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Enrolment and Persistence in Postsecondary Education Among High School Graduates in British Columbia: A Focus on Special Needs Status

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Table of contents

Abstract

This study used Postsecondary Student Information System (PSIS) administrative data within the Education and Labour Market Longitudinal Platform to compare enrolment and persistence in postsecondary education (PSE) among high school graduates in British Columbia with and without special needs across five cohorts from 2010/2011 to 2014/2015 before and after controlling for several sociodemographic characteristics and academic achievement. The use of integrated longitudinal administrative data from the British Columbia Ministry of Education, the PSIS and the T1 Family File and the disaggregation of the special needs categorization were two major strengths of this study. Results show that high school graduates with mental health-related or cognitive needs and those with physical or sensory needs were less likely to enrol in PSE compared with high school graduates without special needs, even after controlling for covariates. Moreover, graduates with mental health-related or cognitive needs were less likely to transition to PSE immediately and less likely to persist in PSE two years after enrolment. These findings suggest that high school graduates with special needs, particularly those with mental health-related or cognitive needs, may encounter different types of barriers in transitioning to PSE.

1 Introduction

The importance of postsecondary education (PSE) on better quality of life outcomes has been well documented. PSE has been associated with higher employment rates and often with better labour market conditions, such as higher wages or salaries (Reid, Chen, & Guertin, 2020). The significance of PSE for students with special needs is more pronounced. For example, the earnings and employment gap between persons with and without disabilities[1] narrowed with postsecondary credentials than among those with a high school diploma only (Pettinicchio & Maroto, 2017; Till et al., 2015). Despite these findings, lower enrolment in PSE among students with disabilities compared with students without disabilities has also been well documented (Arim & Frenette, 2019; Sentenac et al., 2019). However, recent research showed that students with and without a permanent disability were equally likely to drop out of PSE, although those with a permanent disability were less likely to be in the labour force and employed (Stewart & Schwartz, 2018). Another study found that students with disabilities were less likely than those without disabilities to complete PSE only when parental educational attainment was lower than high school graduation (Sentenac et al., 2019). Overall, although students with special needs are equally likely to persist in PSE, except for those from economically more vulnerable family backgrounds (see also Madaus, Grigal and Hughes [2014]), these findings reveal that students with special needs may face additional challenges in their transition to PSE (see Crawford [2012] for a review).

Over the past decade, the promotion of equity, diversity and inclusion within postsecondary institutions has gained attention (Dwyer et al., 2023), with a further understanding of diverse school experiences and needs among students with special needs (Brandt & McIntyre, 2016). Previously, using the National Longitudinal Survey of Children and Youth linked to the T1 Family File (T1FF), Arim and Frenette (2019) showed that youth who were diagnosed with both neurodevelopmental and mental health conditions in their school-age years in 2000-2001 were less likely (a gap of 41 percentage points) to enrol in PSE by their early 20s compared with youth who had no long-term diagnosed health condition. Differences in sex, academic achievement and family background explained about one-third of this gap, suggesting that these youth face barriers to enrolling in PSE that are distinct from those confronting other youth. However, because of data limitations, Arim and Frenette (2019) could not examine the extent to which these students progressed through college or university. More recently, Barnett and Gibson (2021) examined enrolment in PSE and apprenticeship programs among British Columbia high school graduates with and without special needs in the 2009/2010 school year. They found that while about 80% of high school graduates without special needs enrolled in PSE or apprenticeship programs within six years of their graduation, the figures were lower, at about two-thirds, among high school graduates with either physical or sensory needs (68.6%) or mental health-related or cognitive needs (65.0%). Furthermore, compared with high school graduates without special needs (47.4%), both graduates with physical or sensory needs and mental health-related or cognitive needs were less likely to enrol in undergraduate degree programs, but the difference was more pronounced for those with mental health-related or cognitive needs (15.2%) than for those with physical or sensory needs (29.2%). In addition, while graduates with physical or sensory needs were equally likely to enrol in college-level diploma or certificate programs, graduates with mental health-related or cognitive needs were less likely to enrol in college-level diploma programs (generally two years or more in length) but more likely to enrol in college-level certificate programs (generally one year in length). Barnett and Gibson acknowledged that enrolment in PSE was only part of the story and suggested further research could focus on the pathways of students with and without special needs through PSE.

1. The terms “special needs” and “persons with disabilities” are used interchangeably to reflect the terminology of the respective cited studies.

The present study aims to contribute to these research directions and specifically build and expand on Barnett and Gibson's (2021) work by including multiple cohorts and examining not only enrolment but also persistence with details on fields of study using data from the Postsecondary Student Information System (PSIS). Thus, the primary objective of this study is to compare enrolment and persistence in PSE among high school graduates in British Columbia with and without special needs across five cohorts from 2010/2011 to 2014/2015 before and after controlling for several sociodemographic characteristics and academic achievement.

The next section describes the methodology used in this study, including the sources of data. This section is followed by the presentation of results, and the paper concludes with a summary of the findings and directions for future research.

2 Data

The Education and Labour Market Longitudinal Platform (ELMLP) is an environment where anonymized datasets can be integrated longitudinally for researchers to better comprehend the pathways and outcomes of students over time. This study integrated data from the British Columbia Ministry of Education kindergarten to Grade 12 (BC K-12) collection with the PSIS and the T1FF within the ELMLP. The study sample included students who graduated high school[2] in British Columbia with a secondary school diploma (known as a Dogwood Diploma in BC)[3] across five graduating cohorts[4] from 2010/2011 to 2014/2015 (see Table 1 for sample sizes). The study sample excluded students who received an Evergreen Certificate because this certificate is not a graduation credential. Therefore, information on students who obtained an Evergreen Certificate was not available in the 2021 BC K-12 (eligible to graduate) dataset. The Evergreen Certificate, which was developed in response to concerns from parents and educators to address the needs of students with special needs, is a meaningful recognition of the accomplishments of students in their individual learning goals before leaving school. However, this certificate is not equivalent to a Dogwood Diploma, for which students must meet the Ministry of Education's provincial graduation requirements set out in the Graduation Program Order, and is usually not sufficient for enrolment into most PSE programs. It should be noted that the exclusion of students who obtained an Evergreen Certificate from the study sample may have led to an underestimation of differences between students with and without disabilities, as the former group is expected to be more likely to obtain an Evergreen Certificate. Nevertheless, depending on the school year, about 11% to 15% of Grade 12 students with special needs (aged 15 to 19 years) received an Evergreen Certificate. The students were 15 to 19 years old at the time of graduation and enrolled in PSE any year from 2011 to 2020. For instance, Cohort 1 were those students who graduated with a Dogwood Diploma in 2010/2011.[5,6] Note that the number of years considered for enrolment in PSE ranged from 10 years for Cohort 1 to 6 years for Cohort 5. There was roughly an even distribution of males and females who graduated across all five cohorts (Table 1), a pattern largely driven by students without special needs.

2. High school graduation was calculated by including students who graduated with a Dogwood Diploma in that particular year from the ages of 15 to 19 years old.
3. Students who are 18 years of age or older can obtain an Adult Dogwood Diploma and combine credits earned at both secondary and postsecondary schools. These students were excluded from the study sample because the focus was on students within the BC K-12 school system.
4. The cohorts in this study differ from those in a previous study by Leanage and Arim (2024) in two ways. First, students could be in any grade to graduate with a Dogwood Diploma (although 98% of graduates were in Grade 12 at the time of graduation). Second, the additional two years for students to graduate with a Dogwood Diploma were not considered in the present study.
5. Students who were missing information to match to other data sources (less than 1% in all cohorts) were excluded from the study sample.
6. Students who entered the school system in their later years (e.g., Grade 10) and graduated through the British Columbia school system were kept in the study sample.

