

Leverage Analysis of MSFHR Career Awards

Impact of MSFHR Scholar and Senior Scholar Awards on CIHR Funding



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1. Background

Research funding organizations provide a variety of programs to support research. Career or salary-type awards¹ are intended to assist institutions in attracting and retaining the very best researchers and allowing them to devote major portions of their time to research (customarily a minimum of 75%). While funders, institutions, and recipients all believe that such “protected time” allows researchers to further excel at health research, there are few data that actually measure the “leverage” these awards provide.

In autumn 2009, MSFHR undertook a series of analyses to investigate the relative impact of these different types of awards. The primary outcome variable used was CIHR funding obtained by investigators subsequent to the commencement of the MSFHR award (using data provided by CIHR). This measure has the advantage of being readily available, reliable, and fair, in the sense that BC investigators are judged for these awards by national panels on a level playing field within each of the four research pillars (biomedical, clinical, health services, population/public health). The disadvantage is that it represents only one dimension of research effectiveness and impact: i.e., additional research funding. This limitation will be discussed later. We report first on the impact of MSFHR Career awards at both the Scholar and Senior Scholar level.

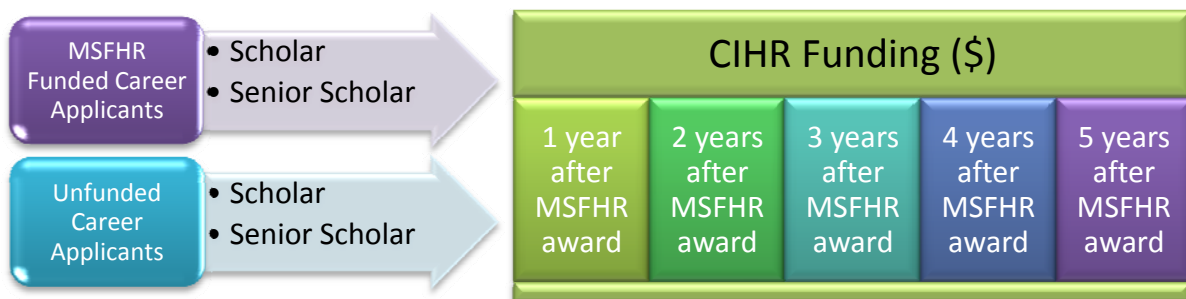
¹ These awards are variously called Salary Award, Investigator Award, Scholar Award, or Scientist Award by different funding agencies. MSFHR offers Scholar and Senior Scholar award programs, the former aimed at investigators within their first 5 years of independent research, and the latter within their first ten years.

2. Career Awards

These analyses compared the annual amount of CIHR funding held by MSFHR-funded Career awardees (Scholars and Senior Scholars) to that of unfunded Career award applicants (acting as the control group), for the five years following the commencement of the MSFHR award (or, for the Unfunded group, the date the award would have commenced had they been successful). Only those CIHR grants that were awarded after the MSFHR award commencement date (or the control date) were included. It should be noted that both the Funded and Unfunded groups have almost identical distributions across the four research pillars (biomedical, clinical, health services, population/public health).

Analyses were conducted for the two award categories—Scholars and Senior Scholars—combined and then separately. The analysis methodology is summarized in the following diagram.

