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Women in scientific occupations in Canada

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.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0ˢ	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
ᵖ	preliminary
ʳ	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
ᴱ	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Overview of the study

This article provides information on women aged 25 to 64 in natural and applied sciences occupations in Canada (i.e. scientific occupations), using data from the 1991 and 2001 censuses and the 2011 National Household Survey (NHS). The employment conditions of men and women in these occupations are also examined, based on data from the Labour Force Survey (LFS).

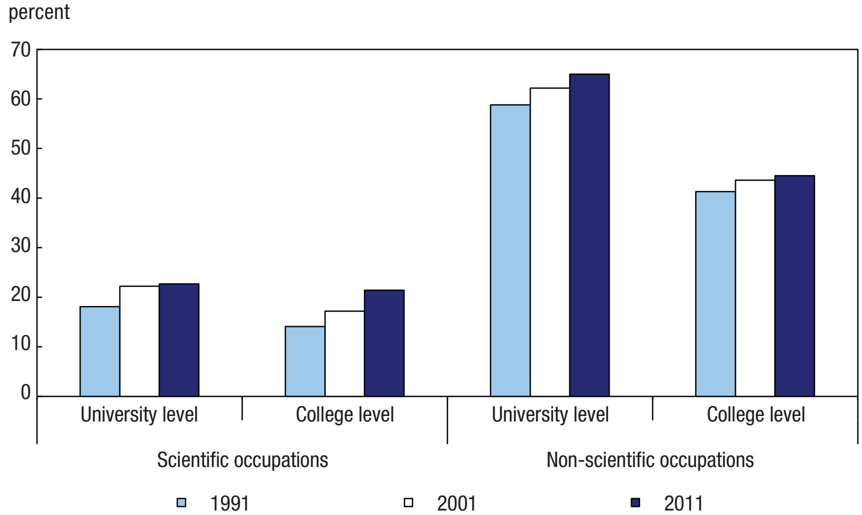
- From 1991 to 2011, the proportion of women in scientific occupations requiring a university education rose from 18% to 23%, and from 14% to 21% in scientific occupations requiring a college education.
- During the same period, the proportion of women in non-scientific occupations requiring a university education increased from 59% to 65%, and from 41% to 44% in non-scientific occupations requiring a college education.
- Between 1991 and 2011, women accounted for 27% of the growth in the number of workers in university-level scientific occupations, but for 75% of the growth in the number of workers in university-level non-scientific occupations.
- Computer science accounted for 60% of the increase in the number of workers in scientific occupations requiring a university education. The smaller contribution of women to the overall increase in the number of scientific workers is related to the fact that they accounted for a smaller share of workers in computer science occupations.
- Workers in scientific occupations generally have better employment conditions. On average, men working full-time earned 9% more than their female counterparts in both scientific and non-scientific occupations.

Introduction

Despite significant progress in education and labour force participation, women remain underrepresented in occupations in natural and applied sciences, which pay relatively higher wages on average, and are overrepresented in occupations in elementary and secondary education and health care—which, in comparison, pay relatively lower wages. Although the wage gap between men and women has been closing over time,[1] field of study is a factor that might explain part of the remaining wage gap,[2] along with other differences such as hours worked, number of years of experience and presence of children.

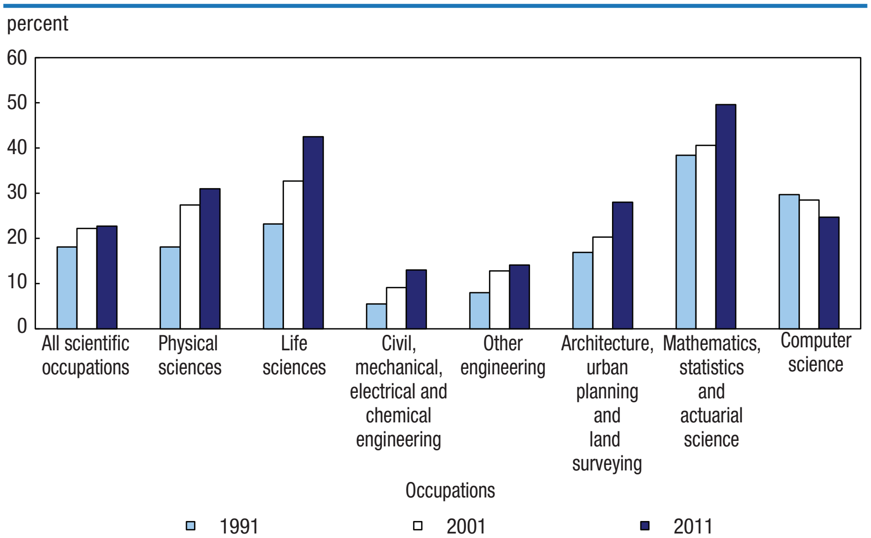
The underrepresentation of women in scientific occupations is itself partly due to their low participation in fields of study related to science, technology, engineering and mathematics (STEM) despite efforts to attract them. According to the 2011 National Household Survey (NHS), women accounted for 33% of STEM university graduates, but almost two-thirds of graduates in non STEM fields.[3] Accordingly, the proportions of women in scientific occupations remained significantly lower than in other occupations, especially among those that normally require a university degree.

