Final Report

Predicting Transfer Pathway Uptake and Associated Income Profiles

A Second Look at the TDSB-PSIS Linkage

Focus on Disability

June 30, 2022

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Executive Summary

Access to and acquisition of postsecondary education (PSE) are increasingly important in securing employment within the Canadian labour force (Canadian Occupational Projection System, 2017). PSE is also tied to health and well-being outcomes (Fonseca & Zheng, 2011; Irwin, 2015; Kearney et al., 2015). Students with disabilities have been identified as a group that continues to face barriers in accessing PSE (Kirby, 2009; Ontario Human Rights Commission, 2016) and experiences ongoing accessibility issues within PSE programs (Dolmage, 2017; National Educational Association of Disability Students [NEADS], 2012; Shanouda & Spagnuolo, 2021). In a recent Canadian study, students with disabilities are identified as being significantly less likely to access PSE as compared to their peers (26% to 49%, respectively) (Parekh et al., 2022a), and when they do attend PSE, are more likely to experience embedded stigma and discrimination (Waterfield et al., 2018). Similarly, research demonstrates how PSE graduates with disabilities continue to face barriers in securing equitable employment opportunities (Chatoor, 2021; Morris et al., 2018).

Despite there being established research on the PSE outcomes related to transference (Walters et al., 2021) and a growing field examining disability and transference, there is far less research addressing the relationship between students' experience of disability, transference, PSE graduation, and future income. Therefore, our analysis not only addresses a particular gap in the scholarly research, but also highlights the barriers students with disabilities encounter as they move through the PSE system into the workforce. Our analysis addresses the following:

1. Do students with and without disabilities achieve parity in predicted income shortly after leaving their programs?
2. Dependent on transfer patterns, are students with and without disabilities more or less likely to reach income parity?
3. **What role do transfer and students' public school experiences play in relation to students' earnings shortly after leaving PSE?**

Highlights

Regardless of their academic pathway, students with disabilities consistently earn less than their non-disabled colleagues.

Students who enter and stay within their college or university program have higher predicted earnings than their respective peers who have transferred between PSE institutions.

When the control variables were included in the model, the increase in earnings was larger for transfer students with disabilities than transfer students without disabilities, suggesting that if students are going to transfer, students with disabilities are more likely to benefit from transferring than their non-disabled counterparts.

In our first analysis examining transfer and graduation from PSE (Parekh, et al., 2022b), the inclusion of students' achievement, program, and school-based variables rendered the gap in students' graduation rates for both transfer and disability variables negligible. However, in the analysis of predicted future earnings, the inclusion of these same variables reduced, but did not eliminate, the persistent income gap between both transfer and disability variables.

Introduction

Access to and acquisition of postsecondary education (PSE) are increasingly important in securing employment within the Canadian labour force (Canadian Occupational Projection System, 2017). PSE is also tied to health and well-being outcomes (Fonseca & Zheng, 2011; Irwin, 2015; Kearney et al., 2015). Students with disabilities have been identified as a group that continues to face barriers in accessing PSE (Kirby, 2009; Ontario Human Rights Commission, 2016) as well as experience ongoing accessibility issues within PSE programs (Dolmage, 2017; National Educational Association of Disability Students [NEADS], 2012; Shanouda & Spagnuolo, 2021). In a recent Canadian study, students with disabilities were significantly less likely to access PSE as compared to their peers (Parekh et al., 2022a), and once enrolled, were more likely to experience embedded stigma and discrimination (Waterfield et al., 2018).

For students who are enrolled in PSE programs, transference between PSE institutions may enable students to secure a seat within a program that best meets their interests and needs. Historically, transferring between PSE institutions has been connected to less than ideal academic outcomes such as lower graduation rates (Walters et al., 2020) and extended PSE completion times (Percival et al., 2016; Tobolowsky & Cox, 2012). Accessibility issues continue to pose critical barriers within PSE programs (Dolmage, 2017; NEADS, 2012; Shanouda & Spagnuolo, 2021). Therefore, it may not be a surprise that students with disabilities are more apt to pursue transfer pathways than their non-disabled peers (Parekh et al., 2022).

Students are motivated to transfer between PSE institutions for many reasons, including adapting to family, work, and academic commitments (Speers et al., 2012). Several theories exist as to "why" students transition between postsecondary institutions, and these include motivators such as successful integration (Carter et al., 2013), student socialization (Carter et al., 2013), and the impact of environmental factors (Crisp & Nuñez, 2014). While greater attention is needed to better understand the overall outcomes for students who transition (Andrew et al., 2014; Bahr, 2012), more attention also needs to be paid to the growing number of students with disabilities who pursue transference in hopes for a better chance to graduate and successfully enter the workforce (Anyinam et al., 2020; Henderson & McCloy, 2019; Milsom & Sackett, 2016: Williams & McCloy, 2019). Interestingly, in a recent Canadian study, students who transfer were far more likely to transfer in responses to "adverse experiences" compared to being driven by a desire for better educational outcomes (Childs et al., 2017). In Childs et al.'s (2017) sample population, 48.4% of community college and 36.1% of university students who transferred stated that they did so because they "Did not like it/Not for me" (p. 291). For students with disabilities, transference is also often related to accessing student accessibility services and addressing barriers within classroom, program, and campus environments (Henderson & McCloy, 2017; O'Donnell et al., 2018; Williams & McCloy, 2019). Despite students with disabilities being more likely to transfer between PSE institutions and the historical relationship between transference and PSE graduation, a recent study found that, when controlling for students' previous achievement, program, and school-based variables, the difference in overall PSE graduation rates for students with disabilities and their non-disabled peers was negligible (Parekh et al., 2022b).

For many students, the motivation of pursuing PSE is related to developing the skills and credentials necessary to secure future employment. Overall, in 2017, Statistics Canada data revealed that, for people with disabilities, less than half were employed (47.3%) compared to 74.3% of their non-disabled peers (Gatto et al., 2020). Statistics Canada data also showed that

Canadians with disabilities were 33% more likely to live in poverty. However, over the last seven years, PSE enrollment has risen by 66% for people with disabilities (Gatto et al., 2020). Researchers have examined the relationship between PSE attainment, disability, and future earnings, and their findings have revealed ongoing substantive disparities. For instance, in a study examining the employment outcomes for autistic youth, results demonstrated a 27.6% difference in terms of gainful employment between students who had not accessed PSE compared to those who had some PSE (Whittenburg et al., 2019). In Chatoor's (2021) study, the following outcomes were determined:

- Graduates with disabilities were more likely to feel overqualified for their jobs as compared to their non-disabled counterparts (48% for disabled students, 34% for non-disabled students)
- Graduates with disabilities were more likely to feel underpaid as compared to their non-disabled counterparts (68% of disabled students report satisfaction vs. 76% of students without a disability).
- Graduates with disabilities were less likely to receive benefits from their employer (health, dental, etc.).
- PSE graduates with disabilities were between 16 and 22% more likely to live in poverty compared to PSE graduates without disabilities.