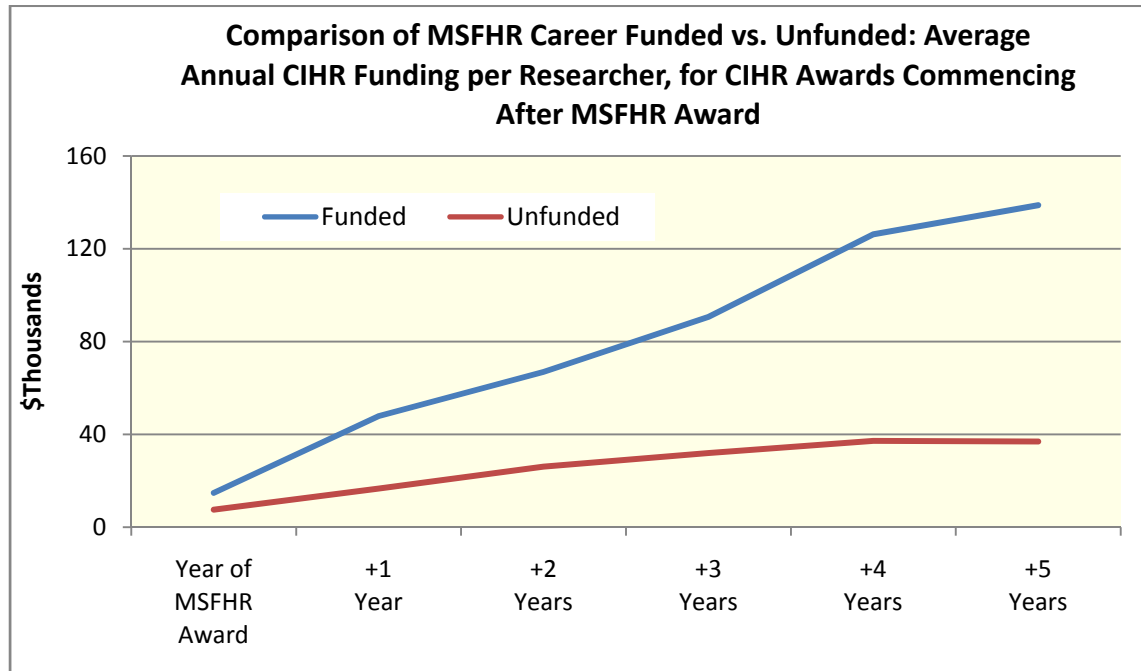
Figure 1. Career Analysis Methodology Summary Diagram



2.1 Analysis Results

For the five years following the commencement of the MSFHR award, the Funded group held greater average (per researcher) amounts of annual CIHR funding than the Unfunded group. This is represented in Figure 2, below. The two groups began with a difference of \$7,195 in the year of the MSFHR Award; by the 5 year point, the difference had increased to \$101,836 per researcher.

Figure 2. Comparison of MSFHR Career Funded vs. Unfunded

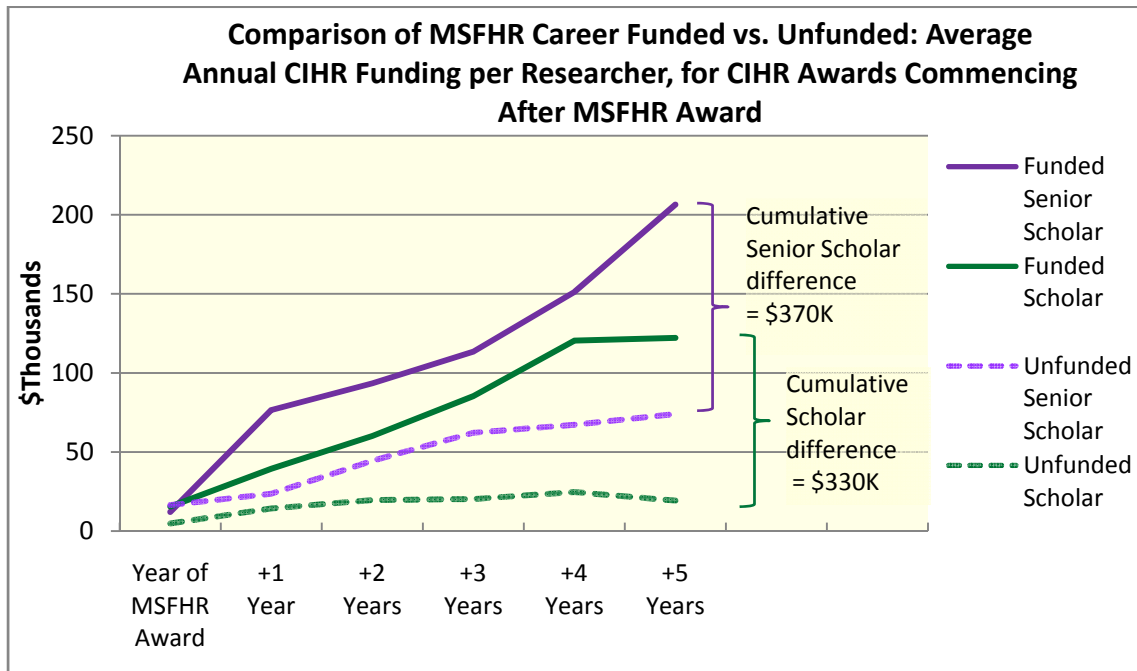


2.2 Scholars vs. Senior Scholars

The same analysis was then conducted for each MSFHR Career award category (Scholar and Senior Scholar). As shown in Figure 3 below, those holding or applying for Senior Scholar awards received greater amounts of funding than their counterparts in the Scholar category, as would be expected based on years of independent research experience. More importantly, both of the Funded groups held greater mean amounts of CIHR funding than their Unfunded counterparts, and, notably, the Funded Scholars received more than the Unfunded Senior Scholars.