Chart 1
Percentage of women in scientific and non-scientific occupations, by skill level, 1991 to 2011



Note: There were more science-related occupations in 2011 than in 1991, particularly in computer science. In order to create this chart, the classifications had to be made comparable over time and some occupations had to be combined in 2011. For a few college-level occupations, no equivalents were found in 2011. These occupations were excluded from the calculations.
Sources: Statistics Canada, Census of Population, 1991 and 2001; National Household Survey, 2011.

Chart 2
Percentage of women in university-level scientific occupations, by occupational category, 1991 to 2011



Note: There were more science-related occupations in 2011 than in 1991, particularly in computer science. In order to create this chart, the classifications had to be made comparable over time and some occupations had to be combined in 2011. For a few college-level occupations, no equivalents were found in 2011. These occupations were excluded from the calculations.
Sources: Statistics Canada, Census of Population, 1991 and 2001; National Household Survey, 2011.

Given the above, this article has three major objectives. The first is to track the proportion of women in natural and applied sciences occupations ("scientific" occupations) and in other occupations ("non-scientific" occupations) over the past two decades, separately for occupations normally requiring a university education and those that require a college education—on the basis of data from the 1991 and 2001 censuses and the 2011 NHS (see *Data sources, methods and definitions*).

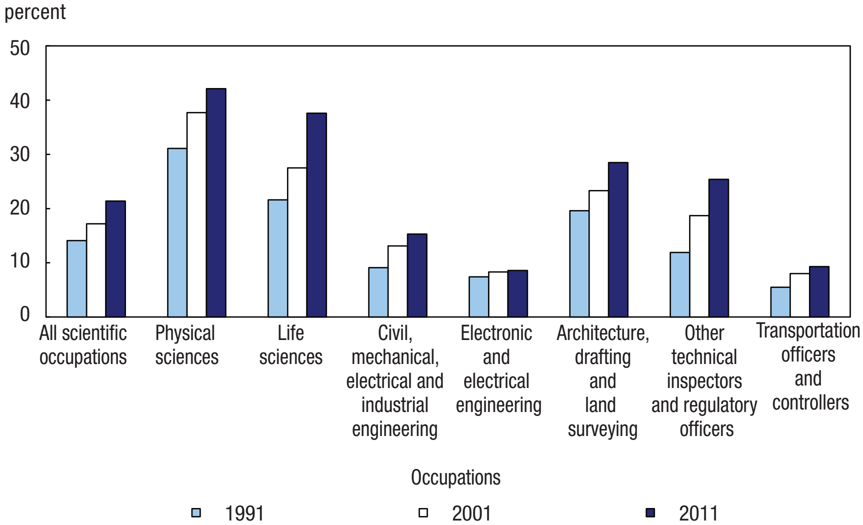
The second objective is to examine the extent to which women contributed to the increase in the number of workers in scientific occupations normally requiring a university education over the period, including the role played by key factors such as age and immigration.

Lastly, the article uses Labour Force Survey data to examine differences in employment conditions between employees in scientific fields and those in other fields, specifically among workers in occupations normally requiring a university degree. The article focuses on persons aged 25 to 64 who were employed at the time of data collection.

The share of women increased in most scientific occupations, except in computer science

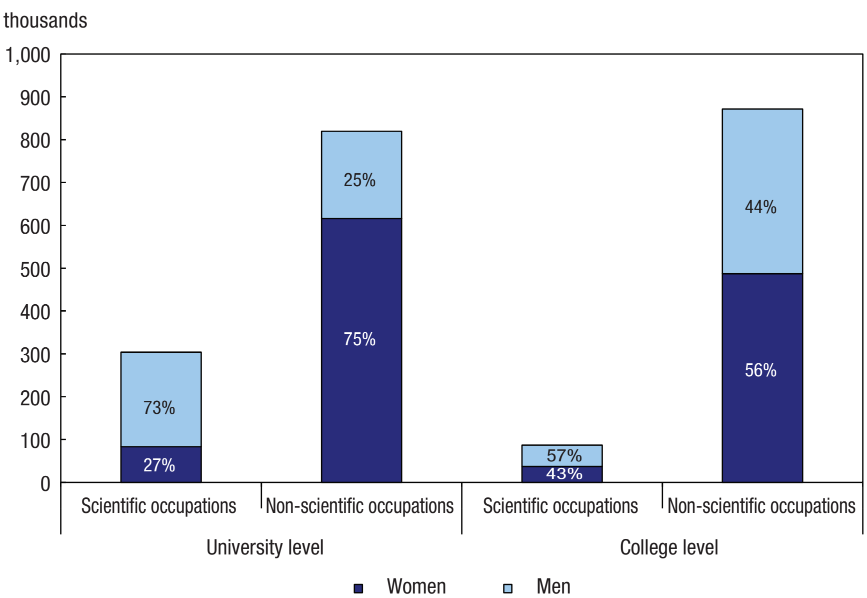
Among workers aged 25 to 64, the proportion of women in scientific occupations rose from 18% in 1991 to 23% in 2011 for occupations requiring a university education, and from 14% to 21% for occupations requiring a college-level education. The increase mainly took place between 1991 and 2001 for university-level scientific occupations (Chart 1).

