

Report in Focus

STRENGTHENING CANADA'S RESEARCH CAPACITY: THE GENDER DIMENSION

In 1912, when Carrie Derick was appointed full professor at McGill University in Comparative Morphology and Genetics, she became the first female professor in Canada. She also joined several pioneering Canadian women who earned their places in university campuses across Canada. Others include Emma Baker and Clara Benson, two of the first Canadian women to earn their PhDs, in psychology and biochemistry, respectively.

At that time, women faced obstacles in many facets of society, including politics, law, medicine, and business. However, this report, *Strengthening Canada's Research Capacity: The Gender Dimension*, focuses on the current challenges faced by women in academia, specifically those in university research positions.

In the past 100 years, the university landscape has changed dramatically. Initially denied entry to academic institutions, calls for the admission of women began in the 1850s. By the 1960s, women were a small fraction of the student body. By the late 1980s there were more female than male full-time undergraduates, and women have recently surpassed men in full-time graduate enrolment (see Figure 1).

Although women have outnumbered men in the general student population for over 20 years, women are underrepresented in academic research careers overall – especially as full professors, senior administrators, and Canada Research Chairholders.

In fact, the higher one looks in university ranks, the lower the percentage of women in comparison to men. This trend is not unique to Canada. In general, the situation is similar to that found in other economically-advanced nations, including the U.S. and to various countries in the European Union.

Despite their historic exclusion and current underrepresentation, Canadian women's research contributions have been instrumental in developing Canada's social and scientific knowledge base. In addition to educating millions of students, women researchers are working to address some of the major issues Canada faces in the 21st century, such as climate change, demographic shifts, and the health of populations.

After the notable absence of women in the 2008 Canada Excellence Research Chair (CERC) program, the Minister of Industry, in March 2010, struck an ad-hoc Panel to examine the program's selection process. Based on the Panel's finding that the lack of female representation was not due to active choices made during the CERC selection process, it was suggested that an assessment of gender equity within the wider university context and talent pool be undertaken by a third-party body.

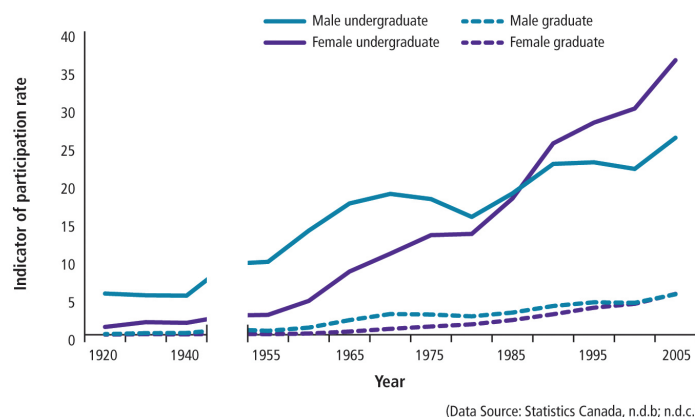


Figure 1. Growth in University Enrolment since the 1920s

The total number of students, as well as the proportion of women, have been growing dramatically in Canadian universities. In the 1960s, women were a small fraction of the student body. By 1989, there were more female than male full-time undergraduates, and women have recently surpassed men in full-time graduate enrolment. Graduate enrolment has grown about twice as fast as undergraduate enrolment. The number of male and female students has been corrected to the total number of male and female Canadians from 20 to 24 years old.



Responding to the Question

In late 2010, the Minister of Industry posed the following question to the Council of Canadian Academies:

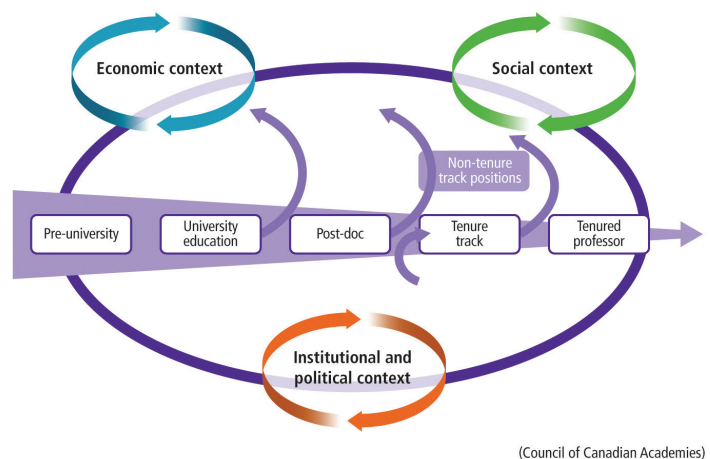
What policies and what societal, cultural, and institutional, economic, and/or other relevant factors influence the career trajectory of women researchers in Canadian universities and underlie gender disparities observed in Canadian university researcher's statistical profile, by discipline area, rank, duty/position/stature, salary, tenure, research funding and/or any other relevant indicators (as determined by the expert panel)?