These annual differences were then totalled, to arrive at the cumulative difference between the groups for the five-year period following commencement of the MSFHR award. For the Senior Scholars, the cumulative difference totalled \$370,000; for the Scholars, it was \$330,000. This is shown in Figure 3, below.

Figure 3. Comparison of MSFHR Career Funded vs. Unfunded by Category (Scholar and Senior Scholar)



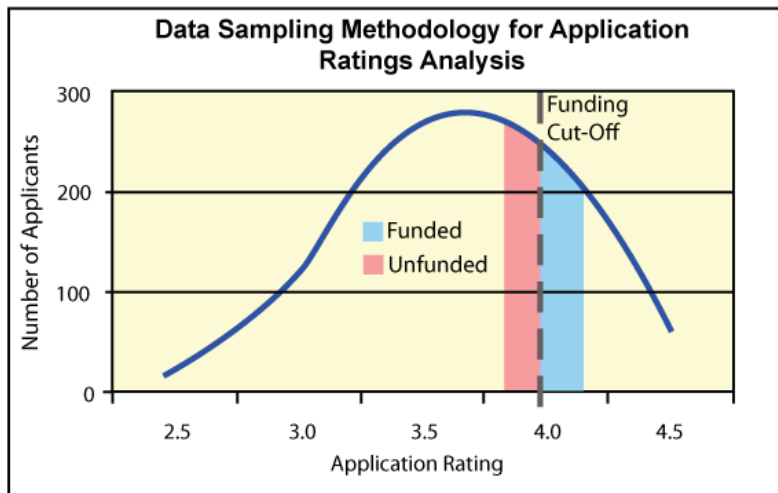
2.3 Career Application Ratings Analysis

Given the differences observed thus far, it is prudent to consider the possibility of selection effect as an alternate explanation to causation. Under this alternate hypothesis, it is not the MSFHR award *per se* that caused the curves to diverge, but rather that the Career award recipients were selected *because* of their high performance, and were therefore already on track to receive greater amounts of CIHR funding.

In the absence of an experimental design, it is difficult to completely rule this out. However, to investigate further, we conducted an additional analysis restricted to those applicants who scored just above and just below the application rating threshold (i.e., the cut-off point for funding).² Figure 4, below, illustrates how the funded and unfunded applicants were sampled for this analysis. (Please note: the graphic is an example only; in the actual data, the cut-off point differed for each competition year, category, and pillar).

This creates a case and control group that are much more similar in terms of ‘quality’, as judged by the peer-review panels, so that any subsequent differences between the two groups are more likely to be the result of the MSFHR award.