Chart 3
Percentage of women in college-level scientific occupations, by occupational category, 1991 to 2011



Note: There were more science-related occupations in 2011 than in 1991, particularly in computer science. In order to create this chart, the classifications had to be made comparable over time and some occupations had to be combined in 2011. For a few college-level occupations, no equivalents were found in 2011. These occupations were excluded from the calculations.
Sources: Statistics Canada, Census of Population, 1991 and 2001; National Household Survey, 2011.

Chart 4
Increase in the number of workers aged 25 to 64 in scientific and non-scientific occupations from 1991 to 2011, by skill level



Sources: Statistics Canada, Census of Population, 1991 and 2001; National Household Survey, 2011.

By comparison, in non-scientific occupations, the proportion of women was significantly higher in 1991 and continued to increase over the next two decades, rising from 59% to 65% in university-level occupations and from 41% to 44% in college-level occupations.

Among workers who held a university-level scientific occupation in 2011, the highest proportion of women was found among those who were in mathematics, statistics and actuarial science, with 50%—up from 38% in 1991 (Chart 2). The proportion of women grew in most university-level occupations, particularly in life sciences where the proportion almost doubled (from 23% in 1991 to 43% in 2011).

The proportion of women also increased in architecture, from 17% to 28%. The proportion of women in the two engineering groups (13% and 14% in 2011) remained the lowest of all fields in 2011, even though the proportions doubled in 20 years.

The group of occupations related to computer science was the only category to see a decline over the 20 year period, from 30% in 1991 to 25% in 2011. Most of the decline occurred between 2001 and 2011.

In college-level occupations, the share of women increased in all occupational categories (Chart 3). In 1991, some scientific occupations already stood out for their relatively high proportions of women, including those in physical sciences (notably chemistry), where women accounted for 31% of workers (42% in 2011). Within college-level scientific occupations, physical sciences had the highest proportion of women in 2011, followed by life sciences (38%, up from 22% in 1991). Within life sciences, the proportion of women was particularly higher in biology.

College-level occupations related to architecture (particularly drafting technologists) and technical inspectors and regulatory officers (especially public health inspectors) also recorded a significant increase in the number of female workers. The proportion of women in these groups increased from 20% to 29% and from 12% to 25%, respectively.

In comparison, college-level occupations in both engineering categories had relatively small proportions of women, with little change in the past 20 years. The proportion of women in these occupations was 15% or less in 1991, 2001 and 2011.

Women contributed less to the increase in the number of workers in scientific occupations requiring a university education

This section examines the extent to which women contributed to the overall growth in the number of workers in scientific occupations from 1991 to 2011. During this period, the number of university-level scientific workers more than doubled as it increased by 304,000 people. The increase in the number of college-level scientific workers was smaller at 87,000 (an increase of 34%).

Within university-level occupations, women accounted for 27% of the total growth in the number of scientific workers between 1991 and 2011, which suggests that men accounted for almost three-quarters of the growth (Chart 4). It was the opposite among those with non-scientific occupations, as women accounted for 75% of the growth in the number of workers between 1991 and 2011.

Within occupations requiring a college education, the relative contributions of men and women were more balanced, with women representing 43% of the growth in scientific workers (an increase of 87,000 jobs) and 56% of the growth in non-scientific jobs (an increase of 872,000 jobs in total).

The sections below focus on occupations requiring a university education as the number of workers grew more rapidly in university-level scientific occupations than in college-level scientific occupations from 1991 to 2011. Women also contributed less to the overall increase in university-level scientific occupations over the period. However, readers interested in more information about occupations normally requiring a college education are invited to consult the section titled *College-level scientific occupations*.

Computer science drove the increase in university-level workers between 1991 and 2011

Between 1991 and 2011, computer science contributed the most to the increase in university-level workers, accounting for 60% of the overall growth (Table 1).

The fact that this sector was the source of such a significant portion of the growth in the number of workers is not surprising, given that the 1990s were characterized by a boom in the information technology and telecommunications industries. As a result, many people were drawn toward occupations in computer science.

However, not as many women chose these professions as compared to men. Between 1991 and 2011, men accounted for more than three-quarters of the increase in workers in computer science, while less than one-quarter was attributable to women. The lower female representation in computer science occupations, which contributed the most to the increase in scientific workers over the period, explains why women contributed relatively less to the overall increase in the number of scientific workers between 1991 and 2011.

In spite of the above, computer science remained the most common field for women in scientific occupations, accounting for more than one-half of them in 2011. This proportion was, however, on the decline—in 1991, computer science jobs accounted for almost two-thirds of all in scientific occupations among women.