Overall results revealed that PSE graduates with disabilities continued to face barriers in securing equitable employment opportunities (Chatoor, 2021). Both Chatoor (2021) and Morris et al. (2018) suggested that the degree of impairment and level of education attained were key intersecting factors in employment outcomes. There are also documented barriers for students with disabilities in particular fields of work. For instance, in another recent Canadian study, Jarus et al. (2020) found that only 4.8% of workers in the field of healthcare self-identified as having a disability. The authors cited significant institutional barriers, such as long hours of study, in-person placement, and prolonged commitments to their programs.

Despite there being established research on the PSE outcomes related to transference (Walters et al., 2021) and a growing field examining disability and transference, there is far less research addressing the relationship among students' experience of disability, transference, PSE graduation, and future income. Therefore, our analysis not only addresses a particular gap in the scholarly research, but also contributes to the extent research that is raising alarms over the barriers students with disabilities encounter as they move through the PSE system and into the workforce.

Data and Methods

Data and Sample

This research draws from a linkage of data from four sources: the Toronto District School Board's (TDSB) Grade 9 Cohort Dataset, the Postsecondary Student Information System (PSIS), and the T1 Family File (T1FF). The Toronto District School Board's (TDSB) Grade 9 Cohort Dataset includes information about students' secondary school factors throughout their secondary school careers. The Postsecondary Student Information System consists of the programs and outcomes of all students in Canadian colleges and universities. Further information

relating to these data is provided in our preliminary report (Parekh et al., 2022b). Finally, the T1 Family File contains information about Canadians' earnings based on income tax records.

This study's sample consists of all TDSB students from the 2004 to 2006 cohorts who pursued postsecondary studies at an Ontario university or college between 2009 and 2011, and who also had a tax record in 2017.[1] Students who began their postsecondary studies at unconventional times, including during the winter semester, were excluded from the analyses.

Variables

The dependent variable for this study was individuals' income as reported on their 2017 tax record. To mitigate the impact of outlying observations, this variable was capped at $300,000. The two key independent variables were students' postsecondary pathways and whether they were identified as having a disability (see below for more information on how the disability variable was constructed). Students' postsecondary pathways were derived from the PSIS data by combining the institution where they began their studies and the last institution that they attended during the study period. In the first series of models, a mobility variable was created to distinguish students who stayed at the same institution from students who transferred to another institution. For the second series of analyses, this variable was recoded to distinguish among six pathways: direct entry university (non-transfer university), university to university transfer, university to college transfer, direct entry college (non-transfer college), college to university transfer, and college to college transfer. Whether students were identified as having a disability was coded as 0 = No and 1 = Yes. Those coded as having a disability included students who were accessing TDSB special education services, who received a permanent disability grant from the Canada Student Loans Program, or who claimed a disability amount in the 2017 income tax.

Data related to students' sociodemographic characteristics, postsecondary programs, and secondary school variables were included in the statistical analyses as control variables. Sociodemographic variables were derived from the TDSB data and included whether students' first language was English (0 = Yes, 1 = No), whether they were born in Canada (0 = Yes, 1 = No), their gender (0 = Female, 1 = Male), and their age when they began Grade 9. Age included two categories: 14 years or younger and 15 years or older. Finally, the average income of students' neighbourhoods was included based on students' postal code from the TDSB data.

Postsecondary program information was derived from the PSIS and included the year students started their programs (2009, 2010, or 2011) and their field of study. The field of study variable distinguishes among liberal arts (arts, humanities, and social sciences), business, STEM, health, and other fields.

Finally, several variables measured secondary school factors. This includes whether students had ever been suspended in elementary or secondary school (0 = No, 1 = Yes), whether students passed the Ontario Secondary School Literacy Test (OSSLT) on their first attempt (0 = Yes, 1 =

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[1] Students who had records in PSIS in 2017 were removed. Please note that full-time students in 2016–17 and 2017–18 were removed from the analyses as they would unlikely be able to fully participate in the labour market (part-time students remained in the sample).

No), and the number of credits they accumulated in Grade 9 (7 or less, 8, or 9 or more). The analyses also include a variable that captures the percentage of time that a student was absent in Grade 9, which is coded as follows: $1 = 0–2\%$, $2 = 3–5\%$, $3 = 6–10\%$, $4 = 11–20\%$, and $5 = 21\%$ or more. This variable is conceptually continuous, and is treated as a quantitative variable in the regression models. Finally, we also include variables that capture whether students were enrolled in an Academic or Applied stream in Grade 9, and their overall Grade 9 average marks, as a percentage grade.

Frequencies[2]

Mobility Pathways: The mobility pathways variable captures students' experience of transference within the PSE system. From our sample of 22,550 students who accessed the PSE system and for whom we had 2017 tax records, 87.1% entered and left PSE staying at the same institution from which they began, while 12.9% had a history of transference. A more detailed examination revealed that 64% entered university and stayed within the same university, whereas 24% of students entered and stayed within the same college. Of transfer pathways, the university to college pathway was the most popular with 6%, followed by a transfer from university to university at 4%. Only 2% of students transferred between colleges and only 1% moved from a college to a university. (See Table 1.)

Table 1: Mobility Pathways

Direct Entry University	63.6%
University to College	5.8%
University to University	3.9%
Direct Entry College	23.5%
College to College	2.3%
College to University	0.9%

Graduation: The combined graduation rate for both university and college was 77%, while approximately 23% had entered either university or college and had not graduated. (See Table 2.)

Table 2: Postsecondary Outcomes (Graduation)

Entered college but did not graduate	11.0%
Entered university but did not graduate	12.1%
Graduated college	19.0%
Graduated university	57.9%

Disability[3]**:** The disability variable included:

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[2] See Appendix B for further analysis on structural and program-based variables and future income.

