



Michael Smith Foundation for  
**Health Research**

Funded by the Government of British Columbia



## MSFHR Career Investigator Program Analysis

Building BC's capacity for excellent health research

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The Michael Smith Foundation for Health Research is the provincial support agency for health research in BC.

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On the cover: Dr. Clay Holroyd, 2007 MSFHR Career Investigator (Scholar)

# Summary

## Background

The Michael Smith Foundation for Health Research (MSFHR) Career Investigator Program is intended to build health research capacity in British Columbia by supporting the establishment, development and retention of career investigators through salary contributions. From the first competition in 2001 through the 2008/09 fiscal year, 283 researchers received the award, for a total of \$78.4 million in funding.

This analysis examines the activities of career investigators (scholars and senior scholars) and the outcomes of their health research using data from award recipients' annual reports received in 2008/09. The report focuses primarily on capacity building, to understand if the Career Investigator Program is fulfilling its purpose; it then examines additional health research outcomes achieved by awardees to explore the benefits of supporting health research capacity in BC.

## Findings

Findings indicate that the MSFHR Career Investigator Program directly contributes to BC's health research capacity by supporting researchers' productivity, additional funding success and training. While the aim of the Career Investigator Program is to build capacity, research capacity in turn cultivates other health research outcomes as career investigators engage in research activities and advance knowledge, inform health-related decision making, and create the potential for research to lead to broader social and economic impacts. The analysis confirms:

- Facilitating 75 percent protected time for research activities increases career investigators' opportunities to conduct research, publish, collaborate and write grants.
- Protected time and the results of increased productivity also contribute to additional funding success, and support the training and mentorship of students.
- Career investigators create and expand knowledge in health-related fields by conducting research, and on average disseminated to 85 percent of those groups designated as end users through publishing and other knowledge translation activities.

- 56 percent of career investigators reported making specific contributions to inform health and research-related decision making, including advising and consulting decision making bodies such as steering committees and planning forums, and developing and providing resources such as clinical guidelines and government reports.
- 12 percent of career investigators indicated that contributions to health decision making have led to changes to policies, programs and other areas.

This analysis is part of our ongoing examination of MSFHR's contributions to health research outcomes in the province. Further analysis of MSFHR programs, initiatives and other activities will add to this knowledge and better shape our understanding of the outcomes of building and supporting research capacity in BC.

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**By protecting researcher's time and facilitating their productivity, a strong research environment and training, the Career Investigator Program supports the development of investigators in BC and builds the province's research capacity.**

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# MSFHR Career Investigator Program

## 2008/09

### About the program

MSFHR's Career Investigator Program, launched in 2001, facilitates the recruitment and retention of qualified new and mid-career investigators in BC by providing partial salary contributions, and establishment grants to provide supplemental start-up funds and infrastructure support.<sup>1</sup> Overall, 283 researchers have been granted the career investigator award. A total of \$78.4 million has been allocated from inception through the 2008/09 fiscal year, which is approximately 45 percent of MSFHR program funds granted in that period. In 2008/09, career investigator awardees received \$13.8 million, representing approximately 38 percent of program funding in that year.<sup>2</sup>

### About the analysis

Data were collected in the 2008/09 career investigator annual reports and analyzed using the five categories of the Foundation's performance measurement and evaluation framework: capacity building, advancing knowledge, informing decision making, health impacts, and broad economic and social impacts. We focus primarily on the capacity building outcomes as the purpose of the Career Investigator Program, but also comment on the other outcome areas to convey the benefits of building research capacity. Of the 177 awardees:

- 64 percent of career investigators are funded as scholars, 35 percent as senior scholars and 1 percent as distinguished scholars.
- 22 percent are in their first year of funding, 25 percent in their second, 23 percent in their third, 12 percent in their fourth and 18 percent in their fifth.
- 50 percent of awardees are biomedical researchers, 24 percent are clinical researchers, 12 percent are health services researchers and 14 percent are population health researchers.

Evaluating the Career Investigator Program involves measurement of a breadth of research activity at various stages with unique purposes aimed at different outcomes. Both quantitative and qualitative data are used for the analysis.<sup>3</sup>

### Career Investigator Program analysis findings

The purpose of the Career Investigator Program is to build research capacity in BC by supporting the establishment, development and retention of investigators. Different results will stem from the various research pillars and stages of career, but overall findings indicate that the program is building the capacity of health research in the province through the support of research productivity, the research environment and researcher development, which in turn facilitate career investigators' contributions to other health research outcomes. Section 1 presents an analysis of the MSFHR Career Investigator Program during the 2008/09 funding year as it relates to capacity building. Sections 2 – 4 examine additional health research outcomes achieved by awardees that stem from or are supported by research capacity, including advancing knowledge, informing decision making, and initial contributions towards broader health, social and economic impacts.

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1 For more information on the Career Investigator Program, see Appendix A.

2 All funding dollars represent actual funding for the stated time period. Total program funds include career investigator, research trainee, research unit, team start-up, team planning, platform, network and institution awards.