Civil engineering and “other engineering” occupations accounted for 16% and 10%, respectively, of the overall increase in the number of scientific workers. Women’s contribution to this increase was also relatively small, representing slightly more than one-quarter and slightly

Table 1
Number of workers aged 25 to 64 and increase from 1991 to 2011, university-level scientific occupations

	1991		2011		Increase from 1991 to 2011	
	number	percentage distribution	number	percentage distribution	number	percentage distribution
University-level scientific occupations						
All	**300,500**	**100.0**	**604,600**	**100.0**	**304,100**	**100.0**
Physical sciences	19,600	6.5	31,100	5.1	11,500	3.8
Life sciences	14,700	4.9	29,300	4.8	14,500	4.8
Civil, mechanical, electrical and chemical engineering	88,900	29.6	138,500	22.9	49,600	16.3
Other engineering	35,000	11.6	64,900	10.7	29,900	9.8
Architecture, urban planning and land surveying	24,300	8.1	33,000	5.5	8,700	2.9
Mathematics, statistics and actuarial science	5,300	1.8	11,400	1.9	6,000	2.0
Computer science	112,600	37.5	296,400	49.0	183,800	60.4
Men	**246,200**	**81.9**	**467,200**	**77.3**	**221,000**	**72.7**
Physical sciences	16,100	5.4	21,500	3.6	5,400	1.8
Life sciences	11,300	3.8	16,800	2.8	5,500	1.8
Civil, mechanical, electrical and chemical engineering	84,000	28.0	120,500	19.9	36,400	12.0
Other engineering	32,200	10.7	55,700	9.2	23,600	7.8
Architecture, urban planning and land surveying	20,200	6.7	23,800	3.9	3,600	1.2
Mathematics, statistics and actuarial science	3,300	1.1	5,700	0.9	2,400	0.8
Computer science	79,200	26.4	223,200	36.9	144,000	47.4
Women	**54,300**	**18.1**	**137,400**	**22.7**	**83,100**	**27.3**
Physical sciences	3,500	1.2	9,600	1.6	6,100	2.0
Life sciences	3,400	1.1	12,500	2.1	9,000	3.0
Civil, mechanical, electrical and chemical engineering	4,900	1.6	18,000	3.0	13,100	4.3
Other engineering	2,800	0.9	9,200	1.5	6,400	2.1
Architecture, urban planning and land surveying	4,100	1.4	9,300	1.5	5,100	1.7
Mathematics, statistics and actuarial science	2,100	0.7	5,600	0.9	3,600	1.2
Computer science	33,400	11.1	73,200	12.1	39,800	13.1

Sources: Statistics Canada, Census of Population, 1991; National Household Survey, 2011.

more than one-fifth, respectively, of the increase in workers in these occupations.

Thus, the contribution of women was relatively smaller in the scientific occupations that experienced the most significant employment growth between 1991 and 2011, computer science in particular, and, to a lesser degree, the engineering sectors.

In contrast, women were more strongly represented in occupations that experienced slower growth. They accounted for more than one-half of the increase in workers in architecture, urban planning and land surveying, physical and life sciences, and mathematics, statistics and actuarial sciences—fields that, when combined, accounted for 13% of the total increase in scientific workers from 1991 to 2011.

Fewer young women are in computer science

As indicated above, computer science occupations accounted for 60% of the increase in university-related science occupations from 1991 to 2011, and men accounted for more than three-quarters of the increase in computer science occupations.

Results by age group indicate that the bulk of the increase came from men aged 35 to 54, as they accounted for more than one-half of the total 60% growth (Table 2). The contribution of young men aged 25 to 34 was smaller, but positive (8 out of 60 percentage points).

Table 2
Decomposition of the increase in the number of workers aged 25 to 64 from 1991 to 2011 in university-level scientific occupations, by field and by age group

	Total	Computer science	Engineering[1]	Other
	percentage			
Total	**100.0**	**60.4**	**26.1**	**13.4**
Age				
25 to 34	11.9	7.0	3.1	1.9
35 to 44	30.7	22.2	6.7	1.8
45 to 54	39.4	23.0	10.9	5.5
55 to 64	17.9	8.3	5.4	4.2
Men	**72.7**	**47.4**	**19.7**	**5.6**
25 to 34	8.9	8.4	1.1	-0.6
35 to 44	21.3	17.2	4.5	-0.4
45 to 54	28.2	15.9	9.2	3.2
55 to 64	14.2	5.9	5.0	3.4
Women	**27.3**	**13.1**	**6.4**	**7.8**
25 to 34	3.1	-1.4	2.0	2.4
35 to 44	9.4	5.0	2.2	2.2
45 to 54	11.2	7.1	1.7	2.3
55 to 64	3.7	2.4	0.5	0.9

1. Includes the two categories of engineering occupations shown in Table 1.
Sources: Statistics Canada, Census of Population, 1991; National Household Survey, 2011.

