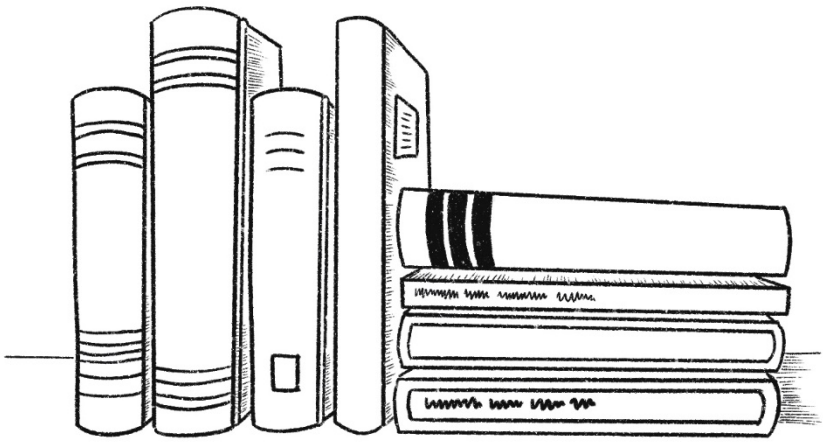

Women's Career Transitions and the Leaky Pipeline in Ontario Universities

A Women in Academia Research Brief

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Introduction

For decades, women have composed the majority of undergraduate students, but have been underrepresented in doctoral programs and in faculty ranks. Observers have thought that over time, as women advanced through the academic 'pipeline' — progressing through undergraduate and graduate programs and junior faculty positions — gender disparities would rapidly decrease in the senior faculty ranks. Recent progress, however, has been very slow, with limited hope for gains in the immediate future (see Gendered Trends in Ontario University Faculty Employment). The lack of progress has led many to suggest that there are 'leaks' in the academic pipeline — in other words, there are obstacles along the academic career pathway that disproportionally affect women, stalling their progress or causing them to drop out.

In this brief, we examine changes in the representation of women at different stages of their academic careers, from undergraduate study through the full professor rank. Our goal is to better understand where women currently and historically have discontinued their progress, or where the 'academic pipeline' is 'leaking.'

After completing undergraduate studies, women become less likely to persist in academia than men. Overall, in 2017, women made up 57.3% of all postsecondary graduates[1] across Canada but accounted for only 45.6% of graduates of doctoral programs (Statistics Canada, 2020a). Given that women represent the majority of master's degree students since 1997 (Turcotte, 2011), it appears that transitions around the doctoral level may be a key place where women are leaving the pipeline.[2]

We use two data sources in this brief. The first is the Postsecondary Student Information System (PSIS), a Canada-wide survey that contains a variety of information related to graduation and enrolment for postsecondary students, including the number of enrolled university students (Statistics Canada, 2021a) and university graduates (Statistics Canada, 2021b) by credential type. The data is available from the 1992-93 academic year through 2018-19 and includes information on gender, field of study, province and program type.[3] We merge this data with the University and College Academic Staff Survey – Full-time Staff (FT-UCASS), which contains information on full-time teaching staff at universities in Canada. For this brief, we define faculty to include full-time teachers, full-time research staff that have an academic rank and salary scale similar to teaching staff and visiting full-time academic staff in faculties only. The specific table we use consists of the number of professors by gender, academic rank, subject taught[4] and province.[5] Due to the disruption in FT-UCASS data collection between 2011-12 and 2015-16, readers should interpret results from these years with caution.[6]