[3] Note that these descriptions of the disability, student demographic, and school-based variables were drawn from an earlier report for ONCAT, see Parekh et al. (2022b).

- Students identified through the TDSB's special education system (excluding gifted).
- Students who did not have experience in special education but applied for the Canadian Student Grant for Students with Permanent Disabilities when accessing postsecondary education.
- Students who both accessed special education in the TDSB and the Canadian Student Grant for Students with Permanent Disabilities.
- Students who were identified as having a disability through the T1 tax files for 2017.

Note: Recent changes to guidelines in disability language encourage the use of identity-first language, such as "disabled people," and, when the identity preferences of a group are unknown the preference is to use person-first language, such as "people with disabilities." New guidelines have also recommended that the term "students with special education needs" be discontinued as it is deemed offensive (National Center on Disability and Journalism, 2021). Therefore, we will use the term "students with disabilities" as a descriptor for students included within the disability variable.

In our sample, 90% of students did not fall within the disability category whereas 10% met the criteria. (See Table 3.)

Table 3: Disability

Students without disabilities	89.6%
Students with disabilities	10.4%

Student Demographics

Students' demographic variables (see Table 4) included in the study are as follows:

Language: The language variable examines whether students speak only English or speak other languages. Fewer than half of students (45%) in this study spoke only English, whereas 55% spoke other languages.

Students' place of birth: The students' place of birth variable identifies whether students were born inside Canada or in another country. Close to two thirds of this cohort (65%) were born in Canada, whereas just over a third (35%) were born outside of Canada.

Gender: The gender of students was taken from the TDSB's Student Information System. At the time, only the gender categories of "male" and "female" were available for analysis. Within the study's population, 53% were identified as female and 47% as male.

Age of students in Grade 9: This variable identifies whether students were 14 years of age or younger or 15 years of age when they were in Grade 9. The vast majority of students (97%) were 14 years or younger when they were in Grade 9, and 3% were 15 years of age.

Deciles of income: This is a TDSB derived variable. Groupings of 10, from the lowest decile or 10% of students with the lowest income, to the highest decile or 10% of students with the highest income. This variable was created by matching the six-digit postal code of a student's residence

with the median income of the dissemination area (DA) in which the student was living, using the variable ECYHNIMED from Environics Analytics (2018 dollars). The deciles were calculated based on all students within the dataset, both those who went to postsecondary and those who did not. Therefore, not all deciles of income included in the Table 4 below work out to 10%. Interestingly, despite the data being organized into equal deciles of 10%, for students who entered the PSE system, there was a skew towards higher income with 45% of students falling within the five lower deciles of income and 55% within the five higher deciles of income.

Year of postsecondary entry: This variable identifies whether students entered postsecondary education in or before 2009 or in or after 2010. Within the study's sample, close to half (51%) began their postsecondary education in 2009 or before, close to a third (31%) began in 2010, with 18% beginning in 2011 or later.

Table 4: Student Demographics

Language	
English only	45.1%
Other than English	54.9%
Country of Birth	
Canada	65.0%
Outside Canada	35.0%
Gender	
Female	52.6%
Male	47.4%
Age at Grade 9	
14 or younger	96.9%
15 years old	3.1%
Deciles of Income	
Lowest Decile of Income	8.5%
Decile 2	8.4%
Decile 3	8.9%
Decile 4	9.5%
Decile 5	9.6%
Decile 6	10.9%
Decile 7	10.3%
Decile 8	10.3%
Decile 9	11.2%
Highest Decile of Income	12.4%
Start of Postsecondary	
2009 or earlier	50.7%
2010	31.1%
2011 or later	18.2%

Field of study: The field of study variable captures the area of study students pursued once they entered PSE. In this study's sample, over a third (37%) pursued the arts, with close to a quarter

pursuing business (24%) and STEM (24%), and the remaining 16% pursuing health and other fields of study. (See Table 5.)

Table 5: Field of Study

Liberal Arts (arts, humanities, and social sciences)	36.8%
Business	23.6%
STEM	23.6%
Health	7.6%
Other	8.5%

School-Based Variables

This study was able to integrate students' public school experiences into the analysis (see Table 6). Historically, studies on postsecondary education that are reliant on Statistics Canada data alone have been unable to examine the relationship between students' high school experiences and their postsecondary access and outcomes. It is important to note that the vast majority of students in this analysis were born between 1990 and 1992 (that is, they were 14 years of age in 2004, 2005, and 2006), and therefore would have been 25 to 27 years of age as of the 2017 tax year, and would have been just starting their working careers.

Key secondary school-based variables include:

Public school suspension data: Students who had been suspended have been seen to have a much lower chance of transitioning to postsecondary education (Brown & Parekh, 2013). Records from PSIS identify those students who had been suspended at any time from JK to Grade 12 between 2000 and 2017. Since students in this analysis entered Grade 9 in Fall 2003 to Fall 2007, and finished Grade 12 between Fall 2008 and Fall 2012, this would apply to suspensions from the early- to mid-elementary grades (Grade 6 for the Fall 2003 cohort; Grade 2 for the Fall 2007 cohort) up to the end of Grade 12. While not complete, these records provide an overview of the vast majority of suspensions, since we know that most suspensions took place from Grade 6 to Grade 12. Within this study's population, 85% of students had not been suspended during their time in the TDSB, with 15% experiencing one suspension or more.

The Ontario Secondary School Literacy Test (OSSLT): This variable indicates whether students have successfully completed the OSSLT on their first try. Passing the OSSLT is a mandatory requirement for students to attain an Ontario Secondary School Diploma. In this study, 87% of students passed the OSSLT upon the first try with 13% either not passing or deferring.

Grade 9 credit accumulation: In Ontario, students are expected to earn eight credits in Grade 9. Some students may opt to take a summer program and earn nine, others may drop one or more credits as a strategy to lighten the academic load. Grade 9 credit accumulation has demonstrated to be an important predictor of future academic achievement (Brown, 2010). The vast majority of students in this study earned the expected eight credits in Grade 9 (80%) with 9% exceeding

expectations by earning nine or more credits. However, 11% of students only earned seven or fewer credits in Grade 9.

Grade 9 program of study: The Grade 9 program of study for students is determined based on the majority of Grade 9–10 courses taken at a particular Academic level. In Ontario, excluding "open" courses, the options for a course level in Grade 9 are Academic, Applied, and Locally Developed. There are important relationships between students' Grade 9 program of study and the courses they pursue throughout their high school tenure. Similar to credit accumulation, 84% of students in this study took the majority of their Grade 9 courses at the Academic level with 16% of students taking the majority of their Grade 9 courses in non-Academic levels.