The smaller contribution of young workers is largely due to the aging of the workforce. In both scientific and non-scientific occupations, the older age groups tended to contribute more to the increase in the number of workers from 1991 to 2011.

Contrary to young men, however, the number of young women in computer science declined over the period. Between 1991 and 2011, the number of women aged 25 to 34 employed in computer science occupations fell by about 4,000, with most of the decline occurring from 2001 to 2011.[4] By comparison, the number of young men in the same age group in computer science occupations rose by more than 25,000 over the period.

It was older women, particularly those aged 45 to 54, who accounted for the positive but limited contribution of women to the total increase in computer science workers during this period.

A number of hypotheses have been put forward to explain the decline in the number of young women in computer science. One hypothesis is a change in the factors that motivate women to opt for a career in computer science,[5] while another is a change in culture in the computer science community that may be less favourable to women.[6]

By contrast, young women did contribute to employment growth in other areas, such as engineering and other scientific sectors, and their contribution even outpaced that of young men in the same age group. Even in these fields, however, men aged 45 to 64 represented the most significant source of growth between 1991 and 2011.

To get a better idea of the choices that young people make regarding their education, it is useful to examine the administrative data from the Postsecondary Student Information System (PSIS). This source provides information on the number of graduates from Canadian postsecondary institutions by sex and field of study. Although the data by field of study cannot be directly compared with the occupational data, it may help identify future trends in the Canadian scientific workforce.

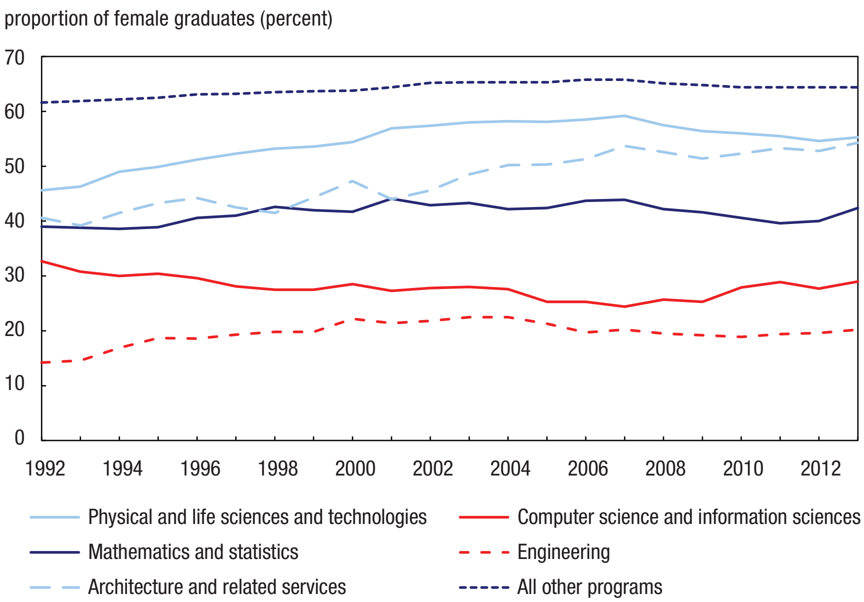
In 2013, the proportion of female graduates in programs related to physical and life sciences and technologies was 55%, up from 46% in 1992 (Chart 5). In the field of architecture and related services, there was also a significant increase, from 41% in 1992 to 54% in 2013. These results are consistent with the increase in the proportion of women observed in these types of occupations.

The proportion of female graduates in engineering rose from 14% in 1992 to 20% in 2013, but remained low in comparison with other fields. The proportion of female graduates rose slightly in mathematics and statistics (from 39% to 42%). In computer science, the proportion of women fell from 33% in 1992 to a low of 24% in 2007, before recovering to 29% in 2013. In all years, the proportion of women graduating in all other (non-scientific) fields of study was over 60%, reflecting the significant share of non-scientific occupations held by women.

Immigrants contributed to the growth in scientific workers

Immigration is another key factor driving the growth of the scientific workforce. Studies have highlighted the role played by immigrants in the renewal of Canada's workforce—particularly in natural and applied

Chart 5
Proportion of women among university graduates, by field of study, 1992 to 2013



Sources: Statistics Canada, Postsecondary Student Information System, 1992 to 2013.

sciences.[7] Furthermore, the proportion of immigrants is higher among science graduates than it is among other graduates—in 2011, more than one-half (51%) of all STEM degrees were held by immigrants.[8]

From 1991 to 2011, immigrant women and Canadian-born women contributed almost equally to the total increase in scientific workers at the university level (13% and 14%, respectively). Immigrant men and Canadian-born men also contributed in comparable proportions (34% and 39%, respectively) (Table 3).[9]

Because it contributed the most scientific workers over the period, examining immigration trends in computer science occupations is also important. From 1991 to 2011, immigrant women accounted for more than one-half (55%)[10] of the growth in female workers in computer science. Among men, immigrants accounted for 47%[11] of the increase in the number of male computer scientists.