In response, the Council appointed a multidisciplinary panel of 15 experts from Canada, the United Kingdom, and the European Union, chaired by Dr. Lorna Marsden, President emerita and Professor at York University. To answer the question, the Panel used available data to develop a baseline of information about women researchers. They developed an overview of the current state of women in university research careers by rank and discipline, and provided a preliminary analysis of trends through synthetic cohort studies (that estimate the career paths of women researchers).

This assessment is based on a review of the academic literature, an analysis of data sets and statistics, interviews with representatives from industry, academia, and the not-for-profit sector, personal testimony from women researchers, and the Panel's expertise.

A life course perspective (see Figure 2) provides a framework for this assessment. It enabled the Panel to consider the factors that may affect research trajectories from the early years, through elementary, junior, and senior high school; the university experience; and in different career stages. Economic, social, institutional and political contexts influence individual choices, including career trajectories.

It should be noted the Panel encountered challenges with regards to accessing particular data. For example, there was a shortage of comprehensive and longitudinal data from the Canadian government, the three granting councils, Canadian universities, and the private sector. In addition, a lack of diversity data and gender disaggregated data regarding the postdoctoral research period, as well as restrictions on some existing data affected the Panel's analysis. Despite the lack of data, the Panel was able to address the charge.



(Council of Canadian Academies)

Figure 2. The University Researcher: A Life Course Perspective

This figure depicts the career path of a typical university researcher in Canada, as well as the external context that can influence her or his trajectory. Note that, while the source population at the pre-university level is large, the bar narrows as we look further down the life course. Arrows, pointing away from the research career path, symbolize the loss of potential candidates who change trajectories due to different factors encountered along the journey to becoming a tenured professor.

“The benefits of a diverse research community extend far beyond the walls of academia. A pool of Canada’s top thinkers and researchers is needed to help secure and build Canada’s economic edge in the knowledge economy. The broader the pool is from which to draw, the more perspectives, experiences, and ideas will be brought to the creative process.”

– Lorna R. Marsden, Chair of the Expert Panel on Women in University Research

Key Findings

THE STATISTICAL PROFILE OF WOMEN IN UNIVERSITY RESEARCH IN CANADA

In order to respond to the central charge, the Panel developed a baseline of information regarding the statistical profile of women researchers in Canada. Major findings in terms of the statistical profile of women in university research in Canada include:

In general, the Canadian profile is similar to that of other economically advanced nations. The profile of women’s representation in Canadian universities is strikingly similar to that found in other economically-advanced nations, including the U.S., and to the average profile across the EU (see Figure 3). As students, women tend to outnumber men. Their proportions equal off at the doctoral degree level, after which men outnumber women at every increasing academic rank. While these similarities at the aggregate level are striking, international variation in the percentage of women *within ranks* indicates that some nations are closer to achieving gender parity in research than others.

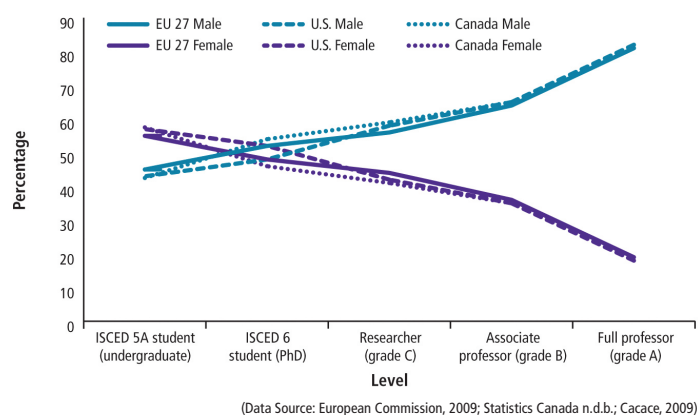


Figure 3. Canada Compared to the EU and the U.S.: Similar Profiles

This figure depicts the proportion of female and male students and academic staff in a typical academic career in Canada, the U.S., and the EU, 2007.