The Grade 9 absenteeism rate: The absenteeism rate is calculated by taking the number of days a student is absent from school, out of the number of days the student is registered in school, for the regular academic year for Grade 9 (Year 1 of secondary). Note that absenteeism is reported in Ontario for half days or full days. Thus, if a student was registered for 190 school days over the regular school year, and was absent for a total of 19 school days (half days and full days included), the absenteeism rate would be 19 of 190 or 10%. With this breakdown in mind, the majority of students in this study (94%) had an absenteeism rate of or less than 10% and 6% of students had reported absenteeism rates of 11% or higher.

The average marks of Grade 9 (Year 1) courses: The relationship of Grade 9 achievement to postsecondary access and to postsecondary graduation has been well documented. Research from Chicago has confirmed that marks for the Grade 9 GPA are stronger predictors than marks for Grade 12 standardized tests like the SAT (see Easton et al., 2017). In the absence of an official GPA, Grade 9 average marks are determined to be parallel with Easton et al.'s (2017) research. The vast majority of students (86%) within this study earned an average Grade 9 mark of 60–89%. Just over 2% of students received an average mark of less than 50% with 7% of students receiving an average mark of 50–59% and 4% of students earning an average mark of 90%+.

Table 6: School-Based Variables

Suspended in Public School	
Never	84.6%
At Least Once	15.4%
First OSSLT Attempt	
Passed	86.5%
Did Not Pass or Deferred	13.5%
Grade 9 Credits	
Seven credits or fewer	11.2%
Eight credits	80.3%
Nine credits or more	8.5%
Grade 9 Academic Level	
Academic	83.6%
Non-Academic	16.4%
Grade 9 Absenteeism	
0 to 2%	54.1%
3 to 5%	26.4%

6 to 10%	13.7%
11 to 20%	4.8%
21% or higher	1.1%
Grade 9 Average Marks	
Below 50	2.4%
50 to 59	7.3%
60 to 69	21.4%
70 to 79	35.1%
80 to 89	29.3%
90 plus	4.4%

Method of Analysis for Regression

A series of least squares regression models were estimated to examine the effects of transferring and disability on earnings. The initial models examine the effect of mobility and disability on income for all students, followed by similar analyses for only those students who graduated from a postsecondary institution. Subsequent analyses examine the effect of transfer pathways and disability on income for all students, followed by models for graduates only. The predictors were added to the models in a series of stages. The first three models examined the effect of (1) mobility or transfer pathway, (2) disability, and (3) both mobility or pathway and disability, without controls. The subsequent models include controls for sociodemographic variables, followed by PSE program information, and finally, variables capturing secondary school factors. Supplementary analyses tested for interaction effects between mobility or transfer pathway and disability status, with and without controls, to assess whether the effect of transferring programs on earnings was different for students with disabilities than it was for their counterparts without disabilities.

Regression Results

For this study, a series of ordinary least squares regression models are estimated, predicting 2017 taxable income from transfer status and disability, with and without controls. The first two series of models are for all students (graduates and non-graduates), followed by models for graduates only. The final series of models first examine the effect of the transfer pathway on income for all student records (graduates and non-graduates), then for just graduates. For each set of regression analyses, Model 1 includes only the mobility or transfer pathway variable; Model 2 only includes disability status; Model 3 assesses their effects together; while Model 4 through Model 6 add controls for sociodemographic variables, postsecondary program characteristics, and secondary school factors, respectively.

The sociodemographic control variables include first language, country of birth, gender, age, and neighbourhood income, while postsecondary controls include the year of first enrollment, field of study, and graduation. Secondary school control variables include whether students were suspended, whether they passed the Ontario Secondary School Literacy Test (OSSLT) on their first attempt, as well as their Grade 9 academic level, Grade 9 absenteeism, Grade 9 average marks, and number of Grade 9 credits. Due to space considerations, the effects of the control variables are provided in the tables, but are sparingly interpreted.

Mobility and Disability: All Students

Table 7 displays the results of the least squares regression models examining the effects of mobility and disability on income for all students. The estimates in **Model 1** reveal that when coded as a dichotomous variable, students who transfer programs have lower incomes than their direct entry counterparts ($p \leq 0.001$). **Model 2** reveals that students with disabilities have lower incomes than their peers without disabilities ($p \leq 0.001$). These effects remained statistically significant in **Model 3**, when both variables were included together, and in **Model 4**, when sociodemographic control variables were added. In terms of the effects of the sociodemographic characteristics, being 15 years of age or older at the start of Grade 9 was associated with a lower income ($p \leq 0.001$), while being male ($p \leq 0.001$), being born outside of Canada ($p \leq 0.05$), and speaking a language other than English ($p \leq 0.001$) were all related to higher earnings. Likewise, living in a higher income neighbourhood while in high school was also associated with higher earnings ($p \leq 0.001$).

When the postsecondary controls are added in **Model 5**, the effects of the mobility and disability variables remained significant predictors of lower incomes ($p \leq 0.001$).[4] Among the PSE variables, starting a postsecondary program later (in 2010 or 2011 as opposed to 2009) was associated with lower incomes ($p \leq 0.001$), while pursuing studies in business, STEM, health, or other fields was related to higher incomes, compared to the liberal arts programs ($p \leq 0.001$), the reference category. As expected, graduates had higher incomes than non-graduates ($p \leq 0.001$).

When the secondary school controls are included in **Model 6**, mobility and disability status remained statistically significant predictors of lower incomes ($p \leq 0.001$). This model also reveals that students who failed or deferred the OSSLT on their first attempt ($p \leq 0.001$) and those who were in non-academic streams in Grade 9 ($p \leq 0.001$) had lower incomes, while Grade 9 absenteeism ($p \leq 0.01$) and Grade 9 average marks ($p \leq 0.001$) also had a statistically significant impact on earnings.

To interpret the effects of mobility and disability status on income, we calculated the predicted incomes for each model, with and without controls. Calculations for the estimates with controls are obtained by holding the control variables constant at their means (for quantitative variables) or proportions (for categorical variables). **Figure 1** displays predicted income for mobile and direct entry (non-transfer) students. In **Model 1**, without controls, transfer students were predicted to earn $35,728 compared to $43,176 for their stationary peers. Compared to **Model 1**, this gap was reduced slightly as control variables were added. In **Model 6**, when controlling for disability status as well as sociodemographic, postsecondary, and secondary school variables, transfer students were still predicted to earn less than non-transfer students, though the earnings gap was less than $4,000 ($38,868 compared to $42,709).