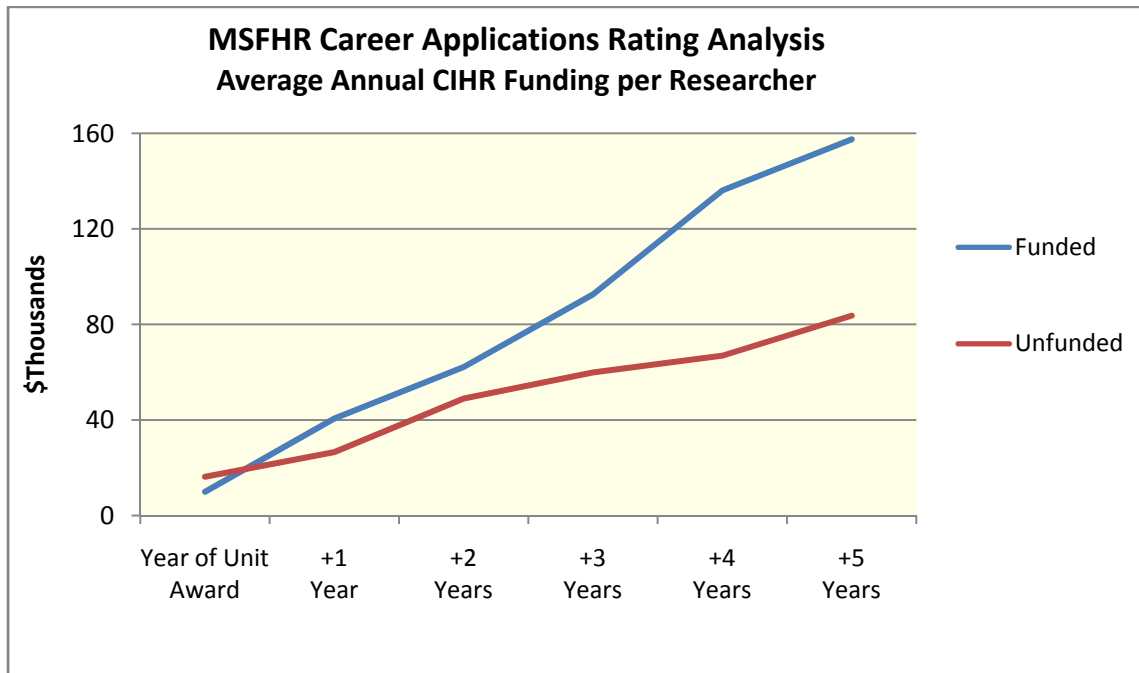
Figure 4. **Data Sampling Methodology for Career Application Ratings Analysis**



² The award competition years, categories (Scholar and Senior Scholar) and pillars (biomedical, clinical, health services, and population health) were adjudicated by different peer review committees; therefore, samples were taken from within each subgroup. Due to the small size of the subgroups, two Funded and two Unfunded researchers were sampled from each.

The results of the restricted analysis can be seen in Figure 5, below. As shown in the graph, the Funded group (with scores just above the cut-off) still performed significantly better than the Unfunded group (with scores just below the cut-off). The difference by Year 5 is \$73,823 per researcher; the cumulative difference for Years 1 through 5 is \$202,973.

Figure 5. Career Application Ratings Analysis Results



2.4 Multivariate Analysis

To account for other factors that might have had an effect on whether researchers received new CIHR awards or not, a binary logistic regression analysis was conducted, with the dependent variable being “received a new CIHR award or not.”

Five independent variables were included in the model:

- MSFHR funding (funded vs. unfunded as previously described)
- Category (Senior Scholar vs. Scholar)
- Gender (male vs. female)
- Pillar (biomedical vs. all others)
- Time since MSFHR funding (measured in years)

The results are presented in Table 1 on the following page. The odds of receiving a new CIHR award were approximately 3.88 times higher for those with MSFHR Career award funding than those without. The odds of receiving a new CIHR award were approximately 1.96 times higher for Senior Scholars than Scholars. As was expected, the odds of obtaining a CIHR award increased as the follow-up period increased (due to the fact that researchers would have had more opportunities to apply for awards). Gender and pillar had no significant effect on receiving a new CIHR award.

Table 1: Results of Binary Logistic Regression Analysis

<i>Predictor Variable</i>	<i>Odds ratio</i>	<i>P-value</i>	<i>95% Confidence Interval for odds ratio</i>	
			<i>Lower</i>	<i>Upper</i>
MSFHR Funding (Funded/Unfunded)	3.88	<0.01	2.58	5.81
Category (Senior Scholar/Scholar)	1.96	0.01	1.22	3.14
Time Since MSFHR Funding (per year)	1.57	<0.01	1.37	1.79
Pillar (Biomedical/all others)	1.06	0.78	0.71	1.59
Gender (M/F)	0.87	0.51	0.57	1.32

3. Interpretation and Limitations

The data clearly suggest that MSFHR-funded Career award recipients received higher annual amounts of CIHR funding than unsuccessful applicants, with respect to funding obtained subsequent to the MSFHR award start date. This was true in both the Scholar and Senior Scholar categories, and was not influenced by either gender or research pillar.

As noted earlier, one alternative explanation to causation is that of selection. MSFHR may have selected higher quality researchers, who would have received more CIHR funding regardless of support from MSFHR. The ratings analysis attempted to control for this by sampling researchers who were much more similar in terms of 'quality.'