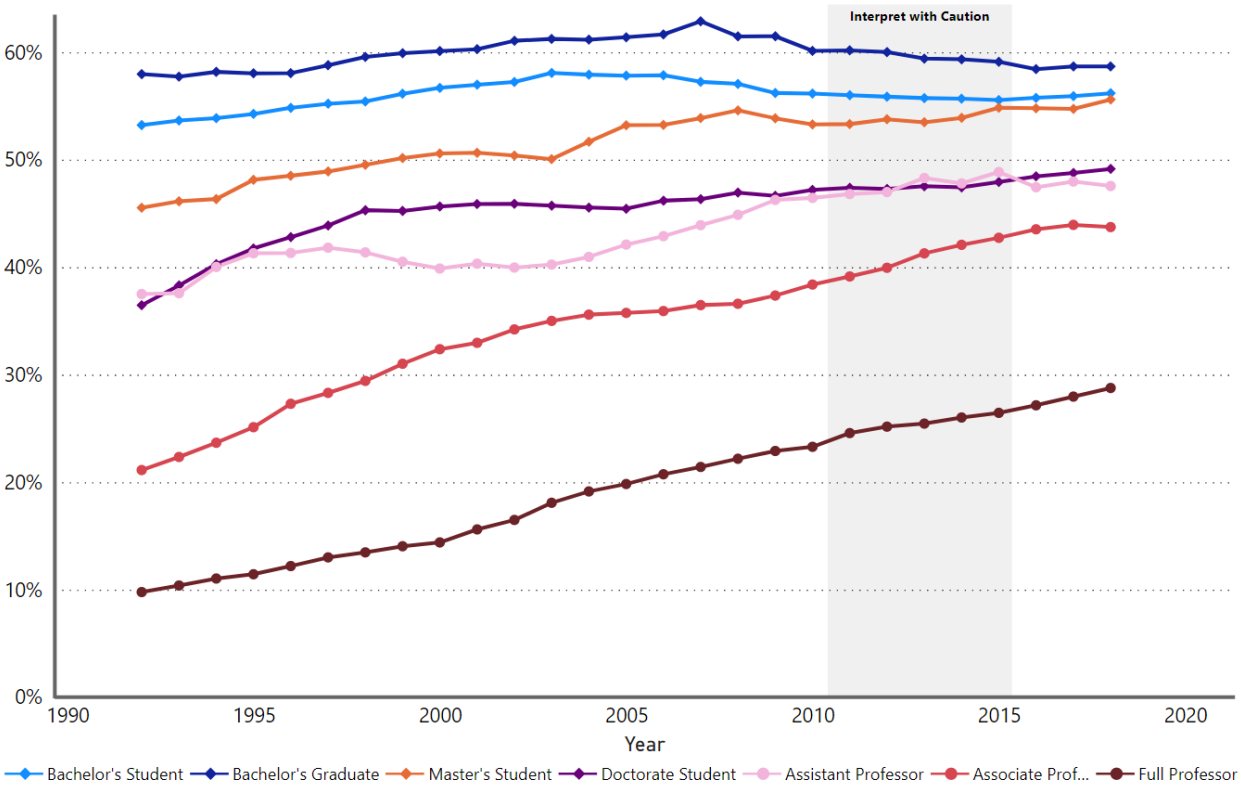
[1] This includes all public colleges and universities in Canada.
[2] However, it should be noted that disparities in graduate programs are in part due to sharply lower percentages of women international students (Statistics Canada, 2020b)
[3] For this brief, we examine only students enrolled in, or graduated from, undergraduate programs and graduate programs (second and third cycle, or master's and PhD programs).
[4] We use the "primary grouping" variant of Classification of Instructional Program (CIP) codes, which consists of 12 groups. We do not show responses classified as "Other" or "Not available" due to small Ns.
[5] We use data in this brief from a custom Statistics Canada tabulation. Counts are probabilistically rounded to multiples of 3 except those less than 3, which are suppressed by Statistics Canada, and are rounded down to 0 for this analysis. As a result, data presented here may not exactly match that from other sources. Also note that all three-year moving averages and forecasted values presented in the brief are calculated using Microsoft Power BI software.
[6] During this time, there are particularly large amounts of absent data for the Subject Taught variable; consequently, results for these years may be inaccurate in some cases. In the visualizations to follow, affected time periods are labeled and shaded grey.

Throughout this brief, we refer to the program type of students and graduates and the rank of professors collectively as 'academic level.'