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[4] In this model, the effects of some sociodemographic variables were reduced. Due to space considerations, these effects are not interpreted in the text but they can be viewed in the appended tables.

Figure 1: Predicted Income Based on Postsecondary Mobility (*n* = 22,550)

	Model 1	Model 3	Model 4	Model 5	Model 6
Mobility - No	$43,175.50	$43,145.20	$43,148.70	$42,792.70	$42,708.80
Mobility - Yes	$35,727.60	$35,932.10	$35,908.10	$38,303.30	$38,867.80

■ Mobility - No ■ Mobility - Yes
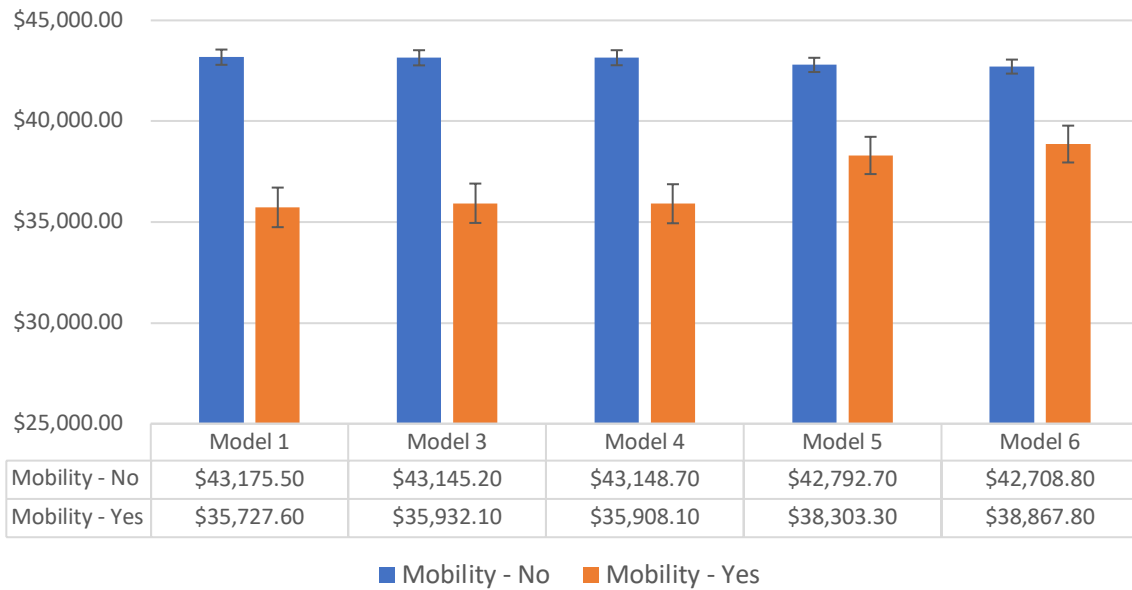
Figure 2 displays predicted income based on students' disability status. In **Model 2**, where the effect of disability status was estimated without controls, students with disabilities were predicted to earn $32,728 compared to their stationary peers who were predicted to earn $43,300. Compared to Model 1, this gap shrinks as controls are added, particularly when controls for postsecondary program characteristics and secondary school variables were added in **Model 5** and **Model 6**, respectively. Similar to the results relating to transfer students, the earnings gap was reduced substantially when comparing the estimates in **Model 6** with all controls, where students with disabilities had predicted incomes of $38,999, while their non-disabled peers were predicted to earn $42,581.

Figure 2: Predicted Income Based on Disability Status (*n* = 22,550)

	Model 2	Model 3	Model 4	Model 5	Model 6
Mobility - No	$43,300.40	$43,279.90	$43,240.40	$42,896.60	$42,580.60
Mobility - Yes	$32,727.90	$32,906.60	$33,250.70	$36,246.10	$38,998.60

■ Mobility - No ■ Mobility - Yes
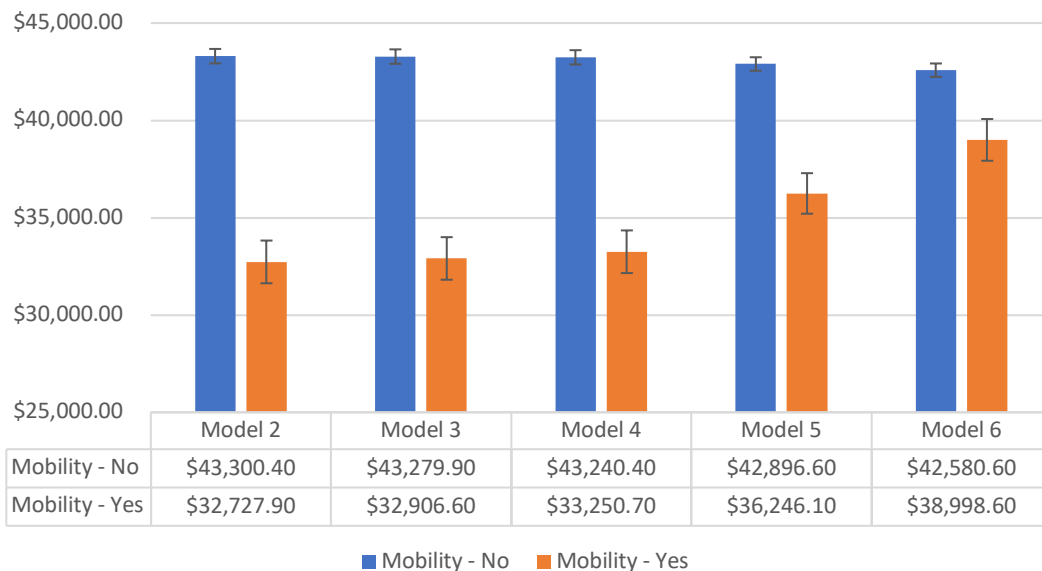
Finally, **Figure 3** displays predicted earnings for the interaction between mobility and disability status.[5] The first model presents the predicted probabilities for the interaction without control variables while the second model controls for all sociodemographic, postsecondary, and secondary school variables. Without controls, non-transfer students without disabilities were predicted to earn $44,273, compared to $33,303 for non-transfer students with disabilities. Transfer students without disabilities had estimated predicted incomes of $36,588 compared to $29,574 for transfer students with a disability. These gaps shrink when controlling for sociodemographic, secondary, and postsecondary control variables, though significant differences remain. With controls, non-transfer students without disabilities were predicted to earn $43,067, compared to $39,594 for non-transfer students with disabilities. Similarly, transfer students without disabilities had predicted incomes of $39,309, compared to $35,141 for transfer students with disabilities.