The BC K-12 administrative data available from 1991 onwards contain information on student enrolment in public and independent schools in British Columbia, including students' characteristics (e.g., sex, age, special needs status) and their progression throughout the British Columbia education system (e.g., graduation). In the BC K-12 data, students are assigned a maximum of one special needs category per school year; however, their special needs status may differ from year to year.[7] This study used the students' special needs category in their final school year. Similar to Leanage and Arim's (2024) work,[8] this study initially focused on eight categories: (1) autism spectrum disorder, (2) behavioural needs or mental illness, (3) intellectual disabilities, (4) learning disabilities, (5) physical needs, (6) sensory needs, (7) gifted, and (8) without special needs. However, because of small sample sizes, special needs categories were further collapsed together. Consistent with previous work by Barnett and Gibson (2021), this study focused on mental health-related or cognitive needs[9] (combining initial categories 1 to 4), physical or sensory needs[10] (combining 5 and 6), and gifted (excluded in their study),[11] compared with a category for without special needs.[12] In addition to the sex variable, the parental income variable (i.e., parents' after-tax income adjusted for household size when students were in Grade 10) was derived from the BC K-12 data integrated with the T1FF[13] and collapsed into five categories ranging from less than $30,000 to $80,000 or more. Finally, academic achievement was based on students' Grade 10 marks in math, science and English.

The PSIS provides information on students' enrolment and persistence within a Canadian public college or university by type of program, credential and field of study. The response rate in 2020/2021 was 95.1% (Statistics Canada, 2022). Educational qualification was based on students' first enrolment, and four categories were considered: college-level certificate, college-level diploma, undergraduate associate degree and undergraduate degree.[14,15,16] Fields of study were derived from the STEM (science, technology, engineering and mathematics) and BHASE (business, humanities, health, arts, social science and education, along with legal studies, trades, services, natural resources and conservation) concepts. Four fields of study were considered: STEM was used as a distinct category, and among non-STEM fields, business and related fields,

7. Students may have more than one special need at the same time; in such cases, the BC K-12 administrative data indicate the most prominent special needs status of a student each year, and this status can change from year to year.
8. Students who were assigned to a special needs category **twice or more** throughout their school years, as well as only once in Grade 12, were identified as students with special needs.
9. This final category included students with a learning disability, a severe learning disability, a mild intellectual disability, a moderate to profound intellectual disability, autism spectrum disorder or mental health-related illness and those needing moderate behaviour support or intensive behavioural interventions.
10. This final category included students with a physical disability or chronic health impairment and those who were deaf or hard of hearing, deaf blind, visually impaired and physically dependent.
11. Barnett and Gibson did not include British Columbia high school graduates with gifted status in their study because preliminary analysis revealed that they generally had different patterns of postsecondary enrolment than graduates with other types of special education needs. This study included those with gifted status and differentiated them from graduates with other types of special needs.
12. To justify the collapsing of the special needs categories into four categories, confidence intervals for the initial descriptive statistics of enrolment in PSE by special needs status were examined. The confidence intervals of statistics for graduates with physical needs and those with sensory needs were very large, thereby they were collapsed into one category (data not shown).
13. If parental income was missing for when a student was in Grade 10, parental income from one year before or after was considered.
14. This study followed Barnett and Gibson's (2021) educational qualification categories and did not distinguish between students' full-time and part-time registration status.
15. Basic education programs, qualifying programs, pre-university programs and non-program studies were excluded from the postsecondary enrolment and persistence analysis.
16. Career, technical and professional training certificates and career, technical and professional training diplomas are referred to here as college-level certificates and college-level diplomas for simplicity, although some may be offered at universities.

health care, and other were distinguished (see Chan, Handler and Frenette [2021] for a similar grouping).[17]

Similar to the parental income variable, a personal income variable for students from when they first enrolled in PSE was derived from the PSIS integrated into the T1FF, and the same income categories noted above for parental income were used. The T1FF represents approximately 95% of the population and provides information on personal income variables.[18]

3 Methods

The results were examined across the five cohorts for the following four groups:[19] graduates without special needs, with gifted status, with mental health-related or cognitive needs, and with physical or sensory needs. All analyses were disaggregated by sex.[20] First, descriptive statistics were examined for first-time PSE enrolment, including transition to PSE by time of first enrolment (i.e., immediate, within six years and delayed),[21] as well as by educational qualification (e.g., college certificate, college diploma, undergraduate associate degree or undergraduate degree).[22] Next, persistence in PSE (i.e., one and two years after first enrolment) was explored. Comparison tests (e.g., chi-square) were conducted to determine group differences that were statistically significant at $p < 0.05$. Finally, separate multivariate analyses[23] were conducted to examine the likelihood of enrolment in PSE, immediate transition and persistence in PSE after two years of first enrolment among students with and without special needs across all five cohorts in the presence of the effects of cohorts, sociodemographic characteristics (i.e., sex, age and income[24]) and academic achievement.[25]

4 Results

The numbers and proportions of male students who graduated high school in British Columbia in each cohort by special needs status are shown in Table 1. The sex distribution in the total number of graduates was roughly equal across all five cohorts, a pattern largely driven by graduates without special needs, followed by those with gifted status. However, there was a higher proportion of males than females among graduates with mental health-related or cognitive needs and among those with physical or sensory needs across all cohorts. More specifically, about two-thirds of British Columbia high school graduates with special needs (except those with gifted status) were male.

17. Unlike Chan, Handler and Frenette's (2021) study, this study did not distinguish among different STEM fields of studies (e.g., traditional, math-intensive STEM vs. traditional, less math-intensive STEM) because of low sample sizes when disaggregating by special needs status and sex.
18. Rates of coverage may vary by year and age (see Section 1 in the reference guide of the Centre for Income and Socioeconomic Well-being Statistics [2023] for an example).
19. The estimates presented in this article will differ from those previously published by the British Columbia Ministry of Education mainly because of data integration with the PSIS, as well as differences in sample definition, including a distinction between mental health-related or cognitive needs and physical or sensory needs but not between institutional types (see also Barnett and Gibson [2021]).
20. Sex differences have been well documented in previous research on educational outcomes of postsecondary students (Chan, Handler, & Frenette, 2021).
21. Enrolment in PSE includes graduates who entered full time or part time in a PSE program.
22. High school graduates may have begun more than one educational qualification from 2011 to 2020, and in this case, they were counted in both cases (see also Barnett and Gibson [2021]).
23. Ordinary least squares regression analysis was used.
24. Parental income of students in Grade 10 was used in the regression analysis for first enrolment and immediate enrolment, whereas students' personal income was used for the remaining analyses of persistence.
25. Sensitivity analyses were conducted with the subsample of graduates who had a special needs status only in their final year compared with all others who did not have a special needs status in their final year (graduates without special needs). Results (data not shown) revealed consistent patterns with the results presented in the paper.