Scientific occupations are generally associated with better employment conditions

According to data from the LFS[12], workers who were employed in natural and applied sciences generally had better employment conditions (Table 4).

For example, among those in occupations normally requiring a university education, women who worked in scientific occupations were more likely than their counterparts in other fields to have a permanent position (93% versus 87%), to work full time (97% versus 85%) and to have higher hourly wages ($36.08 versus $34.56 among full-time workers). Women in scientific occupations were, however, less likely to be unionized (26% versus 61%). Similar differences were noted among men.

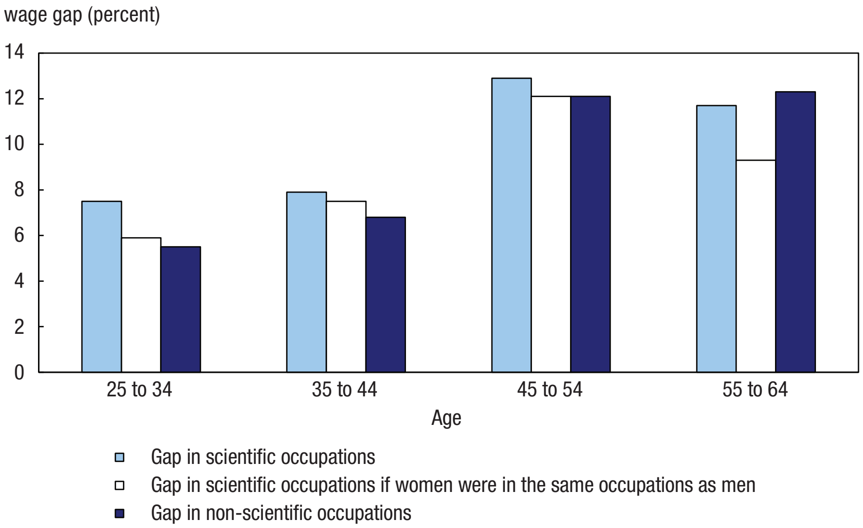
On average, men in scientific occupations who worked full-time earned 9% more than women. The wage gap was similar among those who held non-scientific occupations. The results, however, varied by age group.

Table 3
Decomposition of the increase in the number of workers aged 25 to 64 from 1991 to 2011 in university-level scientific occupations, by field and by immigration status

	Total	Computer science	Engineering[1]	Other
	percentage			
Total	**100.0**	**60.4**	**26.1**	**13.4**
Immigrants	46.8	29.3	13.0	4.4
Canadian-born	53.2	31.1	13.1	9.0
Men	**72.7**	**47.4**	**19.7**	**5.6**
Immigrants	33.9	22.1	9.8	2.0
Canadian-born	38.7	25.2	10.0	3.5
Women	**27.3**	**13.1**	**6.4**	**7.8**
Immigrants	12.9	7.2	3.3	2.4
Canadian-born	14.5	5.9	3.2	5.4

1. Includes the two categories of engineering occupations shown in Table 1.
Sources: Statistics Canada, Census of Population, 1991 and 2001; National Household Survey, 2011.

Chart 6
Wage gap between women and men by age group, university-level scientific and non-scientific occupations, 2010 to 2015



Note: For all age groups and in both categories (scientific and non-scientific occupations), the hourly wage of women was significantly different from that of men ($p < 0.05$). The "fictitious" wage of women in scientific occupations is obtained by multiplying the average wage in each occupational category by the distribution of men across categories, thereby allowing the composition effect to be isolated from other factors in explaining the wage gap in scientific occupations.
Sources: Statistics Canada, Labour Force Survey, March and September data, 2010 to 2015.

Among younger workers, the wage gap was larger among scientific workers than it was among non-scientific workers. Specifically, among those who worked full time in scientific occupations, young males aged 25 to 34 earned approximately 8% more than their female counterparts. This compared with a 6% wage gap among those who were in non-scientific occupations (Chart 6). The gap was at least 12% in the case of women aged 45 and older, both in scientific and non-scientific occupations.[13]

Part of the gender wage gap might be due to the distribution of women across categories of scientific occupations, particularly among younger workers. In an attempt to measure the impact of composition effects on the gender wage gap, a "fictitious" average hourly wage was calculated to reflect what women might earn if they were distributed the same way as men across all occupations (all else being equal).

If women had the same occupational distribution as men, the wage gap would not disappear but would be smaller in all age groups. Among young workers aged 25 to 34, for instance, the wage gap would be 6% (instead of 8%). Similarly, the gap would be 9% instead of 12% among those aged 55 to 64.

The results above are consistent with other reports that examined gender differences in the labour market outcomes of young scientists. According to a recent study,[14] men aged 25 to 34 with a STEM degree had lower unemployment rates, higher wages and lower overqualification rates than their counterparts with a non-STEM degree. The same study found that the employment conditions of young female graduates from STEM programs were not distinctively different from those of young women who graduated from other fields, while young men had a distinct advantage over their counterparts with a non-STEM degree. Additional research is needed to gain a better understanding of the reasons for these differences between men and women in the scientific sectors.