Figure 3: Predicted Income Based on Interaction between Mobility and Disability (*n* = 22,550)
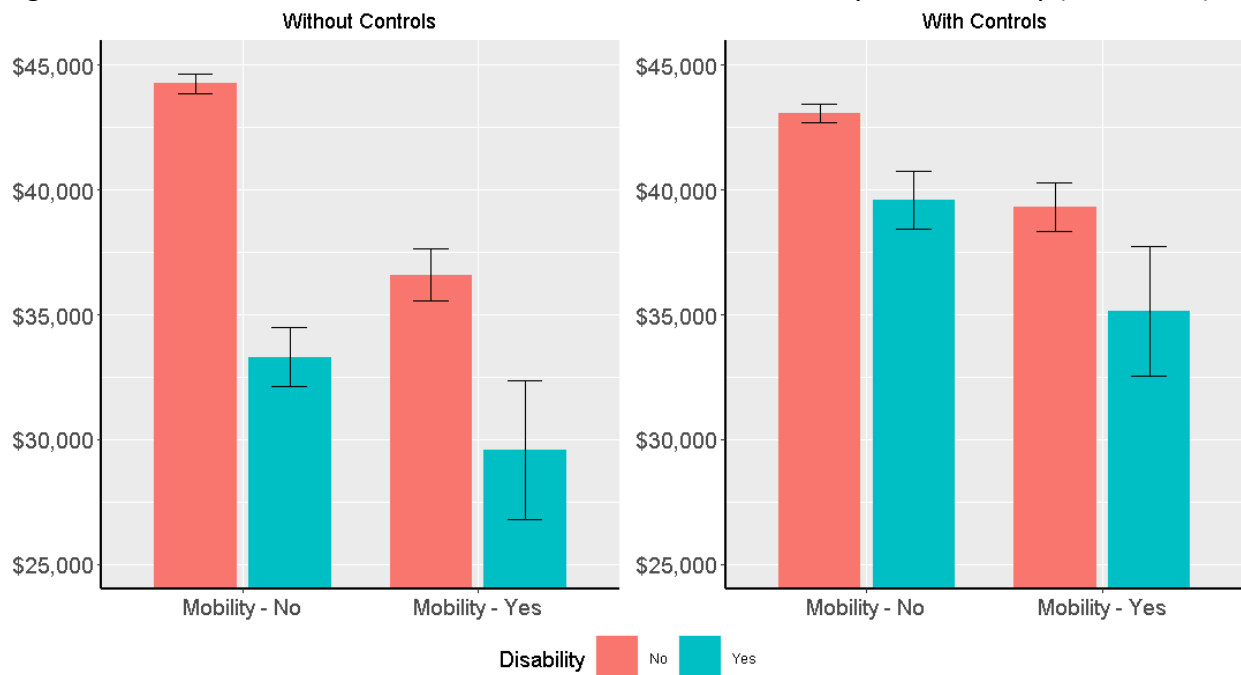
Mobility and Disability: Graduates Only

Table 8 displays the results for analyses of the effect of mobility and disability on income for only those students who graduated from a postsecondary program. **Model 1** reveals that mobility was associated with lower earnings ($p \leq 0.001$) while **Model 2** reveals that students with disabilities were also estimated to earn less than their non-disabled peers ($p \leq 0.001$). **Model 3** reveals that these effects hold when including both variables in the model together.

When controlling for sociodemographic variables in **Model 4**, transferring and being students with disabilities again related to lower earnings ($p \leq 0.001$). Among the control

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[5] The corresponding ordinary least squares regression models are not displayed in appended tables but are available upon request.

variables, higher neighbourhood incomes ($p \leq 0.001$), being male ($p \leq 0.001$), being born outside of Canada ($p \leq 0.01$), and speaking a first language other than English ($p \leq 0.001$) all related to increased earnings. In contrast, being 15 years of age or older at the beginning of secondary school related to lower earnings ($p \leq 0.001$).

The effect of mobility and disability remained in **Model 5**, when controlling for postsecondary program characteristics. With respect to the control variables, beginning postsecondary education in 2010 or 2011 related to lower earnings ($p \leq 0.001$), while students pursuing postsecondary credentials in business ($p \leq 0.001$), STEM ($p \leq 0.001$), health ($p \leq 0.001$), or other fields ($p \leq 0.01$) had higher earnings compared to those who pursued credentials in the liberal arts, the reference category.

The effects of mobility and disability remained even when controlling for secondary school measures (see **Model 6**). Among the control variables in this model, failing or deferring one's OSSLT on the first attempt ($p \leq 0.001$), pursuing a non-academic stream in Grade 9 ($p \leq 0.001$), and earning less than eight credits in Grade 9 ($p \leq 0.001$) were associated with lower incomes, while the effects of Grade 9 absenteeism ($p \leq 0.05$) and Grade 9 average marks ($p \leq 0.001$) were also statistically significant. It is noteworthy that speaking a first language other than English, which predicted higher incomes in **Model 4**, was related to lower incomes in **Model 6** when controlling for postsecondary information and secondary school factors, though the effect was barely statistically significant ($p \leq 0.05$).

Similar to the models that pool graduates and non-graduates, we calculated the predicted earnings for the mobility and disability variables for the models based on graduates only. **Figure 4** displays predicted earnings for the dichotomous mobility variable. In **Model 1**, without controls, transfer students were predicted to earn $39,218 compared to non-transfer students at $46,525. This gap shrinks slightly when adding sociodemographic, postsecondary, and secondary control variables. In **Model 6**, transfer students were predicted to earn $41,630 while their peers had a predicted income of $46,250.