Table 1

Number and proportion of male students who graduated high school in British Columbia, by cohort (school year) and special needs status

	Male				
	Cohort (school year)				
	Cohort 1 2010/2011	Cohort 2 2011/2012	Cohort 3 2012/2013	Cohort 4 2013/2014	Cohort 5 2014/2015
			number		
Total sample size, N	40,388	40,679	41,117	40,393	41,134
Total males, N	20,000	20,289	20,494	19,961	20,587
Special needs status					
Without special needs	18,267	18,543	18,616	17,977	18,284
Gifted	430	348	359	336	381
Mental health-related or cognitive needs	1,152	1,269	1,386	1,498	1,728
Physical or sensory needs	151	129	133	150	194
			percent		
Total males	49.5	49.9	49.8	49.4	50.1
Special needs status					
Without special needs	48.6	48.9	48.8	48.3	48.8
Gifted	50.2	53.4	51.7	53.0	54.8
Mental health-related or cognitive needs	66.7	67.4	67.6	64.7	65.7
Physical or sensory needs	61.6	57.6	56.1	59.3	63.8

Source: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 1999/2000 to 2014/2015.

Table 2 presents the numbers and proportions of students who graduated high school in British Columbia and enrolled in PSE across all cohorts by special needs status and sex. Approximately four-fifths of male and female graduates enrolled in PSE for the first time across all five cohorts, a pattern primarily driven by graduates without special needs.[26] However, first-time enrolment in PSE significantly differed by special needs status across all cohorts (except for Cohort 1 graduates with physical or sensory needs). Graduates with gifted status (about 90%) were more likely to enrol in PSE compared with graduates without special needs (about 80%). In contrast, graduates with physical or sensory needs (about 70% to 80%)[27] and graduates with mental health-related or cognitive needs (about 70%) were less likely to enrol in PSE compared with graduates without special needs (about 80%). These findings reveal that while graduates with gifted status had the highest first-time PSE enrolment, graduates with mental health-related or cognitive needs appear to have had the lowest PSE enrolment compared with graduates without special needs.

26. In total, 25% of students who graduated high school in British Columbia did not appear in the PSIS (or enrolled in PSE in Canada). Disaggregated results by sex revealed that the distribution was similar between males and females (25%) across all five cohorts.
27. In earlier cohorts (cohorts 1, 2 and 3), when delayed enrolment was part of the total sample for physical or sensory needs, first-time enrolment was about 80%. However, in later cohorts, where delayed enrolment was not considered and Cohort 5 had only the first five years for first-time PSE enrolment, the proportion of PSE enrolment dropped to around the low to mid-70s. This divergence may simply be attributable to differences in the number of years considered for first-time enrolment for earlier vs. later cohorts.

Table 2

Number and proportion of high school graduates in British Columbia between 2010/2011 and 2014/2015 who enrolled in postsecondary education in Canada for the first time, by cohort (school year), special needs status and sex

	Cohort (school year)														
	Cohort 1 (2010/2011)			Cohort 2 (2011/2012)			Cohort 3 (2012/2013)			Cohort 4 (2013/2014)			Cohort 5 (2014/2015)		
	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female
	number														
Total	33,611	16,391	17,220	33,627	16,599	17,028	33,671	16,459	17,212	32,712	15,892	16,820	33,111	16,279	16,832
Special needs status															
Without special needs (reference category)	31,367	15,031	16,336	31,525	15,273	16,252	31,434	15,075	16,359	30,298	14,431	15,867	30,475	14,650	15,825
Gifted	795	405	390	592	313	279	640	328	312	581	300	281	629	343	286
Mental health-related or cognitive needs	1,251	834	417	1,335	914	421	1,418	956	462	1,650	1,053	597	1,782	1,150	632
Physical or sensory needs	198	121	77	175	99	76	179	100	79	183	108	75	225	136	89
	percent														
Total	83.2	82.0	84.5 *	82.7	81.8	83.5 *	81.9	80.3	83.5 *	81.0	79.6	82.3 *	80.5	79.1	81.9 *
Special needs status															
Without special needs (reference category)	83.5	82.3	84.7 *	83.1	82.4	83.9 *	82.4	81.0	83.8 *	81.5	80.3	82.6 *	81.3	80.1	82.3 *
Gifted	92.8 *	94.2	91.3	90.8 *	89.9	91.8	92.1 *	91.4	92.9	91.6 *	89.3	94.3 *	90.5 *	90.0	91.1
Mental health-related or cognitive needs	72.4 *	72.4	72.4	70.9 *	72.0	68.5	69.1 *	69.0	69.5	71.2 *	70.3	73.0	67.7 *	66.6	69.9
Physical or sensory needs	80.8	80.1	81.9	78.1 *	76.7	80.0	75.5 *	75.2	76.0	72.3 *	72.0	72.8	74.0 *	70.1	80.9 *

* significantly different from reference category ($p < 0.05$)

1. For sex differences, the reference category is male.

Note: The number of years considered for enrolment in postsecondary education ranged from 10 years for Cohort 1 to 6 years for Cohort 5.

Sources: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2009/2010; and Postsecondary Student Information System, 2010 to 2020.

While consistent sex differences were observed among graduates without special needs across all cohorts (more female than male graduates enrolled in PSE for the first time), they were not statistically significant among students with special needs except for later cohorts. For example, in cohorts 4 and 5, more female than male graduates with gifted status (94.3% of female graduates vs. 89.3% of male graduates) and with physical or sensory needs (80.9% of female graduates vs. 70.1% of male graduates) enrolled in PSE for the first time. Overall, a larger share of females than males enrolled in PSE for the first time; however, these sex differences were less consistent among graduates with special needs.

The proportions of students who graduated high school in British Columbia and transitioned to PSE by time of first enrolment across all cohorts and by special needs status and sex are shown in Table 3. Overall, over 50% of graduates transitioned to PSE immediately, about 80% of graduates transitioned to PSE within six years of graduation from high school. An additional 1.5% to 2.5% were delayed[28,29] in enrolling in PSE. While a decreasing trend in immediate and delayed enrolment is observed across cohorts, an increasing trend is noted in transitioning to PSE within six years of graduation. Graduates with gifted status (about 70% to 80%) were more likely to transition to PSE immediately compared with graduates without special needs (about 50% to 60%). In contrast, graduates with mental health-related or cognitive needs (roughly 40%) were less likely to transition to PSE immediately. Notably, in later cohorts (e.g., Cohort 4), fewer graduates with physical or sensory needs (43.1%) transitioned to PSE immediately compared with graduates without special needs (52.3%). Graduates with gifted status were also more likely to transition to PSE within six years compared with graduates without special needs (about 90% of those with gifted status vs. about 80% of those without special needs) across all five cohorts. However, graduates with mental health-related or cognitive needs (about 70%), as well as graduates with physical or sensory needs (about 70% to 80%), were less likely to transition to PSE within six years, by comparison. For high school graduates who were delayed in transitioning to PSE, graduates with mental health-related or cognitive needs had greater proportions with delayed enrolment compared with graduates without special needs (e.g., in Cohort 1, 3.0% of

28. Students who transitioned to PSE after six years from high school graduation were considered as having a delayed entry into PSE. For example, for students who graduated high school in 2011, a transition to PSE in 2018 or later would be considered as delayed.
29. Cohorts 4 and 5 do not have a delayed enrolment category because it would require data beyond the year 2020, which were not available at the time of the study.

graduates with mental health-related or cognitive needs vs. 2.5% of graduates without special needs). These differences suggest that special needs status (except gifted status) may be a barrier in transitioning to PSE immediately or within six years.