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3 For more information on analysis methods, the MSFHR PM&E framework and analysis limitations, see Appendix B.

# 1. Health research capacity building

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**In terms of facilitating the development of new and cutting-edge research in BC, I think this funding mechanism is essential. ~Scholar**

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Capacity building refers to the opportunity and capability for health research to be performed and applied, including the development of the research environment, individuals and groups (Canadian Academy of Health Sciences, 2009). The Career Investigator Program builds research capacity in BC by facilitating protected time, which supports increased productivity, a viable research environment and researcher development.

## 1.1 Protected time

The primary benefit of the career investigator award is protected time, which enables career investigators to put the majority of their attention on research-related activities. MSFHR funds partial salary contributions and requires that researchers spend at least 75 percent of their time on research activities, alleviating administrative, teaching and other responsibilities that can impede productivity. Protected time is the most reported benefit of the career investigator award to their work. Primarily, career investigators discussed how the award positively impacts research-related productivity by limiting the standard teaching hours and administrative duties. As one scholar explained: “If the [principal investigator] teaches three or more full courses (each with 35 lectures), then the reduction from over 100 lectures per year to 35 lectures per year is life changing!”

Career investigators discussed a number of benefits to research-related activities that accrue from the protected time, including:

- The ability to focus on research and development.
- More time to publish and communicate findings.
- More time to write grants, which supports competitive and greater numbers of applications.

- More time to collaborate and participate in other types of research-related work, such as leadership and reviewer roles.
- More time to work with staff and to supervise, train and mentor.
- More time to broaden goals, expand programs, be creative, focus, gain momentum and pursue other research opportunities.

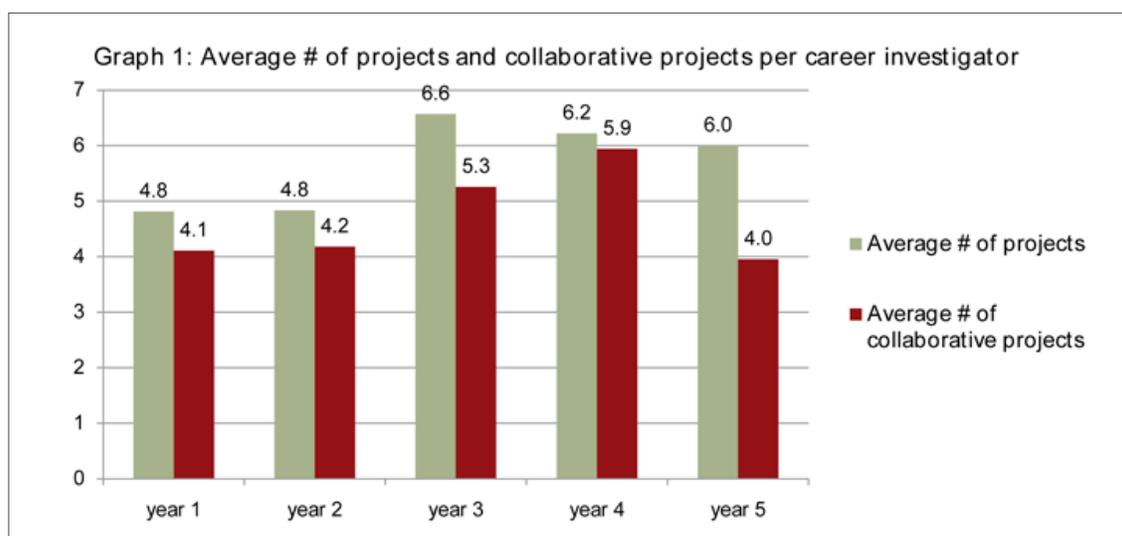
By supporting protected time, the career investigator award provides researchers increased opportunity to engage in research activities, benefiting career investigators’ productivity, development and research environment.

## 1.2 Increased productivity

As the benefits of having protected time increase the ability to focus on and carry out research-related activities, the MSFHR award supports career investigators’ productivity and development. A total of 873 research projects were reported, or an average of six per investigator. Awardees in their first and second year reported an average of five projects, while those in their third, fourth and fifth years reported an average of six projects or more. In addition, investigators in the first year of their award reported an average of five peer-reviewed articles, compared to seven in the second year, eight in the fourth year, and a high of 18 in the fifth year – although for 86 percent of those, the average was seven.<sup>4</sup> While there is an expected level of progress regardless, most awardees indicated that the protected time afforded by the MSFHR award increases opportunities to focus on their work. As one scholar stated: “Simply put, MSFHR-funding has enabled me to focus squarely on medical research. This focus has resulted in the establishment of a highly productive laboratory. My laboratory is currently the highest funded laboratory in my department and the most productive over the last five years.”

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<sup>4</sup> Investigators in year three reported an average of 17 peer-reviewed articles, but submitted information on the first three years of the award. All others (year one, two, four and five) reported on the most recent one-year term.