Figure 4: Predicted Income Based on Postsecondary Mobility for Graduates Only (*n* = 17,470)

	Model 1	Model 3	Model 4	Model 5	Model 6
Mobility - No	$46,525.00	$46,499.70	$46,485.40	$46,372.50	$46,250.20
Mobility - Yes	$39,217.80	$39,440.00	$39,566.00	$40,557.10	$41,629.90

■ Mobility - No ■ Mobility - Yes
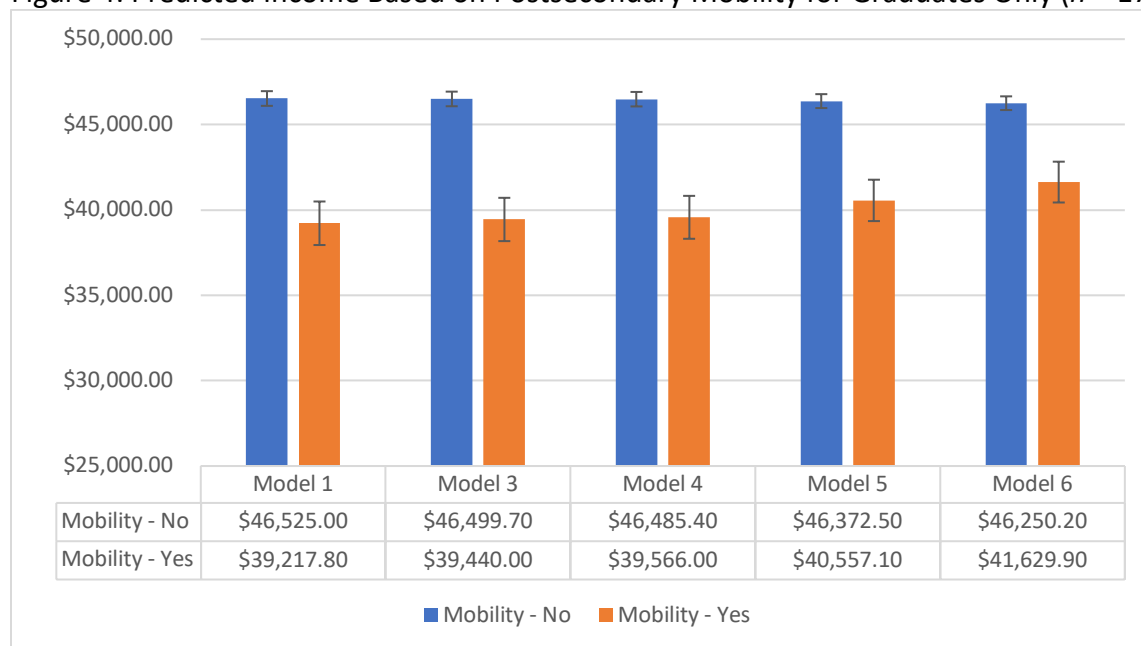
Figure 5 displays predicted earnings based on disability status derived from the estimates in **Table 8**. Drawing on the estimates in **Model 2**, without controls, those who were as students with disabilities were predicted to earn $35,940, while their peers without disabilities were predicted to earn $46,695. This gap reduces slightly with the inclusion of sociodemographic controls in **Model 4** and reduces more with the inclusion of postsecondary and secondary school controls in **Model 5** and **Model 6**, respectively. In **Model 6**, when controlling for all of these variables, students with disabilities had predicted incomes of $42,139 while those without disabilities were predicted to earn $46,117.

Figure 5: Predicted Income Based on Disability Status for Graduates Only (*n* = 17,470)

	Model 2	Model 3	Model 4	Model 5	Model 6
No Disability	$46,694.80	$46,678.20	$46,671.20	$46,454.10	$46,116.90
Disability	$35,939.90	$36,118.10	$36,193.20	$38,521.90	$42,139.20

■ No Disability   ■ Disability
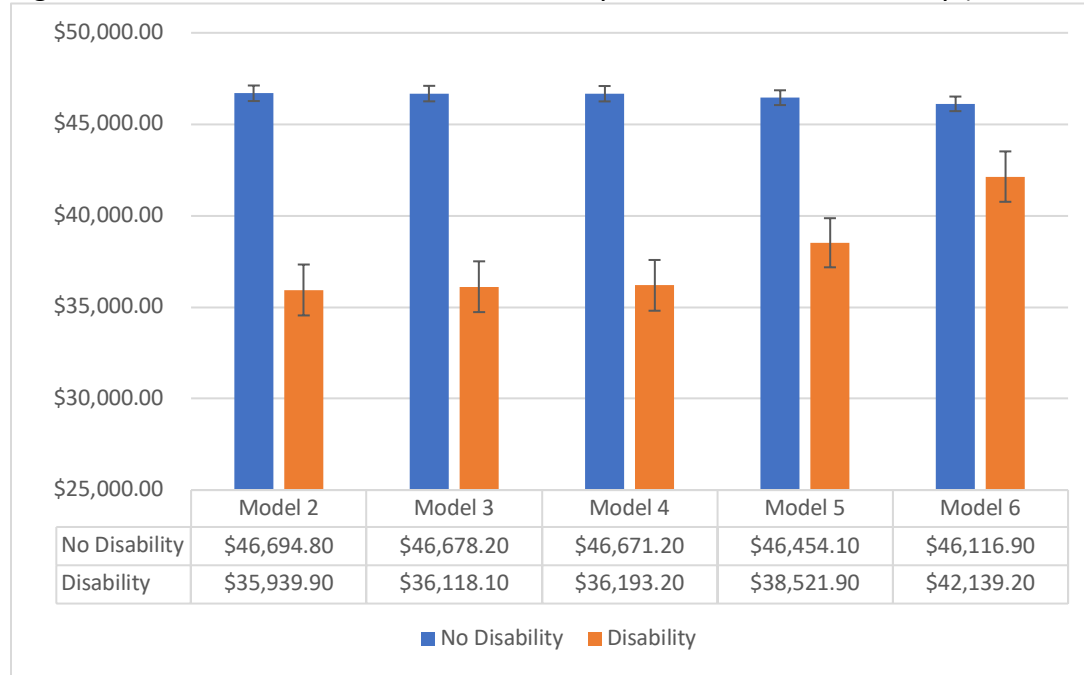
Figure 6 displays predicted earnings based on tests of interactions between disability and mobility.[6] Without controls, non-transfer students without disabilities were predicted to have the highest incomes ($47,435), while transfer students without disabilities were predicted to earn $40,025. For those students with a disability, non-transfer students were predicted to earn $36,453 and transfer students were predicted to earn $32,430. The differences in earnings were reduced when controls were added for sociodemographic variables, postsecondary program information, and secondary school factors. With controls, non-transfer students without disabilities were predicted to earn the most, at $46,584, followed by non-transfer students with disabilities, who had predicted incomes of $42,668. Transfer students without disabilities were predicted to earn $42,014, other things being equal, and transfer students with disabilities had predicted earnings of $37,620.