Women’s progress in Canadian universities is uneven by discipline and rank. In terms of discipline, women faculty members in Canada are most represented in humanities, social sciences and education (HSE) (39.6 per cent) and life sciences (LS) (35.0 per cent). Their numbers are lowest in physical sciences, computer science, engineering, and mathematics (PCEM) (14.8 per cent). Despite gains over the past four decades, there is a great distance to go to approach equity. This is especially true in PCEM, where women enrol in PCEM bachelor’s programs in significantly lower proportions (24.0 per cent) than they do in HSE (61.6 per cent) or LS (69.2 per cent). Clearly, the factors that affect the career trajectories of women researchers differ across disciplines. Progress cannot be tracked by aggregate numbers alone—it is essential to consider women’s representation by discipline, rank, and job status (permanent versus casual).

The higher the rank, the lower the percentage of women in comparison to men. Despite increased participation in undergraduate and graduate degree programs, women are still underrepresented in senior academic and research positions, including administration. As of 2008-2009 women held 32.6 per cent of all faculty positions in Canada, of which approximately 42.6 per cent are assistant professors, 36.2 per cent are associate professors, and 21.7 per cent are full professors (Table 1). On the other hand, synthetic cohort data from the past 40 years indicate that the general situation is improving—at a rate roughly in line with the growth in the proportion of female PhD graduates. While this is encouraging, the data indicate that time alone will probably not be enough to balance the proportion of men and women at the highest levels of academia.

MAIN FACTORS THAT AFFECT THE CAREER TRAJECTORIES OF WOMEN RESEARCHERS IN CANADA:

The Panel concluded that based on the available evidence, the policies, factors, and issues (influences) that are listed below emerge as those that are likely to exert the greatest effects on the career trajectories of women researchers.

Canada could be doing more to fulfill its national and international commitments to women's rights. In addition to upholding the Canadian value of equality, this would bolster Canada's capacity to engage a diverse pool of talented researchers.

The pathway to becoming a researcher is laid before university. Socialization, schemas, and stereotypes define social roles and expectations and can contribute to the lack of encouragement for girls to forge non-traditional paths. For example, female students consistently report lower levels of self-confidence in the physical sciences, computer science, engineering and mathematics (PCEM) disciplines than do males, despite studies that indicate the achievement gap in math is closing.

Young Canadians lack sufficient knowledge about educational requirements for future careers, as well as a clear understanding of what PCEM careers entail. Evidence indicates that there is a disconnect between the educational choices some students make at the secondary level and their post-secondary or career goals, as evidenced by the relatively

INTERNATIONAL INSTITUTIONAL RESPONSE: Child care services at the University of Konstanz, Germany

In 2007, the University of Konstanz initiated a program called *Science Goes Family* that assists the paid work-family life balance for both men and women researchers. The program consists of four modules, with options such as flexible child care at the university; holiday care for school children; flexible working conditions for parents; grants for travel expenses for accompanying children, partners and babysitters at conferences; stipends for doctoral and post-doctoral students with children; and information sessions on how to apply for child benefits and institutional support (U of K, 2011).

Since 2007, the percentage of women who earned a doctoral degree from the university increased from 32 to 36 per cent, and the proportion of female junior professors increased from 12 to 30 per cent. Forty-seven per cent of the University of Konstanz's employees are women, as are 36 per cent of staff engaged in research and development. In addition, 36 per cent of the top positions at this university are held by women (GENDERA, 2010).

small pool of female students in PCEM. Negative perceptions of some research-based careers, a poor understanding of what these careers entail, and a lack of role models who encourage engagement with science and math appear to be factors behind this finding.