Increased research productivity includes collaboration and partnership activities, which builds capacity through shared expertise and resources. As one scholar stated: “I have developed fruitful collaboration with clinician scientists and other basic scientist[s] in complementary field[s] of research that will allow us to do research that no researcher could do individually. Through these collaborations BC is recognized both nationally and internationally for its research....” Career investigators were involved in an average of five collaborative projects, and 78 percent of all reported research projects include collaborators. Biomedical and clinical researchers were most often involved in international collaborations (56 percent and 84 percent respectively) and those within their home institution (48 percent and 70 percent respectively); health services researchers were most often involved in collaborations within BC (73 percent) and within Canada (64 percent); and population health researchers were most often involved in collaborations within BC (89 percent) and international collaborations (72 percent). Collaborators primarily include other researchers, but career investigators also reported working with partners in health, government, industry and the community.

## Productivity and funding

Increased productivity in research-related activities contributes to success in other funding competitions, which brings more research money to the province. While MSFHR funds highly qualified researchers who are already strong applicants in

funding competitions, many career investigators noted the added benefit of the award to additional funding successes. As one senior scholar explained: “Support from my MSFHR career [investigator] award continues to ensure that I have the majority of my time protected for research in order to maximize the productivity of my research team. As granting success is typically directly associated with productivity, the MSFHR award continues to contribute directly to my ability to attract operating funds for my research programs.” In addition to the protected time, career investigators reported other ways that being an MSFHR-funded awardee contributes to funding successes, including the recognition received as an expert, and as demonstration of research quality, value and ability; evidence of a viable program of research; and the leveraging opportunities provided.

To understand how the career investigator award affects researchers’ ability to receive funding from other sources, MSFHR conducted a separate leverage analysis (MSFHR, 2009a). The analysis compares the annual amount of Canadian Institutes of Health Research (CIHR) funding received by MSFHR-funded scholars and senior scholars to funding received by unfunded career investigator award applicants, for the five years after commencement of the award, or when the award would have begun. Findings indicate MSFHR-funded career investigators obtain more CIHR funding than the unfunded group: the funded group received \$7,195 more per researcher in the year of the career investigator award, and \$101,836 per researcher by the fifth year of the award.

### 1.3 A viable research environment: Staff, space and equipment

The Career Investigator Program also contributes to research capacity by providing some career investigators with funds to establish and develop a viable, productive research environment, including infrastructure, staff and trainees. MSFHR establishment grant funding totaled \$2.4 million for 43 awardees in 2008/09. Some career investigators discussed the benefits of the flexibility of the grant, which enables researchers to build upon the specific needs of their programs, and many indicated that the grant provides a “running start” or an “extra boost.” As one scholar stated: “It... allows us to start our careers with the resources to make us successful and pioneer new research directions. This is critical to establishing a truly independent research program.”

### 1.4 Researcher development: Training and mentorship

The protected time that allows investigators to engage in more research-related activities, as well as the resulting benefits of increased productivity and funding successes, support the creation of a rich training environment that facilitates the development of students and others who are the future leaders of health research. While training is an expected part of researchers' work, career investigators reported that the MSFHR award enhances opportunities to attract, recruit and supervise trainees. As one senior scholar stated: “Having the award has been very important for freeing up the time I needed to establish this line of work in the lab, and while still a work in progress, it is clear to me that this has increased the trajectory my lab is taking and will significantly increase the skill sets of my graduate students and [post docs] and make them more competitive in the job market.”

Career investigators also reported that having trainees to support their work increases research productivity and grant capacity, and the involvement in training strengthens their own funding applications because they can establish a record of training experience. Supervising and mentoring are mutually beneficial to career investigators and trainees, and the benefits of the MSFHR award to career investigators extends to trainees.