Presenting the Data

We present data in this brief using visualizations with key highlights outlined below.

Figure 1: Percentage of Faculty and Students with Selected Gender by Academic Level since 1992-93



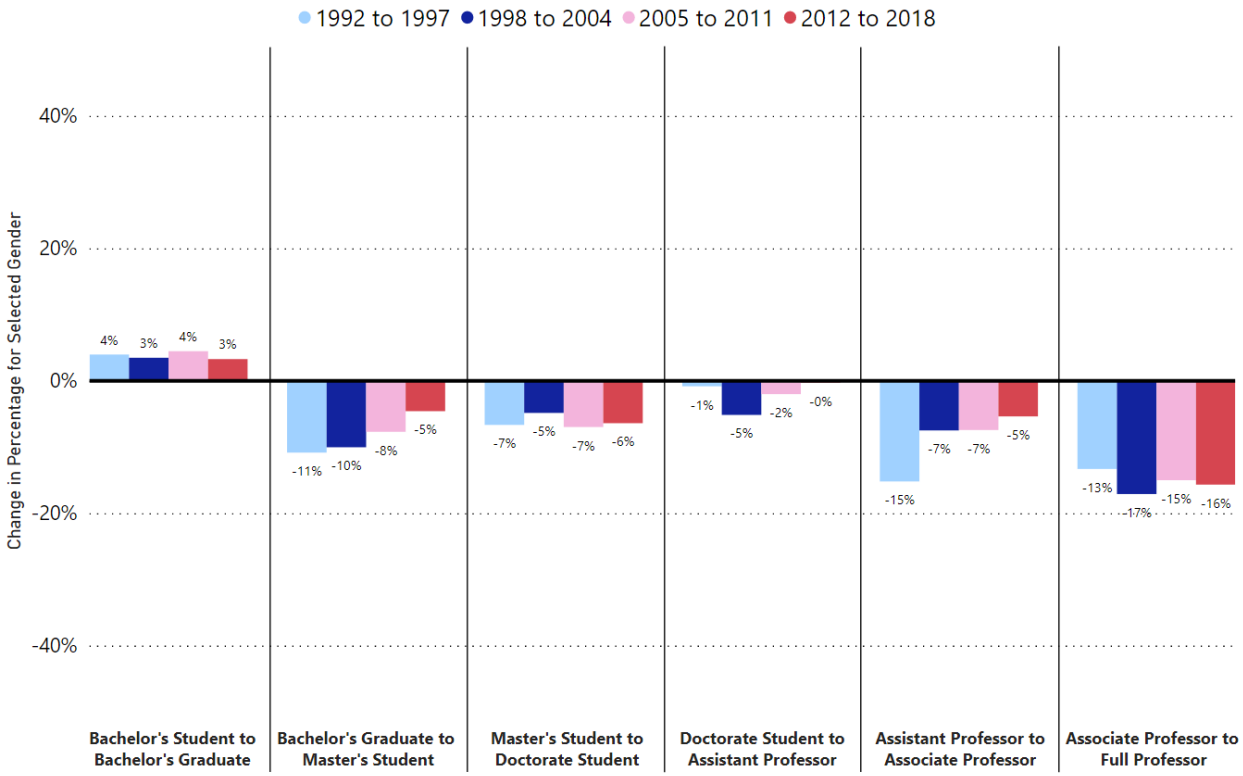
- Women have outnumbered men among bachelor's students and graduates since at least 1992-93, when enrolment data is first available.
- The representation of women in more advanced levels of study and in faculty ranks has increased over time. Women enrolled in master's programs began outnumbering men starting in 1999-00 and represented nearly 56% of master's students in 2018-19. For women doctorate students, representation increased rapidly in the 1990s, but then slowed, and stood at 49% in 2018-19.
- Women assistant professors are now nearly equal in number to men, representing 48% of assistant professors in 2018-19. Women have also increased steadily in the associate and full professor ranks, but are still substantially outnumbered by men; women represent 44% and just 29%, respectively.
- The percentage of women in science, technology, engineering and mathematics (STEM)[7] disciplines is generally lower than in other disciplines. For example, in 2018-19, 35% of students enrolled in STEM-related doctoral programs were women, compared to 49% across all fields. For undergraduate students in STEM-related fields, women's

[7] More specifically, the disciplines examined are: "architecture, engineering, and related technologies," "mathematics, computer and information sciences" and "physical and life sciences, and technologies."

prevalence grew substantially through the 1990s before leveling out near 40%, where it remains.