Table 3

Transition of high school graduates in British Columbia to postsecondary education, by cohort, special needs status, sex and time of enrolment

	Immediate			Within six years			Delayed		
Cohort (school year)	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female
					percent				
Cohort 1 (2010/2011)									
Total	51.1	49.9	52.2 *	81.2	80.0	82.4 *	2.5	2.6	2.4
Special needs status									
Without special needs (reference category)	51.0	49.9	52.0 *	81.5	80.3	82.6 *	2.5	2.6	2.4
Gifted	74.6 *	75.4	73.8	91.7 *	93.5	89.9	F	F	F
Mental health-related or cognitive needs	40.0 *	39.5	41.0	70.1 *	69.8	70.8	3.0 *	3.2	2.6
Physical or sensory needs	54.7	53.0	57.5	79.2 *	78.2	80.9	F	F	F
Cohort 2 (2011/2012)									
Total	52.0	50.4	53.5 *	81.2	80.3	82.0 *	1.9	2.1	1.8
Special needs status									
Without special needs (reference category)	52.2	50.8	53.6 *	81.7	80.9	82.4 *	1.9	2.0	1.8 *
Gifted	71.3 *	73.3	69.1	90.5 *	90.2	90.8	F	F	F
Mental health-related or cognitive needs	40.0 *	39.2	41.8	69.0 *	70.1	66.5	2.6 *	2.7	F
Physical or sensory needs	49.6	46.5	53.7	75.5 *	72.9	79.0	F	F	F
Cohort 3 (2012/2013)									
Total	51.2	49.2	53.1 *	80.8	79.4	82.3 *	1.4	1.4	1.4
Special needs status									
Without special needs (reference category)	51.4	49.5	53.2 *	81.4	80.1	82.6 *	1.4 *	1.4	1.5
Gifted	70.5 *	72.1	68.8	91.8 *	91.1	92.6	F	F	F
Mental health-related or cognitive needs	40.8 *	39.1	44.2 *	68.1 *	67.8	68.6	1.9 *	1.9	F
Physical or sensory needs	46.0	48.1	43.3	73.8 *	73.7	74.0	F	F	F
Cohort 4 (2013/2014)									
Total	52.0	49.9	54.2 *	80.7	79.6	81.8 *	...	...	...
Special needs status									
Without special needs (reference category)	52.3	50.1	54.3 *	81.2	80.3	82.1 *	...	...	...
Gifted	74.0 *	72.0	76.2	91.0 *	88.7	93.6 *	...	...	...
Mental health-related or cognitive needs	43.7 *	43.1	44.6	70.5 *	69.7	72.0	...	...	...
Physical or sensory needs	43.1 *	46.0	38.8	70.4 *	71.3	68.9	...	...	...
Cohort 5 (2014/2015)									
Total	57.9	55.8	60.0 *	80.9	79.7	82.1 *	...	...	...
Special needs status									
Without special needs (reference category)	58.5	56.6	60.4 *	81.6	80.7	82.5 *	...	...	...
Gifted	78.3 *	77.2	79.6	90.5 *	90.0	91.1	...	...	...
Mental health-related or cognitive needs	44.9 *	44.4	45.8	68.6 *	67.9	70.0	...	...	...
Physical or sensory needs	48.0	43.8	55.5	74.7 *	70.6	81.8 *	...	...	...

... not applicable

F too unreliable to be published

* significantly different from reference category ($p < 0.05$)

1. For sex differences, the reference category is male.

Note: The number of years considered for enrolment in postsecondary education ranged from 10 years for Cohort 1 to 6 years for Cohort 5.

Sources: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2009/2010; and Postsecondary Student Information System, 2010 to 2020.

More female than male graduates without special needs transitioned to PSE immediately (about 55% to 60% of female graduates vs. about 50% to 55% of male graduates) and within six years (about 82% of female graduates vs. about 80% of male graduates) across all five cohorts. However, sex differences among graduates with special needs across the cohorts were less consistent and differences were only found in cohorts 3, 4 and 5. For example, in Cohort 3, more female graduates (44.2%) than male graduates (39.1%) with mental health-related or cognitive needs transitioned to PSE immediately. In Cohort 4, more female than male graduates with gifted status (93.6% of female graduates vs. 88.7% of male graduates) transitioned to PSE within six years, and in Cohort 5, more female than male graduates with physical or sensory needs (81.8% of females vs. 70.6% of males) transitioned to PSE within six years. Overall, female graduates were more likely to transition to PSE immediately and within six years among graduates without special needs. Sex differences were in a similar direction, albeit not consistently statistically significant across all cohorts, for graduates with special needs, possibly because there are more males than females with special needs status (excluding graduates with gifted status).

Table 4 shows the proportions of students who graduated high school and transitioned to PSE by special needs status, sex and educational qualification. Across all five cohorts, regardless of students' special needs status and sex, about 45% to 50% of high school graduates enrolled in an undergraduate degree program, the highest proportion by educational qualification. This was followed by college-level diploma, college-level certificate and undergraduate associate degree programs.[30] However, this pattern differed by special needs status across the five cohorts. Graduates with gifted status (about 75% to 80%) were more likely to enrol in undergraduate degree programs compared with graduates without special needs (about 50% to 55%). In contrast, graduates with mental health-related or cognitive needs, as well as those with physical or sensory needs (about 25% to 35%), were less likely to enrol in undergraduate degree programs. Opposite patterns were found for college-level programs and undergraduate associate degree programs (see Table 4). Overall, graduates with special needs (except graduates with gifted status) tended to be less likely to enrol in undergraduate degree programs but more likely to enrol in college-level programs compared with graduates without special needs, suggesting that there may be additional challenges to accessing certain PSE programs among students with special needs.

30. In each cohort, about 2% or less (similarly for both males and females) were enrolled in other programs (data not shown because of small sample sizes).

Table 4

Transition of high school graduates in British Columbia to postsecondary education, by cohort, special needs status, sex and educational qualification