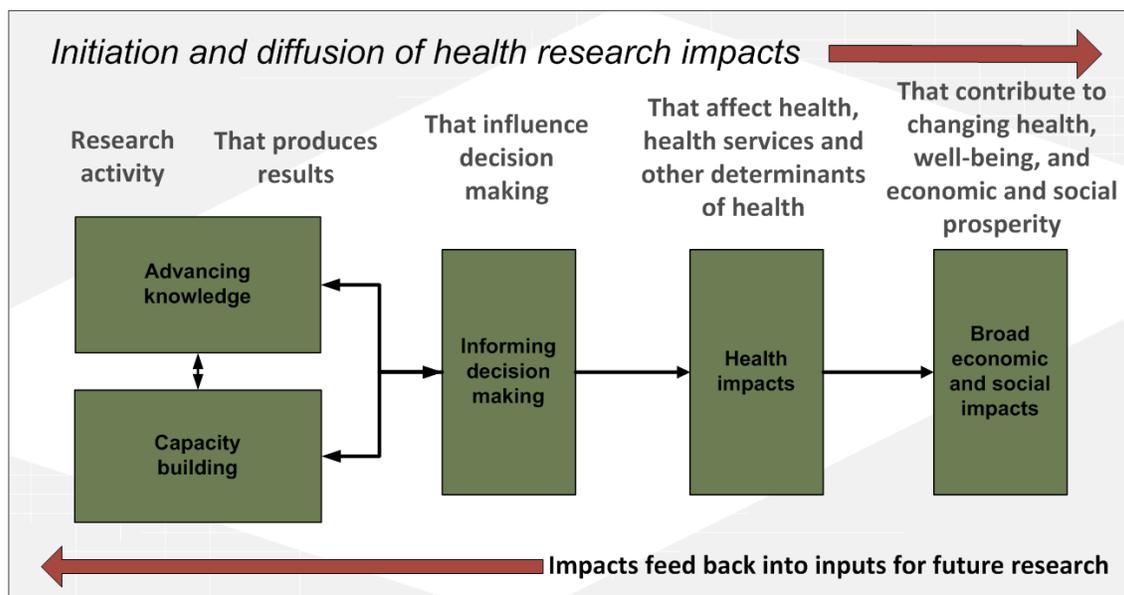
Career investigators reported a total of 1,634 trainees: 39 percent undergraduate, 19 percent masters, 25 percent PhD and 17 percent post-doctoral fellows. Seventy-nine career investigators supervised or co-supervised 160 active master's, PhD and post-doctoral awardees of the MSFHR Research Trainee Program in 2008/09, which represents approximately 15 percent of the reported trainees at those levels. Thirty-seven percent of career investigators also discussed training and mentorship successes, including the educational progression, research experience, graduation, awards and funding achievements of their trainees during the year.

To a lesser degree, career investigators reported involvement in mentoring programs, continuing education, and lectures and tutorials, often aimed at audiences outside of the research community such as health professionals, community members and high school students. These activities build capacity by raising awareness of research and providing training to those not directly involved in research.

## Beyond program goals

While the focus of the Career Investigator Program is to build BC's health research capacity, capacity building in turn fosters other health research outcomes that, in the long term, impact health and prosperity in BC. Equipped with time, resources and skills, MSFHR-funded career investigators contribute to additional outcomes along the progression of health research to impacts (see Figure 1). The following section discusses career investigators' activities that advance knowledge, inform decision making and have the potential to lead to broader health, social and economic impacts.

Figure 1:  
Adaptation of the CAHS framework for health research progression to impacts (CAHS, 2009).



## 2. Advancing knowledge

Advancing knowledge is one of the initial stages to research having a broader impact, and indicates what successes are being achieved and what leadership and innovation is taking place in research. Understanding how MSFHR-funded career investigators contribute to advancing knowledge entails an analysis of their advancements and expertise in research, and the attention and recognition received by MSFHR Career Investigators.

### 2.1 Research advancements and expertise

MSFHR-funded career investigators advance knowledge in their fields by conducting research, which is evident in the findings of their work. Contributions to knowledge can be measured through publishing and knowledge translation (KT) activities that communicate those research findings. Awardees primarily reported peer-reviewed journal articles, with a total of 1,646 completed in the reporting period, but also included books and book chapters; conference and poster presentations; invited talks; lectures; and workshop and meeting presentations.

Further exploration of MSFHR Career Investigators' successes in advancing knowledge during the reporting year focused on the 76 responses to a question about "world firsts." While some related to methodologies, technologies and other aspects of research, the majority reported significant findings. Examples of noteworthy achievement, using impact factors of the related journal articles, include:

- Dr. Fabio Rossi's team discovered a previously unknown type of cell inside muscles that plays a key role in muscle repair. These cells are dormant in normal muscle but spring into action when the muscle is damaged, helping its regeneration or, when it fails, driving the formation of a fibrous scar. This discovery could lead to innovative new treatments to repair injured or scarred muscles. (Joe et al., 2010) (Scholar)
- Using state-of-the-art 3D facial imaging techniques, Dr. Suzanne Lewis' team discovered a previously unrecognized physical difference in the faces of males with autism spectrum disorders (ASDs), which may provide evidence of a connection between brain asymmetry and ASD. Identification of this abnormality could be used to diagnose autism at an earlier stage leading to more effective treatments. (Hammond et al., 2008) (Scholar)
- Bacterial infection in humans is mediated by secretion of molecules by bacteria into the human host cells. Dr. Natalie Strynadka's team discovered a molecular switch that controls a particular secretion system that bacteria use to inject proteins into host cells. Understanding this switch could lead to new ways of preventing a wide array of bacterial infections that affect human populations. (Zarivach et al., 2008) (Senior scholar)
- The human body expends considerable energy during normal activities, much of which is wasted. Dr. Max Donelan's team invented the world's first Biomechanical Energy Harvester, a device that can capture substantial amounts of wasted energy from the human body's activity and convert it to electricity without any significant increase in the effort of the user. This device has great potential for powering artificial limbs and other portable medical devices. (Donelan et al., 2008) (Scholar)
- Using MRI imaging techniques, Dr. Steven Miller's research group was the first to identify abnormal brain development in newborns with heart-birth defects even prior to heart surgery. Findings are similar to those in premature newborns and may indicate abnormal brain development in utero. Information about brain development may reveal when to carry out interventions for congenital heart disease. (Miller et al., 2007) (Scholar)
- Granulosa cell tumours are a type of ovarian cancer for which treatment is often unsuccessful. Using cutting edge genetic techniques, Drs. David Huntsman and Marco Marra and their teams discovered a single mutation in these cancer cells that appears to be a driver of the cancer. Testing for the presence of this mutation in problematic cases of cancer may improve diagnosis and lead to more targeted and successful therapies. (Shah et al., 2009a) (Senior scholars)
- Teams led by Dr. Sam Aparicio and MSFHR-funded senior scholar Dr. Marco Marra accomplished the complete sequencing of the genome of a lobular invasive breast cancer and its metastatic recurrence