- For fields that have traditionally been viewed as feminine, such as health and education, women vastly outnumber men as students, comprising roughly 70% of bachelor's, master's and doctorate students. Women faculty in these fields have also increased over time, with women making up nearly 70% of assistant professors, 60% of associate professors and 50% of full professors.

Figure 2: Change in Percentage of Women/Men Between Academic Levels by Time Period

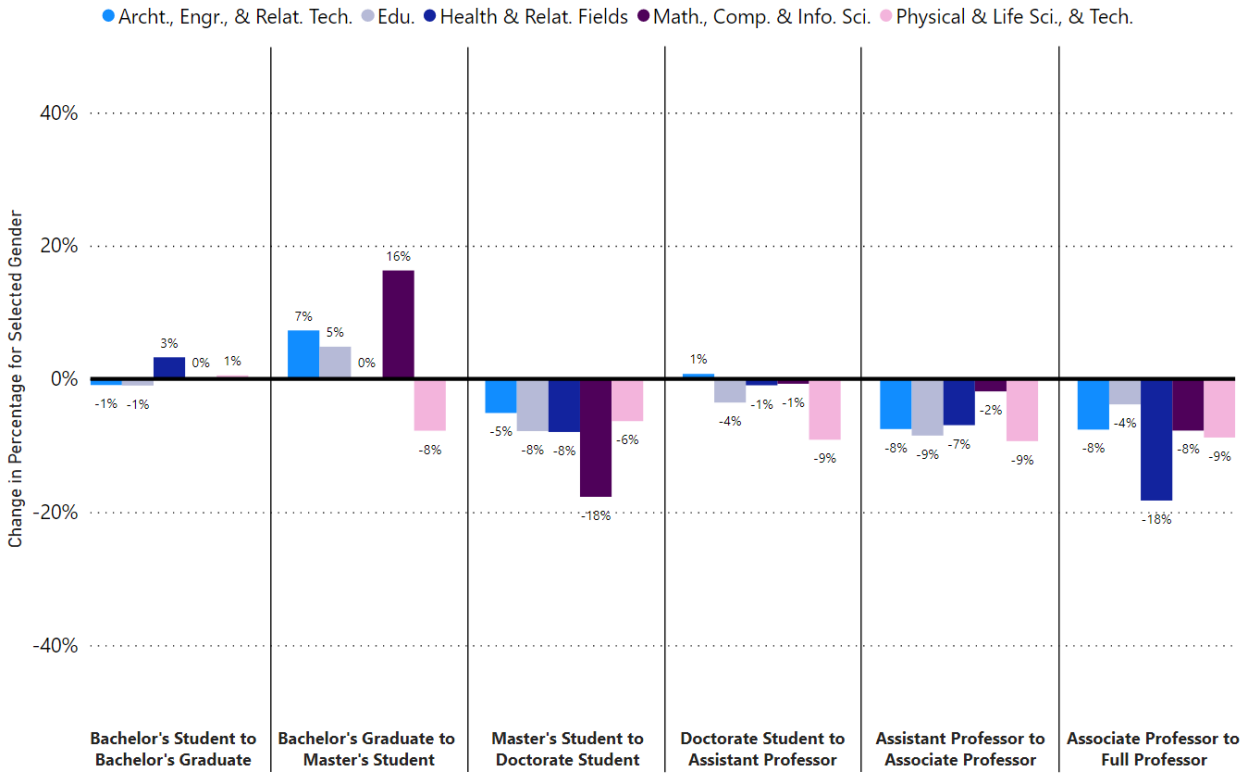


Note: We have organized the graph so that the first 'step' in an academic career, from a bachelor's student to a bachelor's graduate, is on the left, and each subsequent step is to the right; the final step is the promotion from associate to full professor. Positive percentages indicate that more women (or men, depending on the option selected) are in the next level than the previous one.

