender
X<-matrix(c(62,246,81,313),nrow=2); X; prop.table(X,2); chisq.test(X); rm(X)

# pillar
X<-matrix(c(102,13,10,7,19864,4650,2045,2993),nrow=2,byrow=T); X; prop.table(X,1); chisq.test(X); rm(X)

# pillar with multiple choice allowed
X<-matrix(c(109,22,13,9,19864,4650,2045,2993),nrow=2,byrow=T); X; prop.table(X,1); chisq.test(X); rm(X)

# tOOGP
X<-matrix(c(13,49-13,500-13,2682-49-(500-13)),nrow=2); X; prop.table(X,2); chisq.test(X); rm(X)

# FScheme
X<-matrix(c(1,49-1,23-1,559-49-(23-1)),nrow=2); X; prop.table(X,2); fisher.test(X); rm(X)
```