	College-level certificate			College-level diploma			Undergraduate associate degree			Undergraduate degree		
	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female
	percent											
Cohort 1 (2010/2011)												
Total	14.4	16.9	12.1 *	20.2	20.5	20.0	10.9	8.9	12.8 *	47.6	44.3	50.8 *
Special needs status												
Without special needs (reference category)	14.2	16.5	12.1 *	20.4	20.7	20.1	10.9	8.9	12.8 *	47.8	44.6	50.8 *
Gifted	4.5 *	6.4	F	11.1 *	13.3	8.7 *	5.8 *	5.9	5.7	75.0 *	71.6	78.6 *
Mental health-related or cognitive needs	28.2 *	29.8	25.0	21.3	19.7	24.7 *	12.6	11.0	15.9 *	23.9 *	23.2	25.3
Physical or sensory needs	18.7	20.5	F	26.0	25.0	27.4	17.3 *	F	F	30.0 *	29.6	30.7
Cohort 2 (2011/2012)												
Total	14.2	16.7	11.7 *	17.2	17.9	16.5 *	12.4	10.8	14.0 *	49.1	44.9	53.2 *
Special needs status												
Without special needs (reference category)	13.7	16.1	11.5 *	17.2	18.1	16.4 *	12.4	10.8	13.9 *	49.7	45.6	53.6 *
Gifted	3.4 *	F	F	8.5 *	8.4	8.5	9.9	8.8	11.2	74.6 *	75.8	73.4
Mental health-related or cognitive needs	30.4 *	33.7	23.2 *	19.4	17.6	23.2 *	14.8 *	11.7	21.6 *	23.0 *	21.0	27.2 *
Physical or sensory needs	22.6 *	27.6	F	21.9	25.0	F	21.2 *	F	62.1	23.4 *	F	59.4
Cohort 3 (2012/2013)												
Total	15.0	17.2	12.8 *	16.8	17.9	15.8 *	11.8	10.3	13.1 *	50.3	45.9	54.6 *
Special needs status												
Without special needs (reference category)	14.5	16.6	12.7 *	16.9	18.0	15.8 *	11.8	10.3	13.1 *	50.9	46.7	54.8 *
Gifted	4.9 *	5.8	F	10.5 *	13.5	7.4 *	6.9 *	7.1	6.7	74.1 *	69.6	78.9 *
Mental health-related or cognitive needs	29.4 *	32.8	22.5 *	18.6	17.4	21.1	14.2 *	11.9	19.0 *	25.1 *	23.5	28.5
Physical or sensory needs	25.8 *	25.7	F	15.2	F	F	16.7	F	F	36.4 *	31.1	52.1
Cohort 4 (2013/2014)												
Total	14.1	16.6	11.8 *	16.7	17.9	15.5 *	11.4	9.8	12.9 *	51.7	46.9	56.1 *
Special needs status												
Without special needs (reference category)	13.7	16.1	11.6 *	16.7	18.2	15.5 *	11.3	9.6	12.8 *	52.3	47.6	56.5 *
Gifted	3.8 *	F	F	9.5 *	11.2	7.8	8.2 *	8.3	8.2	76.4 *	72.6	80.4 *
Mental health-related or cognitive needs	25.9 *	27.8	22.4 *	17.3	15.0	21.6 *	14.8 *	13.3	17.7 *	30.0 *	29.0	31.7
Physical or sensory needs	23.1 *	24.7	F	21.1	23.6	F	15.7	F	F	32.7 *	32.6	32.8
Cohort 5 (2014/2015)												
Total	13.8	16.4	11.4 *	15.4	16.1	14.8 *	9.6	8.3	11.0 *	54.7	50.4	58.8 *
Special needs status												
Without special needs (reference category)	13.4	15.6	11.4 *	15.5	16.3	14.7 *	9.6	8.2	10.8 *	55.4	51.3	59.2 *
Gifted	3.4 *	F	F	8.2 *	8.8	7.5	6.3 *	6.3	6.4	78.0 *	75.9	80.5
Mental health-related or cognitive needs	26.0 *	30.3	17.6 *	17.7 *	15.5	22.1 *	11.4 *	8.7	16.5 *	33.3 *	30.8	38.1 *
Physical or sensory needs	19.9 *	22.5	F	18.2	14.4	24.6	15.3 *	14.4	F	34.7 *	33.3	36.9

F too unreliable to be published

* significantly different from reference category ($p < 0.05$)

1. For sex differences, the reference category is male.

Note: The number of years considered for enrolment in postsecondary education ranged from 10 years for Cohort 1 to 6 years for Cohort 5.

Source: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2009/2010; and Postsecondary Student Information System, 2010 to 2020.

Few sex differences were noted. Among students without special needs, females were more likely than males to enrol in undergraduate degree programs (about 50% to 60% of females vs. about 45% to 50% of males). This pattern was also largely observed among graduates with gifted status (about 75% to 80% of females vs. about 70% to 75% of males). While no sex differences were observed among graduates with physical or sensory needs, both in an earlier cohort (i.e., Cohort 2) and a later cohort (i.e., Cohort 5), more females (27.2% in Cohort 2 and 38.1% in Cohort 5) than males (21.0% in Cohort 2 and 30.8% in Cohort 5) with mental health-related or cognitive needs were enrolled in undergraduate degree programs. Additionally, female graduates with mental health-related or cognitive needs were more likely to enrol in college-level diploma programs (about 22% to 25%) compared with males (about 15% to 19%) across all cohorts (except Cohort 3). An opposite pattern was observed for college-level certificates, where more males than females were enrolled in these programs. These findings suggest that males with mental health-related or cognitive needs, in particular, are at risk for not enrolling in an undergraduate degree or college-level diploma program.

Table 5 presents the proportions of high school graduates' enrolment in either STEM or non-STEM programs. Over 50% of male and female graduates enrolled in non-STEM (other) programs, followed by STEM, business and related fields, and health care. Across all five cohorts, graduates with gifted status (about 38% to 48%) were more likely to enrol in STEM programs and less likely (about 40% to 50%) to enrol in non-STEM (other) programs compared with graduates without special needs (23% to 28% for STEM and 54% to 60% for non-STEM [other] programs). In contrast, graduates with mental health-related or cognitive needs and those with physical or sensory needs were less likely (14% to 17%) to enrol in STEM programs but more likely (about 70% to 75%) to enrol in non-STEM (other) programs compared with graduates without special needs. Few additional differences were noted for business and related fields, and health care (see Table 5).

Table 5

First-time enrolment in science, technology, engineering and mathematics programs or other programs, by cohort, special needs status and sex

Cohort (school year)	STEM			Non-STEM (health care)			Non-STEM (business and related fields)			Non-STEM (other)		
	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female	Total	Male[1]	Female
	percent											
Cohort 1 (2010/2011)												
Total	23.0	27.7	18.5 *	3.9	1.3	6.5 *	12.5	12.9	12.1 *	60.0	57.8	62.0 *
Special needs status												
Without special needs (reference category)	23.0	27.8	18.6 *	4.0	1.2	6.6 *	12.6 *	13.1	12.2 *	59.7	57.5	61.8 *
Gifted	38.0 *	47.1	28.5	F	F	F	12.0	11.0	13.0	48.3 *	40.9	56.1 *
Mental health-related or cognitive needs	12.6 *	15.6	6.5 *	4.0	F	7.5	9.0 *	8.5	10.1	74.5 *	74.1	75.3
Physical or sensory needs	14.0 *	F	F	F	F	F	10.0	F	F	71.3 *	70.5	72.6
Cohort 2 (2011/2012)												
Total	25.5	30.0	21.2 *	4.5	1.4	7.4 *	12.0	12.6	11.4 *	57.5	55.7	59.1 *
Special needs status												
Without special needs (reference category)	25.6	30.3	21.2 *	4.5	1.4	7.4 *	12.1	12.8	11.5 *	57.1	55.2	58.9 *
Gifted	45.0 *	55.6	32.8 *	2.7 *	F	F	9.5	10.1	8.9	42.5 *	32.3	54.1 *
Mental health-related or cognitive needs	14.4 *	15.0	13.3	4.1	F	9.3	8.4 *	8.8	7.4	72.6 *	74.5	68.5
Physical or sensory needs	13.9 *	F	F	F	F	F	F	F	F	70.8 *	69.7	72.1
Cohort 3 (2012/2013)												
Total	25.8	30.2	21.6 *	4.8	1.8	7.7 *	13.0	13.9	12.1 *	55.8	53.8	57.6 *
Special needs status												
Without special needs (reference category)	25.8	30.2	21.7 *	4.9	1.9	7.8 *	13.3	14.4	12.2 *	55.4	53.3	57.4 *
Gifted	47.2 *	59.6	34.2 *	3.4	F	5.0	7.7 *	7.1	8.4	41.5 *	31.4	52.0 *
Mental health-related or cognitive needs	16.5 *	19.3	10.8 *	3.3 *	F	7.9	9.0 *	8.1	10.8	70.7 *	71.2	69.7
Physical or sensory needs	12.9 *	F	F	F	F	F	12.1	F	F	72.0 *	68.9	75.9
Cohort 4 (2013/2014)												
Total	26.5	30.8	22.5 *	5.0	1.9	7.9 *	12.8	13.8	11.9 *	55.1	53.2	56.8 *
Special needs status												
Without special needs (reference category)	26.7	31.3	22.5 *	5.1	1.8	8.0 *	13.0	14.2	12.0 *	54.6	52.4	56.6 *
Gifted	47.0 *	54.9	38.9 *	3.7	F	F	8.6 *	9.4	7.8	40.8 *	33.2	48.5 *
Mental health-related or cognitive needs	15.9 *	17.9	12.3 *	4.7	2.4	8.8 *	10.0 *	9.0	11.9	68.4 *	70.1	65.3
Physical or sensory needs	12.2 *	16.9	F	F	F	F	F	F	F	74.2 *	68.5	82.8
Cohort 5 (2014/2015)												
Total	27.6	31.3	24.0 *	5.2	2.0	8.2 *	12.0	12.6	11.4 *	54.5	53.6	55.4 *
Special needs status												
Without special needs (reference category)	27.8	31.9	24.0 *	5.3	2.0	8.3 *	12.2	12.9	11.6 *	54.0	52.6	55.3 *
Gifted	48.3 *	53.0	42.7 *	3.6	F	6.0	10.4	10.3	10.5	37.4 *	34.8	40.5
Mental health-related or cognitive needs	16.1 *	16.6	15.0	3.3 *	F	7.1	9.0 *	9.3	8.6	70.5 *	72.2	67.0 *
Physical or sensory needs	17.6 *	15.3	F	F	F	F	8.5	F	F	68.2 *	72.1	61.5