Comparison of the CIHR funding levels at the time of adjudication also shows very little difference between the MSFHR-funded and unfunded groups. We recognize, though, that some research projects submitted to MSFHR by applicants as part of their career award application may have also been submitted to CIHR for operating grant support. This could have contributed to the observed association, if both the MSFHR and CIHR review panels rated the research project similarly. This might explain the early separation between the MSFHR-funded and unfunded groups, but would be less likely to explain later differences given that CIHR operating grants have an average duration of 3 years. In any event, to posit that 100% of the subsequent success of the awardees was due to the predictive value of the award adjudication process and not to any effect of the award itself, is to lend far greater credence to the predictive validity of the peer-review process that most observers or participants would lend.

Even if there is a causal effect, it is difficult to judge how much of the subsequent success can be attributed to the MSFHR Career funding itself. Receiving a Career award can make an investigator more competitive in subsequent CIHR grant competitions by virtue of the Career award designation alone. Also, the MSFHR-funded award recipients may have been more successful by garnering additional support from other external agencies and from their own institutions.

Unfortunately, limitations will almost always arise when analyzing observational data. The most reliable way to rule out these alternatives and confirm a causal effect would be through a randomized controlled trial design in which Career awards would be awarded based on randomized allocation. For obvious reasons, this is not feasible.

Like all scientific data, the present findings should be viewed in light of all other available information. Narrative reports from Career award recipients and their research leaders consistently point to the tangible impact of the awards. In addition, there is a highly plausible mechanism of action for Career awards: namely, that those who are able to spend most of their time on their research, manuscripts, grant submissions and collaborations, are those most likely to succeed. The present data are of value not so much in establishing that leverage exists for Career awards, but in beginning to quantify the degree of the effect.

Appendix A: Additional Methodological Details

MSFHR Data

MSFHR Career data included applicants to the Scholar and Senior Scholar competitions for the competition years 2001-2007. The Funded group included all those who received an MSFHR Career award. Where more than one MSFHR award was received by a given researcher (e.g. Scholars who later received Senior Scholar awards), only the first instance was counted. The Unfunded group included those applicants who never received an MSFHR Career award. Where applicants were unfunded in more than one competition, only the first instance was counted. Those with 'offer declined' were excluded from the analysis.

CIHR Data

Only those CIHR awards commencing after the start date of the MSFHR award (or, for the Unfunded group, the date their MSFHR award would have commenced) were included; payments for any CIHR awards commencing previous to the MSFHR award start date were excluded.

CIHR award types included Operating Grants, Salary Awards, and Clinical Trials, where the MSFHR applicant is the Principal Investigator. Award types excluded from the analysis were NCE Operating Grants, NCE New Initiatives, Canada Research Chairs, Business-Led Networks of Centres of Excellence (BL-NCE), Centres of Excellence for Commercialization and Research (CECR), as these are 'flow-through' funds rather than actual CIHR awards.

Year Range

The year range of the CIHR data was fiscal years 1999/00 to 2008/09.

It is important to note that with each subsequent MSFHR competition, a decreasing number of CIHR funding years are available for analysis. Only the 2001–2002 MSFHR applicants have the full six years of CIHR data (year of award plus five years following). The table below shows the number of cases in each year.

Number of Cases

Career Awards Analysis – Number of Cases

	Year of MSFHR Career Award	+1 Year	+2 Years	+3 Years	+4 Years	+5 Years
Funded Senior Scholar <i>n</i> =	51	46	34	25	20	15
Funded Scholar <i>n</i> =	182	156	132	106	86	61
Unfunded Senior Scholar <i>n</i> =	61	55	49	43	42	38
Unfunded Scholar <i>n</i> =	195	161	136	111	100	80

As the analysis compares mean funding per researcher, the n for each year should not have any effect on the results except for diminishing precision of the estimates in later years.

Career Application Ratings Analysis – Number of Cases

	Year of MSFHR Career Award	+1 Year	+2 Years	+3 Years	+4 Years	+5 Years
Funded n (Scholars and Senior Scholars) =	87	78	67	54	43	31
Unfunded n (Scholars and Senior Scholars) =	42	35	28	23	19	14

Statistical Analysis

Statistics consultancy work was provided by Nathalie Gagnon of Research Link.



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