Conclusion

Between 1991 and 2011, the proportion of women in scientific occupations increased, from 14% to 21% in college-level occupations and from 18% to 23% in university-level occupations. Increases were seen in all occupational categories, except in computer science occupations, where the proportion of women declined from 30% to 25% over the period.

Computer science had the most workers in 2011, and was the main driving force behind the growth in science workers from 1991 to 2011. However, women contributed little to the increase in the number of computer science workers over the period. The number of young women with a computer science occupation even declined over the period. Furthermore, more than half (55%) of the increase in the female workforce in computer science was attributable to immigrants.

Table 4
Employment characteristics of women and men aged 25 to 64 in university-level scientific and non-scientific occupations, 2010 to 2015

	Women		Men	
	Scientific occupations	Non-scientific occupations (ref.)	Scientific occupations	Non-scientific occupations (ref.)
	percentage			
Job status				
Permanent	93.2*	87.2	94.6*	86.2
Temporary	6.8*	12.8	5.4*	13.8
Full-time or part-time status				
Full-time	97.0*	84.7	99.0*	92.8
Part-time	3.0*	15.3	1.0*	7.2
Unionization				
Unionized	25.7*	60.8	18.6*	46.9
Non-unionized	74.3*	39.2	81.4*	53.1
Job tenure				
Less than 1 year	11.5*	9.6	13.4*	11.4
1 to 2 years	9.1*	7.5	11.6*	9.3
2 to 5 years	24.3*	19.1	24.8*	21.0
5 years or more	55.1*	63.8	50.3*	58.4
Firm size				
Less than 20 employees	7.2	8.1	9.5	9.8
20 to 99 employees	11.1	10.6	13.1*	10.6
100 to 500 employees	12.6	13.2	14.7	13.5
More than 500 employees	69.1	68.1	62.7*	66.2
	2015 dollars ($)			
Hourly wage[1]				
Average	36.08*	34.56	39.68*	37.89
25 to 34	31.84*	30.69	34.23*	32.39
35 to 44	37.26*	35.89	40.20*	38.32
45 to 54	38.46*	36.43	43.43*	40.83
55 to 64	40.32*	36.99	45.05*	41.53

1. Full-time employees
* significantly different from the reference category (ref.) ($p < 0.05$)
Note: In the LFS, scientific and non-scientific occupations are determined on the basis of the 2011 National Occupational Classification (NOC). The differences between the 2011 NOC and 2006 NOC for university-level occupations are relatively minor. The results in this table are based on paid employees.
Source: Statistics Canada, Labour Force Survey, March and September data from 2010 to 2015.

Scientific occupations are typically associated with better employment conditions. Both male and female scientific workers were more likely to hold a permanent position, work full time and earn higher wages. However, male scientific workers earned more than their female counterparts, including among younger workers aged 25 to 34.

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Data sources, methods and definitions

Data sources

The data for this article come from the 1991 and 2001 censuses, the 2011 National Household Survey (NHS) and the Labour Force Survey (LFS). The data on employment characteristics from the 1991 and 2001 Census of Population come from the long form sent to 1 in 5 households, or about 20% of the population. The 2011 NHS data come from a questionnaire sent to 1 in 3 households. The response rate for the NHS, a voluntary survey, was 68% compared with rates above 90% for previous censuses.

The LFS is conducted monthly with about 56,000 households. It provides information on major labour market trends by industry, occupation, hours worked, employment rate and unemployment rate. Data for the Northwest Territories, Yukon and Nunavut are excluded. The data used in this article are from March and September of each year between 2010 and 2015, in order to have a sufficiently large sample size and to ensure that observations are independent. The standard errors have been calculated with bootstrap weights.

"Scientific" occupations

Unlike the Classification of Instructional Programs (CIP), which has a group of fields of study referred to as "science, technology, engineering and mathematics" (STEM), the National Occupational Classification (NOC) does not provide sub-categories of scientific and non-scientific occupations. In an attempt to identify the occupations of persons with a STEM degree, natural and applied sciences occupations are used but it is important to note that STEM graduates may work in other occupations. These graduates can, in fact, teach, become managers or hold a job in an entirely different field. However, this occupational group is the one that most closely corresponds to the STEM field of study, which is why it was used in this article.

Harmonization of occupational codes

Occupations from the censuses, the NHS and the LFS are all coded according to the NOC. This system was developed jointly by Employment and Social Development Canada and Statistics Canada, and is updated periodically to reflect changes in the labour market. For example, some occupations that existed in 1991 had disappeared by 2011 and, inversely, new occupations in 2011 did not yet exist in 1991. Therefore, a number of occupations had to be reclassified to make them comparable over time.[15]

Occupational data from the census and NHS data have been made comparable on the basis of the 2006 National Occupational Classification (NOC 2006). The LFS data uses the 2011 National Occupational Classification (NOC 2011). Using NOC, occupations can classified across skill levels. Natural and applied sciences occupations (scientific) were divided into two groups based on (a) whether they required a university degree or (b) a college diploma, and were compared with non-scientific occupations in their respective skill categories. Managers were excluded from this analysis because they have a variety of skill levels.