F too unreliable to be published

* significantly different from reference category ($p < 0.05$)

1. For sex differences, the reference category is male.

Notes: The number of years considered for enrolment in postsecondary education ranged from 10 years for Cohort 1 to 6 years for Cohort 5. STEM refers to science, technology, engineering and mathematics.

Sources: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2010/2011 to 2014/2015; and Postsecondary Student Information System, longitudinal 2011 to 2020.

Sex differences were once again observed more consistently among graduates without special needs than those with special needs. Among graduates without special needs, more females than males across all cohorts were enrolled in non-STEM (other) programs (about 55% to 60% of females) and health care programs (about 6% to 8% of females), but fewer females than males were enrolled in STEM (18% to 24% of females) and business and related fields (11% to 12% of

females). Further disaggregation by special needs status and sex showed that female graduates with gifted status across all cohorts (except Cohort 5) had higher enrolment in non-STEM (other) programs; in Cohort 5, female graduates with mental health-related or cognitive needs (67.0%) were less likely than their male counterparts (72.2%) to enrol in non-STEM (other) programs. In all cohorts (except Cohort 1), female graduates with gifted status (6% to 12%) and female graduates with mental health-related or cognitive needs in cohorts 1, 3 and 4 (15% to 19%) had lower enrolment in STEM programs. Overall, these results indicate that first enrolment in STEM or non-STEM programs varies by special needs status and sex. As a result, males were more likely to enrol in STEM programs, whereas females were more likely to enrol in non-STEM (other) programs, regardless of their special needs status.

Table 6 shows the proportions of graduates who persisted[31] in PSE one and two years after first enrolment. Overall, high school graduates were more likely to persist one year after first enrolment (90%) compared with two years (80%) across the five cohorts, regardless of their special needs status.[32] Notably, graduates with mental health-related or cognitive needs were less likely to persist both one (about 85%) and two (about 70%) years after PSE enrolment compared with graduates without special needs (about 90% after one year and about 85% after two years). These results suggest that graduates with mental health-related or cognitive needs are more at risk for not continuing PSE both after one and two years, compared with those without special needs.[33]

Table 6
Persistence in postsecondary education one year and two years after enrolment, by cohort and special needs status

	Cohort (school year)									
	Cohort 1 (2010/2011)		Cohort 2 (2011/2012)		Cohort 3 (2012/2013)		Cohort 4 (2013/2014)		Cohort 5 (2014/2015)	
	One year	Two years	One year	Two years	One year	Two years	One year	Two years	One year	Two years
	percent									
Total	91.4	83.6	92.3	84.3	92.1	84.4	92.3	83.7	92.5	83.3
Special needs status										
Without special needs (reference category)	91.5	83.8	92.5	84.6	92.3	84.7	92.6	84.3	92.7	83.8
Gifted	95.9	91.3	97.5	96.1 *	97.5	91.9	96.0	92.7	95.3	93.6
Mental health-related or cognitive needs	83.5 *	69.8 *	84.3 *	69.8 *	84.9	71.8 *	84.9 *	70.4 *	88.8	72.2 *
Physical or sensory	90.7	81.5	90.6	80.4	82.7	82.0	89.1	75.0	88.8	73.7

* significantly different from reference category ($p < 0.05$)

Sources: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2010/2011 to 2014/2015; and Postsecondary Student Information System, longitudinal 2011 to 2020.

The final set of analyses examined the likelihood of enrolment in PSE, immediate transition and persistence in PSE after two years of first enrolment among students with and without special needs across all five cohorts, after controlling for sociodemographic characteristics known to be associated with these outcomes and for academic achievement, also known to be associated (see Table 7).[34,35] These analyses also allowed for consideration of all factors that may be associated with PSE outcomes simultaneously. For first-time enrolment in PSE, after considering the effects of sociodemographic characteristics and academic achievement, graduates with gifted status were 3 percentage points more likely to enrol in PSE, compared with graduates without special needs. However, graduates with mental health-related or cognitive needs were

31. Persistence was defined as continuing one or two years consecutively after first enrolment in PSE.
32. Disaggregated results by sex indicated that there were no statistically significant differences between males and females in persistence in PSE regardless of their special needs status (data not shown).
33. Sensitivity analyses indicated that the length of program did not change the pattern of these results (i.e., when students who graduated PSE were taken into account in the analyses, the patterns and the statistical significance were the same).
34. Marginal probability effects from probit and logit regression models were also estimated and yielded nearly identical results. These results are not included in this paper; however, they are available from the authors upon request. Given that the ordinary least squares models achieved the same results as the marginal effects from logit and probit models, the ordinary least squares models were presented for simplicity.
35. Models excluding the covariates are not shown but available from the authors upon request.

6 percentage points less likely and those with physical or sensory needs were about 2 percentage points less likely to enrol than graduates without special needs. Furthermore, graduates with mental health-related or cognitive needs were 2 percentage points less likely to enrol immediately in PSE compared with students without special needs. Lastly, graduates with mental health-related or cognitive needs were 2 percentage points less likely to persist after two years of first enrolment compared with graduates without special needs.

Table 7

Predicting postsecondary outcomes of high school graduates in British Columbia

	First-time enrolment		Immediate transition to postsecondary education		Persistence for two years	
	Model 1		Model 2		Model 3	
	regression coefficient	standard error	regression coefficient	standard error	regression coefficient	standard error
Intercept	0.976 *	0.008	0.632 *	0.010	0.502 *	0.026
Special needs status						
Without special needs (reference category)	...	...	...	...	...	...
Gifted	0.026 *	0.006	0.081 *	0.008	0.003	0.007
Mental health-related or cognitive needs	-0.063 *	0.004	-0.015 *	0.005	-0.018 *	0.005
Physical or sensory needs	-0.024 *	0.011	0.008	0.013	-0.005	0.014
Sex						
Female	0.003	0.002	-0.018 *	0.002	0.004	0.002
Male (reference category)	...	...	...	...	...	...
Age (BC K-12)						
Age 18 or younger	-0.001	0.007	0.149 *	0.009	-0.004	0.009
Age 19 (reference category)	...	...	...	...	...	...
Parental income (Grade 10)						
Less than $30,000	-0.059 *	0.003	-0.054 *	0.003	...	...
$30,000 to $39,999	-0.048 *	0.003	-0.055 *	0.004	...	...
$40,000 to $49,999	-0.037 *	0.004	-0.049 *	0.004	...	...
$50,000 to $59,999	-0.029 *	0.004	-0.045 *	0.005	...	...
$60,000 to $69,999	-0.017 *	0.004	-0.025 *	0.005	...	...
$70,000 to $79,999	-0.008	0.005	-0.023 *	0.006	...	...
$80,000 or more (reference category)	...	...	...	...	...	...
Missing income	-0.075 *	0.003	-0.093 *	0.004	...	...
Personal income						
Less than $30,000	...	...	...	...	-0.005	0.025
$30,000 to $39,999	...	...	...	...	-0.007	0.028
$40,000 to $49,999	...	...	...	...	-0.001	0.030
$50,000 to $59,999	...	...	...	...	-0.007	0.035
$60,000 to $69,999	...	...	...	...	0.000	0.042
$70,000 to $79,999	...	...	...	...	0.007	0.059
$80,000 or more (reference category)	...	...	...	...	...	...
Missing income	...	...	...	...	-0.063 *	0.025