Table 1. Representation of Women and Academic Staff by Seniority and Field of Study in Canada, 2008-2009

	Percentage of women as full professor	Percentage of women as associate professor	Percentage of women as assistant professor	Percentage of women in lecturer/instructor position and other/not-ranked	All	Total number of researchers (women and men)
Life sciences	23.4	41.5	46.1	60.0	35.0	7,089
Humanities, social sciences and education	28.5	42.6	48.0	51.1	39.6	18,390
Physical sciences, computer science, engineering and mathematics	9.0	15.5	23.9	29.1	14.8	8,235
Other subjects or not reported	18.2	30.8	36.7	0.0	32.0	225
All subjects	21.7	36.2	42.6	44.9	32.6	33,939
Total number of researchers (women and men)	12,657	12,120	8,394	768	33,939	

(Data Source: Statistics Canada, n.d.d.)

The paucity of women in leadership positions makes it difficult for other women to envision themselves as leaders. The lack of women in leadership positions can also make it difficult for women to become leaders. The higher in the ranks one looks, the fewer women are present in comparison to men, for instance in positions such as full professors and presidents of universities. Mentorship and sponsorship initiatives would provide women with role models who defy gendered expectations and offer advice and support.

Institutional practices can negatively influence the career trajectories of women researchers. The transition of the university from a traditional, elite, male-dominated institution, to one that welcomed women and minorities, has required adjustments in policies, practices, attitudes, and leadership. Yet "chilly climates" (where the combined affects of seemingly small inequities can create a negative atmosphere for learning, for teaching, and for fulfilling professional roles on campus), including the cumulative effects of stereotyping, recruitment, and evaluation biases still remain challenges for some academic women.

For women, a small but persistent university salary gap can have significant financial effects over the long term. This gap cannot be fully explained by age or rank, and has changed little during recent years. Even at the full professor level, women make 95 per cent of what men do. Over years of work, this disparity contributes to a substantial pay difference between women and men faculty members and continues to affect income through pension payments after retirement.

The paid work-family life balance is a particular challenge for women researchers with families. Several studies indicate that women in academia spend more time on child care and other unpaid domestic labour than do men. Extra investments in family responsibilities can translate into challenges for women who need to build their professional profile through conferences and networking events outside of regular working hours. In addition, the lockstep tenure and promotion process lacks the exit and re-entry points that are necessary for those who wish to leave academia for periods of time. More family-friendly options and more flexible models of career progression are important considerations for a diversifying workforce.

INTERNATIONAL INSTITUTIONAL RESPONSE: ADVANCE program at the University of Michigan

Funded by the U.S. National Science Foundation, the ADVANCE program aims to improve the campus environment for faculty in four areas—equitable recruitment, retention, positive departmental climate, and development of leadership skills. Before the program was implemented in 2001-2002, 13 per cent of new tenure-track hires in science and engineering were women. This increased to 29 per cent from 2003-2010. In addition, 14 women scientists and engineers have been appointed as dean or departmental chair.

CONCLUSION

As countries around the world compete to become innovation leaders, societies are increasing their reliance on skilled researchers to find solutions for today's challenges and to educate the minds that will solve the challenges of tomorrow. In the knowledge economy, a talent pool of Canada's top thinkers and researchers is needed to help secure and build Canada's economic edge. The wider the pool is from which to draw, the more perspectives, experiences and ideas will be brought to the creative process. The benefits of a diverse research community extend far beyond the walls of universities. Arguments for fully including women in research careers range from addressing skills shortages and increasing innovation potential by accessing wider talent pools, to greater market development, stronger financial performance, better returns on human resource investments, and developing a better point from which to compete in the intensifying global talent race. These contributions are in addition to the basic, or knowledge discovery research that is one of the main duties of academic researchers. The Expert Panel hopes this report will serve as an important tool in the development of new policies and programs that will further Canadian research and the role of women within this domain.

Inside the Full Report

- Historical and contemporary insights into Canadian women's research contributions.
- A statistical profile of women in academia and a secondary analysis of Canada Research Chair program data.
- A life course approach to the charge, encompassing a range of factors that affect the educational and career trajectories of girls and women at different stages of life.
- Analysis of the paid work-family life balance and the nature of university research positions.
- Examples of national and international illustrative practices to recruit, retain, and promote women researchers.



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The Expert Panel on Women
in University Research



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Science Advisor to the Public Interest

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This Report in Focus was prepared by the Council based on the Report of the Expert Panel on Women in University Research.



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