nine years later. The majority of mutations in the recurrent cancer were not present in the original tumour, indicating that significant evolution of tumours occur during the natural history of cancer. This has important implications for the treatment of cancer and the prevention of its spread. (Shah et al., 2009b)

In addition to advancing knowledge of the respective research fields, many career investigators are involved in activities that indicate contributions to research expertise. Career investigators reported initiating, developing, organizing, providing and taking leadership roles in initiatives and other research-related resources that benefit the research community. This includes research centres and networks; events such as conferences, symposia, workshops and research days; meetings such as research consultations; and publications about research practices. The resources contribute to the research community by:

- Supporting the development and advancement of research and knowledge, including research priorities, competencies, tools and methods.
- Improving accessibility of research data and information.
- Increasing opportunities to network and partner.

This work not only advances knowledge of research fields and processes, it also supports the capacity of the research community as it enables others to build upon existing expertise and infrastructure.

## 2.2 Recognition

The recognition received by MSFHR-funded career investigators is an indication of the impact of their work and expertise in the research community. Sixty percent of career investigators reported receiving attention in the media during the year, listing print, online, radio and television coverage ranging from local and provincial to national and international sources. The coverage focused primarily on the career investigators' research, but many were asked to provide commentary on issues.

Career investigators also reported invitations to present at prestigious events and institutions; acknowledgement from peers of their leadership in the field and their roles as directors of centres, chairs of committees and conferences, and leaders of groups

and teams; and awards and honours received for specific research or work throughout a career, from both research-specific and more general sources. Examples include receiving Canada's Top 40 Under 40 Award (scholar), serving as spokesperson for a women and heart disease campaign (senior scholar) and receiving recognition from TIME Magazine for one of the Best Inventions of 2008 (scholar).

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**It... provides a feeling of commitment and recognition, which is quite invaluable in providing stature in the local and national research/granting communities. ~Senior scholar**

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These forms of recognition suggest the prominence of the career investigators' research and careers, the expertise in their fields and the value of their knowledge. While career investigators receive this attention as a result of their own activities, about a quarter of researchers indicated that being an MSFHR award recipient enhances awareness and recognition of their work by increasing visibility and exposure, as well as providing credibility and prestige because the award itself is a sign of accomplishment and capability. As one senior scholar stated: "It... provides a feeling of commitment and recognition, which is quite invaluable in providing stature in the local and national research/granting communities."

### 3. Informing decision making

MSFHR-funded career investigators inform decision making by engaging in KT activities directed at user groups in and outside the research community, and make contributions to various areas of health services and policy decision making that may, in the long term, impact health-related areas. This is important in understanding the larger impacts of health research – informing decision making is the step from which research knowledge progresses toward broader outcomes in health, the economy and society (CAHS, 2009). To explore how MSFHR-funded career investigators inform decision making, analysis includes KT activities directed at various user groups, the contributions to areas such as health, government and industry that increase the information and knowledge of those who make decisions, and the initial decision making outcomes that indicate actual changes in health-related areas.

#### 3.1 Research users

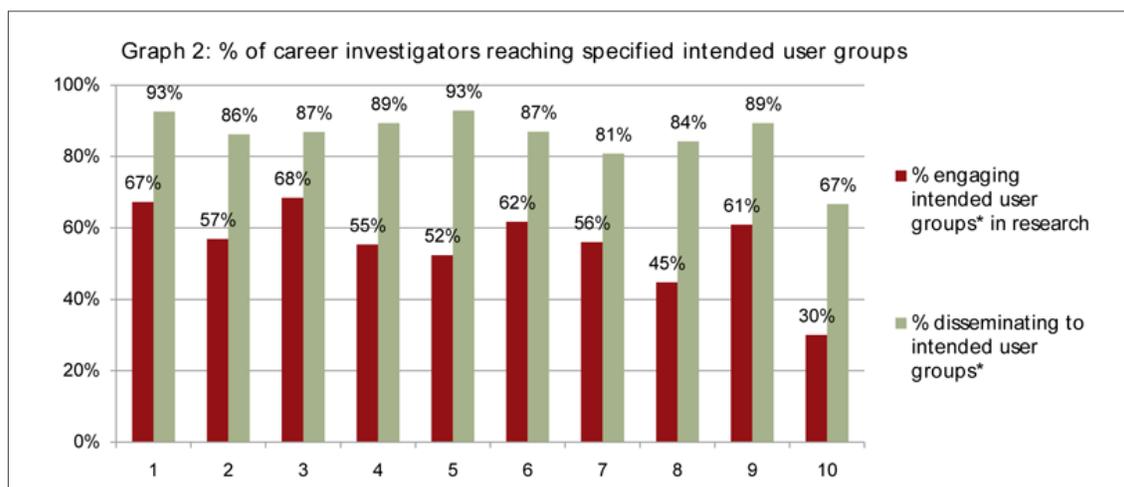
MSFHR-funded career investigators reported a variety of intended users of research other than researchers and academics, which suggests there are many opportunities to inform decision makers of the applicable findings of research activities. Career investigators listed an average of three user groups other than their research and academic peers, with the largest proportions intending their research to benefit health care practitioners (69 percent), followed by consumers of health care (37 percent)