College-level scientific occupations

From 1991 to 2011, the number of people in a college-level scientific occupation rose by 87,000, or 34% (Table 5). At the university-level, the number of people in these occupations doubled, as it increased by more than 300,000 people.

Compared with university-level occupations, women contributed in a larger degree to the increase in workers in college-level occupations (43%, compared with 57% for men).

Specifically, women contributed to the increase of technical inspectors and regulatory officers occupations (accounting for 11% of the total increase in college-level scientific workers), life sciences (10%) and architecture, drafting and land surveying (8%).

Men's contribution occurred mainly in the two engineering occupational groups (where they accounted for almost one-third of total growth) and in other technical inspectors and regulatory officers occupations (18%).

Table 5
Number of workers aged 25 to 64 and increase from 1991 to 2011, college-level scientific occupations

	1991		2011		Increase from 1991 to 2011	
	number	percentage distribution	number	percentage distribution	number	percentage distribution
College-level scientific occupations						
All	**254,800**	**100.0**	**341,800**	**100.0**	**87,000**	**100.0**
Physical sciences	28,200	11.1	31,200	9.1	2,900	3.3
Life sciences	27,300	10.7	38,100	11.1	10,800	12.4
Civil, mechanical and industrial engineering	30,800	12.1	50,800	14.9	20,000	23.0
Electronic and electrical engineering	79,900	31.4	92,300	27.0	12,500	14.4
Architecture, drafting and land surveying	43,100	16.9	52,500	15.4	9,400	10.8
Other technical inspectors and regulatory officers	23,700	9.3	49,400	14.5	25,700	29.5
Transportation officers and controllers	21,800	8.6	27,500	8.0	5,700	6.6
Men	**218,900**	**85.9**	**268,600**	**78.6**	**49,700**	**57.1**
Physical sciences	19,500	7.7	18,100	5.3	-1,400	-1.6
Life sciences	21,400	8.4	23,800	7.0	2,400	2.8
Civil, mechanical and industrial engineering	28,000	11.0	43,000	12.6	15,100	17.4
Electronic and electrical engineering	73,900	29.0	84,400	24.7	10,500	12.1
Architecture, drafting and land surveying	34,700	13.6	37,600	11.0	2,900	3.3
Other technical inspectors and regulatory officers	20,800	8.2	36,800	10.8	16,000	18.4
Transportation officers and controllers	20,600	8.1	24,900	7.3	4,300	4.9
Women	**35,900**	**14.1**	**73,200**	**21.4**	**37,300**	**42.9**
Physical sciences	8,800	3.5	13,100	3.8	4,300	4.9
Life sciences	5,900	2.3	14,300	4.2	8,400	9.7
Civil, mechanical and industrial engineering	2,800	1.1	7,800	2.3	5,000	5.7
Electronic and electrical engineering	5,900	2.3	7,900	2.3	2,000	2.3
Architecture, drafting and land surveying	8,400	3.3	15,000	4.4	6,600	7.6
Other technical inspectors and regulatory officers	2,800	1.1	12,500	3.7	9,700	11.1
Transportation officers and controllers	1,200	0.5	2,600	0.8	1,400	1.6

Sources: Statistics Canada, Census of Population, 1991; National Household Survey, 2011.

Notes

1. See Cooke-Reynolds and Zukewich (2004); Drolet (2011).
2. See Bobbit-Zeher (2007); Christie and Shannon (2001); Davies and Guppy (1997); Gerber and Cheung (2008); Frenette and Coulombe (2007); McMullen et al. (2010); OECD (2011).
3. See Statistics Canada (2013).
4. The decrease in the number of women in computer science occupations is not limited to Canada. According to a report by the U.S. Census Bureau, the proportion of women among computer science workers in the United States has decreased from about 33% in 1990 to 27% in 2011 (Landivar 2013).
5. See Sax (2012).
6. See Lobo (2014).
7. See Badets and Howatson-Leo (1999).
8. See Statistics Canada (2013).
9. Female immigrants contributed less to college-level scientific occupations because immigrants are more likely to have a university degree than a college diploma.
10. This percentage is obtained by dividing 7.2 by 13.1 in the computer science column of Table 3.
11. This percentage is obtained by dividing 22.1 by 47.4 in the computer science column of Table 3.
12. The LFS data for March and September of all years between 2010 and 2015 were combined in order to maximize the number of independent observations. This approach has been selected because survey respondents are interviewed over 6 consecutive months in the LFS.
13. This result is consistent with other studies that also noted an increase in the gender wage gap by age. In the past two decades, the wage gap between younger men and women has narrowed in part because the latter hold different occupations than the women who preceded them (see Drolet, 2011).
14. See Hango (2013).
15. The article uses the method developed in Uppal and LaRochelle-Côté (2014) to allow comparisons over time.

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