... not applicable

* significantly different from reference category ($p < 0.05$)

Notes: Additional models were run with a continuous age variable rather than the categorical (i.e., age 18 or younger vs. age 19) to further explore the associations between high school graduates' age and their postsecondary outcomes. The number of years considered for enrolment in postsecondary education ranged from 10 years for Cohort 1 to 6 years for Cohort 5. BC K-12 refers to the British Columbia kindergarten to Grade 12 dataset. STEM refers to science, technology, engineering and mathematics.

Sources: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2010/2011 to 2014/2015; Postsecondary Student Information System, longitudinal 2011 to 2020; and Postsecondary Student Information System and T1 Family File dataset, 2007 to 2020.

Table 7

Predicting postsecondary outcomes of high school graduates in British Columbia (continued)

	First-time enrolment		Immediate transition to postsecondary education		Persistence for two years	
	Model 1		Model 2		Model 3	
	regression coefficient	standard error	regression coefficient	standard error	regression coefficient	standard error
Educational qualification						
College certificate	...	...	0.013 *	0.004	-0.052 *	0.003
College diploma	...	...	0.068 *	0.003	-0.014 *	0.003
Undergraduate associate degree	...	...	0.177 *	0.004	-0.007 *	0.003
Undergraduate degree (reference category)	...	...	...	...	...	...
Field of study						
Non-STEM (business and related fields)	...	...	0.164 *	0.006	-0.017 *	0.005
Non-STEM (health care)	...	...	0.282 *	0.004	-0.005	0.003
Non-STEM (other)	...	...	0.246 *	0.002	-0.011 *	0.003
STEM (reference category)	...	...	...	...	...	...
Academic achievement						
Grade 10 English						
English grade: A (reference category)	...	...	...	...	...	...
English grade: B	-0.011 *	0.002	-0.027 *	0.003	-0.001	0.003
English grade: C	-0.083 *	0.003	-0.123 *	0.004	-0.014 *	0.003
English grade: F	-0.201 *	0.009	-0.200 *	0.010	-0.052 *	0.014
Missing English grade	-0.141 *	0.006	-0.185 *	0.007	-0.029 *	0.007
Grade 10 science						
Science grade: A (reference category)	...	...	...	...	...	...
Science grade: B	-0.020 *	0.003	-0.096 *	0.003	-0.002	0.003
Science grade: C	-0.106 *	0.003	-0.193 *	0.004	-0.019 *	0.004
Science grade: F	-0.198 *	0.009	-0.277 *	0.011	-0.047 *	0.015
Missing science grade	-0.067 *	0.007	-0.126 *	0.008	-0.003	0.009
Grade 10 math						
Math grade: A (reference category)	...	...	...	...	...	...
Math grade: B	-0.001	0.003	-0.090 *	0.003	-0.004	0.003
Math grade: C	-0.015 *	0.003	-0.145 *	0.004	-0.011 *	0.003
Math grade: F	-0.102 *	0.008	-0.234 *	0.009	-0.039 *	0.011
Missing math grade	0.035 *	0.007	0.039 *	0.008	0.017 *	0.009
Cohort						
Cohort 1 (reference category)	...	...	...	...	...	...
Cohort 2	-0.002	0.002	-0.106 *	0.003	0.003	0.003
Cohort 3	-0.012 *	0.002	-0.110 *	0.003	0.004	0.003
Cohort 4	-0.022 *	0.002	-0.108 *	0.003	0.004	0.003
Cohort 5	-0.032 *	0.003	-0.062 *	0.003	0.010 *	0.003

... not applicable

* significantly different from reference category ($p < 0.05$)

Notes: Additional models were run with a continuous age variable rather than the categorical (i.e., age 18 or younger vs. age 19) to further explore the associations between high school graduates' age and their postsecondary outcomes. The number of years considered for enrolment in postsecondary education ranged from 10 years for Cohort 1 to 6 years for Cohort 5. BC K-12 refers to the British Columbia kindergarten to Grade 12 dataset. STEM refers to science, technology, engineering and mathematics.

Sources: Statistics Canada, British Columbia Ministry of Education kindergarten to Grade 12 dataset, 2010/2011 to 2014/2015; Postsecondary Student Information System, longitudinal 2011 to 2020; and Postsecondary Student Information System and T1 Family File dataset, 2007 to 2020.

All sociodemographic covariate effects were largely in the expected direction. High school graduates enrolled in a college-level certificate, college-level diploma or undergraduate associate degree program were 1 to 18 percentage points more likely to transition immediately compared with high school graduates transitioning immediately to an undergraduate degree program. However, high school graduates who enrolled in a college-level certificate, college-level diploma or undergraduate associate degree program were less likely (-1 to -5 percentage points) to persist for two years in PSE. For transitioning immediately to PSE, high school graduates in health care programs (+28 percentage points) and business and related fields or non-STEM (other) programs (+16 to +25 percentage points) were more likely to transition immediately to PSE compared with graduates in STEM programs. However, high school graduates in business and related fields or non-STEM (other) programs were slightly less likely (-1 to -2 percentage points) to persist for two years in PSE. Overall, both graduates with mental health-related or cognitive needs and those with physical or sensory needs were less likely to enrol in PSE. Graduates with mental health-related or cognitive needs were also less likely to transition immediately into PSE compared with high school graduates without special needs. This indicates that graduates with special needs, except for those with gifted status, may face additional barriers to enrolling in PSE compared with graduates without special needs.

5 Discussion

Lower PSE enrolment rates and barriers to accessing PSE among high school graduates with special needs have been well established in previous research. However, past research has been largely limited to examining these associations using cross-sectional data that provide temporal snapshots that rely mostly on one cohort of students and a broad special needs category. Exploring PSE enrolment and persistence with longitudinal data among high school graduates with disaggregated special needs categories across multiple cohorts can enhance the understanding of whether PSE enrolment among high school graduates with diverse special needs has improved over time compared with high school graduates without special needs. Using longitudinal administrative kindergarten to Grade 12 data integrated with postsecondary information, this study found that about 80% of students who graduated high school in British Columbia with a Dogwood Diploma across all five cohorts enrolled in PSE in Canada, and females were overall more likely to enrol in PSE than males, but these figures were mostly driven by graduates without special needs. By comparison, graduates with special needs (except those with gifted status) had lower first-time PSE enrolment, a pattern consistent with previous research (e.g., Barnett & Gibson, 2021; Arim & Frenette, 2019). More specifically, while about 90% of students with gifted status enrolled in PSE, the figures were about 70% for graduates with mental health-related or cognitive needs and 70% to 80% for graduates with physical or sensory needs. A cautionary note should be made for the results of this study regarding the relatively small but significant differences observed between graduates with and without special needs, which may be attributable to the exclusion of students who obtained an Evergreen Certificate and are likely to have more severe types of disabilities than those who obtained a Dogwood Diploma. In addition, the inclusion of all types of registration status without distinguishing between those who registered in PSE full time and those who registered part time contributed to reducing overall differences. Given these factors, the actual gaps may indeed be larger, as shown in previous studies (e.g., Arim & Frenette, 2019).