and community-based organizations (31 percent). Other intended user groups include professional organizations (30 percent); industry (29 percent); federal, provincial and municipal representatives (27 percent); health system managers (24 percent); charitable organizations (24 percent); health consumer groups (15 percent) and other groups (4 percent).

#### 3.2 Reaching intended users

While awardees’ research is more applicable to some user groups than others, it is evident that career investigators are engaging intended users in the research process and disseminating to those groups at fairly consistent rates, which suggests that applicable information is reaching relevant audiences. For example, while only 29 percent of career investigators reported health system managers as an intended user group, 68 percent of those career investigators included health system managers in the research process, and 87 percent disseminated to the group. In another example, only 27 percent of career investigators indicated government representatives as a targeted user group of research, but 52 percent of those included representatives in the research process, and 93 percent reported dissemination activity.

On average, career investigators engaged 55 percent of intended users in research and disseminated to 85 percent of intended user groups. Research users were



\*1. Health care practitioners 2. Consumers of research 3. Health system managers 4. Health professional organizations 5. Federal/provincial/municipal representatives 6. Community-based organizations 7. Consumer groups 8. Charitable organizations 9. Industry 10. Other

involved in the research process as co-investigators, in planning and providing direction, in analysis, in reviewing findings and in disseminating results; and career investigators disseminated to research users through presentations, grey literature, online resources, instructional forums, meetings and KT through groups such as charitable and not-for-profit organizations. By engaging with user groups in research, investigators share research knowledge, develop the research capacity of those involved, and build relationships in and make contributions to communities. For example, through community learning centres, one scholar co-developed online health education resources based on community identified health priorities for and with First Nations communities: “Through this engagement we were also able to build community-based research and technological capacity as well as contribute to cultural and language preservation activities.”

Through these research and dissemination activities, researchers share information and open a dialogue with targeted audiences, big and small, who can apply the relevant knowledge to decision making in their own areas of expertise.

### 3.3 Contributions to decision making

Career investigators reported making specific contributions to decision making, indicating the potential for broader outcomes in health, the economy and society. Commonly reported contributions include advising and consulting to decision making bodies, and developing and providing resources to inform decision makers. These contributions were primarily in the area of health, but also include government, education, research and industry.

Career investigators engaged in KT activities to share knowledge in their research fields, but also reported advising and consulting to inform decision making bodies. They reported participating in guideline, steering and advisory committees; involvement in health society and health centre leadership; and involvement in planning forums. Also reported were consultations with and participation in government working groups and advisory panels, such as expert advising for the Standing House of Commons Committee on Health (scholar); the Federal Senate

Committee Hearings on Autism (scholar); and the European Union regarding research directions related to food safety (senior scholar). Career investigators contributed to research and education decision making by participating in university and department committees deciding on hiring, promotions, outreach activities and awards; in journal editorship and review; and in research-related committees, including grant reviews, advisory boards and student advisory committees.

Career investigators develop and provide resources to advance knowledge among their research peers, as discussed previously, and also contribute resources to inform and assist research- and health-related decision makers. Nine career investigators reported writing 21 clinical guidelines during the reporting period; of those, 17 were written by clinical researchers and four by health services researchers. Eighteen career investigators wrote 42 government reports in the reporting period; 28 were written by population health researchers, eight by health services researchers, five by clinical researchers and one by a biomedical researcher.

Other resources include tools such as a community report on a cost model for asthma care in BC (distinguished scholar); targeted research papers on food security “to help frame policy and communicate strategy with health authorities, government and consumers” (senior scholar); a policy document on organ trafficking (scholar); and a cannabis commission report, which “was presented in the British House of Lords in October 2008 and has since been presented on... national and international levels to lawmakers, policymakers and researchers” (senior scholar).

### 3.4 Initial health decision making outcomes

While 56 percent of career investigators reported specific contributions to health decision making through sharing expertise and resources, a small number of career investigators (12 percent overall) indicated that changes resulted from their efforts – in policies, programs, care delivery, interventions and resource allocation. Of the 22 career investigators reporting application of their research, 10 were health services researchers, seven were clinical researchers and five were population health researchers.