- Across all disciplines, the only positive increase between adjacent levels for women is between bachelor's students and bachelor's graduates. The rest of the percentages are negative, indicating that there are fewer women in the subsequent, more advanced levels.
- One of the largest drops between adjacent levels is for women between bachelor's graduates and master's students. In the mid-1990s (1992-93 to 1997-98), there were 11% fewer women master's students than bachelor's graduates. This difference has decreased over time; recently, 5% fewer women continue to master's programs relative to men.
- There is no difference in the percentage of women between doctoral students and assistant professors for the most recent time period. For previous time periods, the difference was slightly negative, indicating that fewer women were continuing to tenure-track positions than men.
- The changes from assistant to associate professor, and from associate to full professor, are also negative. There are fewer women associate professors than assistant professors and even fewer full professors. However, because associate and full professor ranks are often held for long periods of time, differences will change slowly, even if more women than men are entering these ranks.

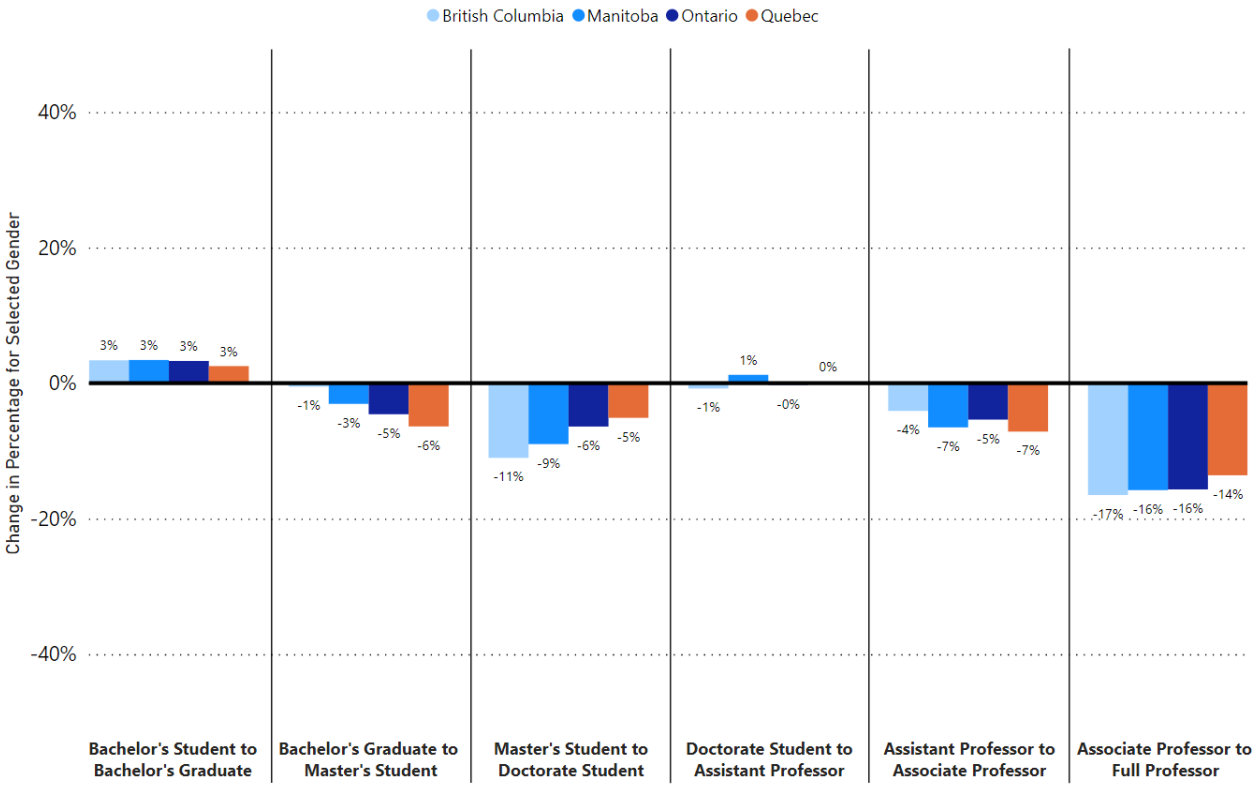
- Compared to women in all disciplines combined, women in STEM-related disciplines are less likely to graduate from bachelor's programs — men and women are roughly equal in this case — but are more likely to continue to master's programs. There is a limited drop-off between bachelor's graduates and master's programs — 1% to 2% — which has been consistently small over time. However, women's prevalence declined more between doctoral programs and assistant professor positions compared to other disciplines.
- For health and education fields, the representation of women has increased slightly between levels up to master's students, but fewer women continued to doctoral studies than in earlier time periods. In 2018-19, there were 8% fewer women in doctoral programs compared to master's programs, which is similar to percentages observed for all students and students in STEM-related disciplines.