A further look at disaggregated special needs categories also revealed that there was diversity among high school graduates regarding the time of their transition to PSE. Similar to Barnett and Gibson's (2021) study, there was a decreasing trend in immediate and delayed enrolment observed across cohorts, while an increasing trend was noted in transitioning to PSE within six years of graduation. Notably, having a special needs status (except for graduates with gifted status) seemed to be a barrier for immediate PSE enrolment across all cohorts. While graduates with gifted status had higher proportions (over 70%) of immediate enrolment in PSE, graduates with mental health-related or cognitive needs consistently had lower proportions (about 40%) of immediate enrolment compared with graduates without special needs (over 50%). Similar patterns emerged for transitioning to PSE within six years. When considering graduates' sex along with their special needs status, few sex differences appeared in later cohorts. For example, in Cohort 3, female graduates with mental health-related or cognitive needs (44.2%) were more likely to enrol immediately compared with males (39.1%). Female graduates with gifted status in Cohort 4 (93.6%) were more likely than their male counterparts (88.7%) to enrol in PSE within six years, and female graduates with physical or sensory needs in Cohort 5 (81.8%) were also more likely to enrol in PSE within six years compared with their male counterparts (70.6%). The lack of consistent significant sex differences among graduates with special needs may be because two-thirds of graduates among those with special needs (except those with gifted status) were male. However, this distribution also suggests that when sex differences are in favour of females, males, particularly those with special needs (except those with gifted status), are significantly more at risk than females of not enrolling in PSE. These findings emphasize the importance of considering disaggregated data by special needs status and sex to provide a richer understanding of PSE experiences among graduates with and without special needs.

Three other PSE experiences—educational qualification, field of study and persistence—were considered by sex and special needs status in this study. High school graduates were more likely to enrol in undergraduate degree programs and, more specifically, in non-STEM (other) programs, a pattern largely driven by graduates without special needs. Further disaggregation by special needs category revealed significant differences in educational qualification and field of study. Graduates with special needs (except graduates with gifted status) had lower enrolment in undergraduate degree programs, whereas graduates with gifted status had higher enrolment, compared with graduates without special needs. However, an opposite pattern was found for graduates enrolling in college-level certificate programs in all cohorts (except Cohort 1 graduates with physical or sensory needs), where graduates with mental health-related or cognitive needs and those with physical or sensory needs had higher proportions of enrolment, while graduates with gifted status had lower proportions of enrolment than graduates without special needs. Furthermore, when examining fields of study by special needs status, graduates with special needs had lower enrolment in STEM programs but higher enrolment in non-STEM (other) programs, while graduates with gifted status had higher enrolment in STEM programs and lower enrolment in non-STEM (other) programs compared with graduates without special needs across all cohorts. Upon further examination for persistence in PSE, graduates with mental health-related or cognitive needs in particular were less likely to persist in PSE one and two years after first-time PSE enrolment compared with graduates without special needs.

Regarding sex differences, the results were mixed when sex and special needs status were considered. More females than males were enrolled in undergraduate degree programs, while more males than females were enrolled in college-level certificate programs, regardless of special needs status. Additionally, compared with males, fewer females with gifted status in all cohorts (except Cohort 1) and fewer females with mental health-related or cognitive needs in cohorts 1, 3 and 4 were enrolled in STEM programs. In contrast, in cohorts 2, 3 and 4, female graduates with gifted status had higher enrolment in non-STEM (other) programs than males.[36] Nevertheless, these results should be interpreted in light of known sex differences in special needs, where there are more males than females in all special needs categories (except those with gifted status). Overall, most enrolments were in undergraduate degree and college-level diploma programs, as well as in non-STEM-related fields of study, across all five cohorts, regardless of students' sex and special needs status. Persistence one year and two years after PSE enrolment seemed to be at risk only for graduates with mental health-related or cognitive needs and, as expected, was higher among graduates without special needs, by about 10% to 15% from one year to two years after first-time enrolment.

When socioeconomic factors were considered along with student characteristics (e.g., sex, age, special needs status, cohort and academic achievement), high school graduates with special needs (excluding graduates with gifted status) were less likely to enrol in PSE (-2 to -6 percentage points). Additionally, only graduates with mental health-related or cognitive needs were less likely to transition to PSE immediately (-2 percentage points) and less likely to persist in PSE two years after their first-time PSE enrolment (-2 percentage points). Once again, these significant but small differences may be attributable to the exclusion of students who obtained an Evergreen Certificate, as well as the inclusion of all types of registration status.[37] Differences in cohort, sex, academic achievement and other sociodemographic characteristics explained 43.6% of the gap between graduates with and without special needs in first-time enrolment in PSE. These findings suggest that other factors that were not considered in this study contribute to this gap. Even the delay in PSE enrolment for high school graduates with special needs may be critical, since Frenette (2022) showed that taking a gap year between high school graduation and PSE is associated with less cumulative earnings for both males and females compared with individuals

36. There may be various reasons for observed cohort differences, ranging from changes in educational practices and policies implemented in PSE to the increase of student accessibility services across postsecondary institutions (Michalski, Cunningham, & Henry, 2017). This is beyond the scope of this study.
37. Differences were larger when graduates' registration status was restricted to full-time students only (analysis not shown).

who enrolled in PSE shortly after high school, with the exception of men enrolled in non-degree programs, where taking a gap year is positively associated with earnings. Future research may focus on specific barriers to accessing PSE and identify accommodations for students with special needs. This may provide insights to enhance a successful transition to adulthood.

This study acknowledges several limitations. First, there was a maximum assignment of one special needs status to each student per academic year, and thereby, this study was not able to capture whether students had more than one special needs status at the time of graduation. Second, those who obtained an Evergreen Certificate were not available in the dataset, and this may have led to an underestimation of differences in enrolment and persistence by special needs status. Third, unlike Leanage and Arim's (2024) previous study, the sample sizes for students with physical needs or sensory needs were low in this study, and therefore, these groups could not be disaggregated. Nevertheless, this study highlighted the importance of examining disaggregated special needs categories, since diversity exists within the different special needs status categories. Finally, this study excluded high school graduates who attended PSE outside Canada and those in private PSE (about 11% of students; see Fecteau and Van Bussel [2023]) since the PSIS data are exclusively from public postsecondary institutions. Despite these limitations, this study had several strengths because it uniquely encompassed high school graduates who were assigned to a special needs category **twice or more** throughout their school years from kindergarten to Grade 12 in British Columbia, allowing for a more inclusive sample of students with special needs. In addition, this study examined PSE outcomes in five different cohorts using longitudinal education administrative data to demonstrate patterns of first enrolment in PSE, time of enrolment, persistence within PSE, educational qualifications and fields of study. Future research may explore geographic mobility among high school graduates as they transition to PSE using a special needs status lens. The completion of PSE among graduates with and without special needs and their transition into the labour market could also be a fruitful endeavour in future studies.

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