Examples include:

- Changes in policy around prostitution and the treatment of marginalized women as a result of cohort studies of women at risk. (Senior scholar)
- Formal implementation of a risk assessment and management model in numerous Canadian, US, European, Asian and Australasian jurisdictions, which is intended to guide decision makers in identifying persons who are at a higher or lower risk for violence-related outcomes, and the corresponding interventions. (Scholar)
- Significant philosophical and programmatic shifts in a hospital program leading to a number of innovative changes to the way care is delivered, including the development of new clinical interventions. (Senior scholar)
- Better counselling of physicians to caregivers regarding neurodevelopmental prognosis as a result of studies that identified the most informative brain imaging modalities to be applied in clinical practice. (Scholar)

It takes time for research to mature to the point of having direct applicability to decision makers, and there are many factors influencing health and health-related decisions, but the important step to encouraging application and use of research knowledge is its translation to and exchange with users who have the opportunity to apply that information. The Career Investigator Program enhances those opportunities to share expertise and engage with decision makers who can impact health-related areas. As one scholar stated: “This award allows the [career] investigator greater opportunities to establish collaborative relationships with other researchers, but more importantly, with practitioners and policy makers, making it more likely that... policy and practice-relevant research projects will be identified and pursued.”

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**This award allows the [career] investigator greater opportunities to establish collaborative relationships with other researchers, but more importantly, with practitioners and policy makers, making it more likely that... policy and practice-relevant research projects will be identified and pursued. ~Scholar**

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## 4. Far-reaching potential

The value of health research relies heavily on the assumption that it will have widespread, long-term benefits and will result in changes that improve the status of individuals, services and the population. As this report covers a one-year period of research activity, measuring long-term or more extensive impacts, including those in health, the economy and society, is outside the scope of analysis. However, while the following sections do not include measurable impacts resulting from the work of MSFHR-funded career investigators, we can discuss how initial contributions suggest potential in these areas.

### 4.1 Health impacts

Health impacts refer to the changes in health and health-related areas resulting from research application, including individual health, health services and broader determinants of health (CAHS, 2009). Nine of the 22 career investigators who reported research application – the initial health decision making outcomes discussed in section 3.4 – also mentioned measurable changes and improved health outcomes. However, quantification of the actual impact on health resulting from research application in policy, practice and other areas is likely outside the focus of most career investigators' work. While measurable impact may be unknown, the findings of research and the initial research-informed changes that are already occurring in health-related areas suggest that further opportunities exist for research to inform and impact health.

### 4.2 Broad economic and social impacts

Economic and social impacts refer to the broad outcomes of research that benefit the economy and society, such as the creation of jobs, cost savings to the health system, and the value of products and spin-off companies. This is an area of focus when trying to capture the return on investment in monetary measures, as impact can include the economic benefits of research being conducted, as well as economic benefits resulting from the health impacts of research (CAHS, 2009). Different types of analysis are required to understand the monetary

gains or broad changes to the economy and society in BC as a result of MSFHR-funded research, but it is possible to comment on some economic contributions of career investigator awardees that indicate opportunities for broader impact.

One third of MSFHR-funded career investigators reported contributions to industry that have the potential to result in economic outcomes. Ten career investigators reported 20 patents; 18 (90 percent) of those were granted to biomedical researchers, with the remaining two granted to a clinical researcher. Eleven technology transfer agreements were reported by nine investigators; seven of those were reported by biomedical researchers, and the other four reported by clinical researchers. Some of the opportunities reported by awardees related to research contracts and agreements with industry, while others discussed the development of products, including screening tools, imaging technology and drug development. Three career investigators reported that businesses had been established from the biomedical, clinical and health services research pillars.

## 5. Conclusions

The MSFHR Career Investigator Program directly builds health research capacity in the province by supporting researchers' productivity, environment and development. Findings indicate that:

- Enabling career investigators to focus on research-related activities increases opportunities to conduct research, publish, collaborate and write grants, which benefits productivity and facilitates funding successes.
- Additional establishment funding assists in the development of a viable, productive research environment by providing additional funds for staff, infrastructure and other start-up costs.
- Protected time and a productive environment support training and mentorship of students and others who are the future leaders of health research.

By protecting researchers' time and facilitating their productivity, a strong research environment and training, the Career Investigator Program supports the development of career investigators in BC and builds the province's health research capacity.

Health research capacity — the people, infrastructure and environment to support research — contributes to career investigators' ability to advance knowledge, inform decision making, and progress findings toward broader outcomes in health, the economy and society. As our analysis has shown, capacity building also contributes to other outcomes of research. Career investigators develop and progress expertise in health-related fields by conducting research and inform decision making by engaging with and disseminating to users of research, and those initial contributions to policy, programs and other areas may, over time, have impact in broader health, economic and social areas.

Findings indicate that the Career Investigator Program builds capacity and that MSFHR-funded career investigators are contributing to other areas along the progression of health research to impact, especially in advancing knowledge and informing decision making. Broader impacts in health, the economy and society are unknown, but initial contributions suggest the potential for research to be applied and lead to impact in these areas in the future. These long-term results will be explored in upcoming analyses.