Figure 3: Change in Percentage of Women/Men Between Academic Levels by Discipline



- Women in mathematics, computer and information sciences are far more prevalent in master's programs compared to bachelor's graduates than for other disciplines (an increase of 15% vs. a decrease of 5%, respectively). However, they are also less likely to continue to doctoral programs — the prevalence of women drops by 16% during this transition.
- Women in physical and life sciences are among the least likely of the selected disciplines to pursue master's programs. They are also comparatively less likely to advance through doctorate programs and assistant professor positions. This is somewhat unexpected since women are most prevalent in these STEM-related fields than in the others examined here.

Figure 4: Change in Percentage of Women/Men Between Academic Levels by Province



- There is limited variation across provinces, except for the two transitions between bachelor's graduates and doctorate students — provinces that are low on one transition tend to be higher on the other. For example, women in Quebec are transitioning into master's programs at the lowest rate of the four provinces at -6%, but they have the highest rate for continuing to doctoral programs at -5%.
- For STEM-related disciplines, trends in other provinces are also generally comparable to those in Ontario. The most notable differences are the percentages of women entering master's programs in British Columbia and Quebec (4% and 5% increases, respectively). This can be compared to a 2% decline for Ontario and Manitoba.
- There are also some nuanced trends for education and health. The starkest differences are between provinces for the transition from doctorate student to assistant professor. In Ontario and Quebec, we see little change in the percentage of women across these levels, whereas in Manitoba and British Columbia, there are 10% to 15% fewer women in assistant professor positions compared to doctorate programs.

Summary

- The bachelor's student to bachelor's graduate transition stands out as the only time when women are more likely to persist between career levels than men. This has been true dating back to the early 1990s. However, after this transition, the pipeline begins to leak, with fewer women reaching each additional level of study or academic rank.
- Women are almost equally represented at the assistant professor rank as at the doctorate student level of study, suggesting that women are not leaving the pipeline during their transition to tenure-track jobs as has been suggested elsewhere, particularly in literature from the U.S. (Sato et al., 2021).
- Across all the results considered here, there is limited evidence of progress in more senior faculty ranks, especially at the full professor rank. Women remain vastly underrepresented among full professors and compose just 29% of them in the 2018-19 academic year.
- Longitudinal data should be utilized to conduct analyses such as these, but unfortunately it is simply not available in Canada. Consequently, results from this study should be viewed with some caution. Findings relating to transitions to and from associate and full professor ranks are likely to be particularly misleading because of slow turnover.
- Another limitation of this analysis is that it did not examine data on secondary students since it is not available consistently over time. Evidence suggests that young women begin choosing their career paths early in life, before entering university (Well et al., 2018).

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