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**In each year of my MSFHR Scholar award I have been recruited to other institutions in Canada and internationally. In each instance, the MSFHR Scholar award was a major reason for staying in BC. My research is completely transferrable to other regions; therefore, additional financial, personal and operating support have been very important in my decision to stay in BC. ~Scholar**

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# Appendices

## Appendix A — The Career Investigator Program

Eligible researchers must hold a PhD (or equivalent), DDS, DVM, DPharm or MD and be sponsored by a BC university or research institute. Two categories of researchers currently qualify for funding: scholars are those career investigators who have less than five years of independent research experience in academic, industry and government setting; and senior scholars are those with less than 10 years of independent research experience. Distinguished scholars were required to have more than 10 years of independent research experience, although funding for that cohort of career investigators was discontinued in 2004.

The establishment grant is a one-time, non-renewable grant open to researchers who are: (1) new recruits to a BC university/research institute, or (2) career investigators with less than 24 months of independent research experience, or (3) career investigators whose first full-time academic appointment with health research as the primary focus is within 24 months of the competition date, or (4) BC career investigators who are changing research locations within three months prior to or three months after the competition date. Recipients receive base funding, and matching funding for those base establishment grant recipients who are successful at acquiring additional cash contributions from their host institution.

For more information on the Career Investigator Program, see [www.msfhr.org/funding/individual\\_awards/career\\_investigator](http://www.msfhr.org/funding/individual_awards/career_investigator)

## Appendix B — About the analysis

### *Methods*

Award recipients report retrospective, self-reported data about activities, outputs and outcomes annually throughout the award term. Annual reports are developed to align with the PM&E framework and fulfill multiple purposes.

The data set includes annual reports from 177 active career investigator award recipients in 2008/09, incorporating both qualitative and quantitative data. The 2008/09 reporting cycle was a transition year as the annual reports were revised to align with the newly-developed PM&E framework and implemented mid-cycle. As a result, 20 career investigators (11 percent) completed reports that differed in format and content. The previous annual report was primarily open ended so the majority of quantitative findings represent 157 of the 177 career investigators, or 89 percent of the group. The qualitative data represent 100 percent of career investigators as both reports asked about research-related activities and could be coded accordingly.

Quantitative data was analyzed to explore means, medians, ranges and trends, and make comparisons primarily by pillar and funding year. Qualitative data were inputted into NVivo 8 and themed according to the outcome areas of the PM&E framework. Quantification of qualitative data is provided when possible, especially those themes representing a smaller percentage of career investigators.

### *The PM&E framework*

In our commitment to accountability, quality improvement and demonstrating results, MSFHR applies a performance measurement and evaluation (PM&E) framework to ensure coordinated evaluation across the Foundation. The PM&E framework outlines broad outcome areas that correspond to three key performance areas:

- Organizational effectiveness: The internal operations of MSFHR
- Impact of health research funding: Results of funding programs and initiatives
- Value-add of MSFHR: The unique contribution of the Foundation to the research community and other stakeholders

The framework was developed from the literature and existing models, and is linked to MSFHR's *Strategic Direction: 2009 – 2015* (MSFHR, 2009b). For more information, visit [www.mfshr.org/about/monitoring\\_evaluation](http://www.mfshr.org/about/monitoring_evaluation)

### *Analysis limitations*

There are many commonly cited issues that make evaluating health research and research funding impact difficult, such as: the lag time of research means that it can take many years before any impact is realized and can be measured; the chain of impact may not obviously connect a certain effect to a specific cause, such as one particular research finding or research grant; the research community is a vibrant and interconnected network of individuals and groups, making it difficult to associate impact to one; and for research to progress along the path to impact, a variety of non-research and indirect factors are required (for examples, see Bernstein, Hicks, Borbey & Campbell, 2006; CHSRF, 2008; Deloitte – Insight Economics, 2007; Frank & Nason, 2009). Issues most relevant to this analysis include:

- MSFHR transitioned to an outcome analysis framework and new reporting templates in 2008/09. This transition created inconsistencies: some career investigators submitted reports on the former templates; career investigators in year three were asked for the cumulative three years of information, while all others were asked for one year of activities; and career investigators may not have been collecting information about new questions. These issues are noted in the analysis where applicable.
- Quality and availability issues surrounding self-reported data: relying on researchers to follow the progression of research activities, collect the applicable data and provide the information.
- It is difficult to measure research outcomes in health, policy, industry, etc. when measurement and analysis is of one year of research activities.
- For those researchers who are engaging with user groups beyond peer researchers and academics, the results of KT activities (i.e. decisions made on health policy) are often unknown and/or out of scope of the researchers' involvement. There are many factors at play in influencing decisions, and it is difficult to attribute downstream changes to some KT activities.
- There were no specific benchmarks or indicators defined when the program was originally launched, so it is difficult to measure expectations of awardees and/or the program.

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