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[6] The models with interactions are available upon request.

Figure 6: Predicted Income Based on Interaction between Mobility and Disability for Graduates Only (*n* = 17,470)
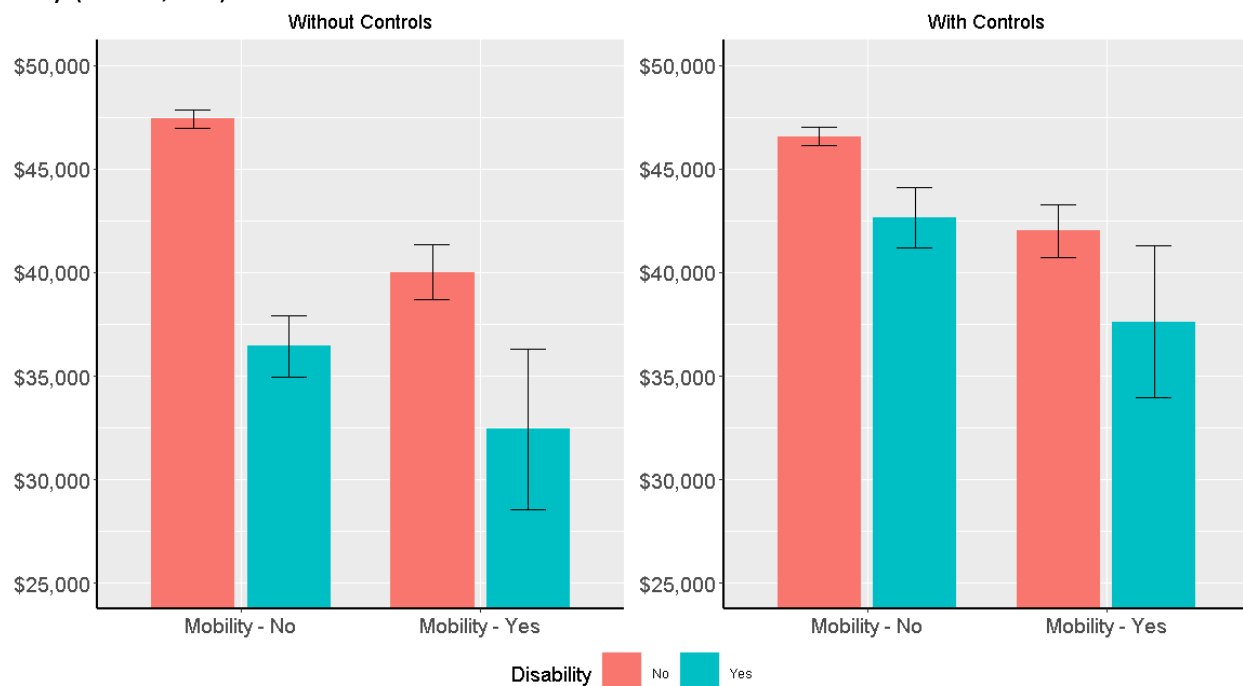
Transfer Pathway and Disability: All Students

The results of the least squares regression analyses predicting income based on detailed transfer pathways and disability status for all students are provided in **Table 9**. The estimates in **Model 1** reveal that students who pursued a pathway other than direct entry to university experienced lower incomes compared to that group ($p \leq 0.001$). Likewise, the estimates in **Model 2** reveal that students with disabilities earned less than their peers without disabilities ($p \leq 0.001$). The effects of transfer pathways and disability status remained in **Model 3**, when both variables were included in the model.

The effect of pathways and disability status remained significant in **Model 4** when controlling for sociodemographic variables. Among the sociodemographic control variables, being 15 years of age or older at the start of secondary school related to lower earnings ($p \leq$ 0.001), while higher neighbourhood income ($p \leq 0.001$), being male ($p \leq 0.001$), being born outside of Canada ($p \leq 0.05$), and speaking a first language other than English ($p \leq 0.05$) were all associated with higher earnings.

In **Model 5**, after controlling for postsecondary program information, disability status and pursuing another pathway than direct entry university still resulted in lower incomes, although the effect of the college to university transfer pathway had reduced significance ($p \leq 0.05$). Additionally, beginning postsecondary in 2010 or 2011 resulted in lower earnings ($p \leq 0.001$) compared to those who started their programs in 2009. Those whose studies were in areas relating to business, STEM, health, or other fields had higher earnings when compared to students in liberal arts ($p \leq 0.001$), the reference category. As expected, graduates reported statistically significant higher earnings than non-graduates ($p \leq 0.001$). Finally, the direction of the effect of first language reversed when controlling for postsecondary program information: in

this model, those speaking a first language other than English were predicted to earn less than their peers, but this effect was only moderately statistically significant ($p \leq 0.05$).

Model 6 controls for secondary school factors, and once again shows that those with disabilities experienced lower earnings than their counterparts without disabilities ($p \leq 0.001$). With all of the control variables in the model, although most pathways related to lower earnings ($p \leq 0.001$) relative to the reference category, the effect of the dummy variable representing those who transferred from a college to a university did not produce statistically significant differences in income compared to the direct entry university pathway.

As with the estimates from the mobility analyses above, we calculated the predicted incomes for the PSE pathway and disability variables, for the models in **Table 9**. The predicted earnings based on the transfer pathway are provided in **Figure 7**. Where applicable, the control variables are held constant at their means or proportions. The estimates from **Model 1**, without controls, reveal that direct entry university students had the highest predicted income at $46,699, followed by university to university transfer students at $39,849, then college to university transfer students at $36,657. University to college transfer students had predicted incomes of $34,621, followed by direct entry college and college to college transfer students at $33,244 and $31,286, respectively. The earnings gaps across pathways reduced slightly as controls were added for sociodemographic variables, postsecondary program information, and secondary school factors. In **Model 6**, with all controls, direct entry university students earned the highest amount ($43,372), but they were more closely followed by college to university transfer students ($41,483), direct entry college students ($40,889), college to college transfer students ($39,502), and university to university transfer students ($39,481), with university to college transfer students earning the least ($37,611) in 2017.

Figure 7: Predicted Income Based on Postsecondary Transfer Pathway (*n* = 22,550)
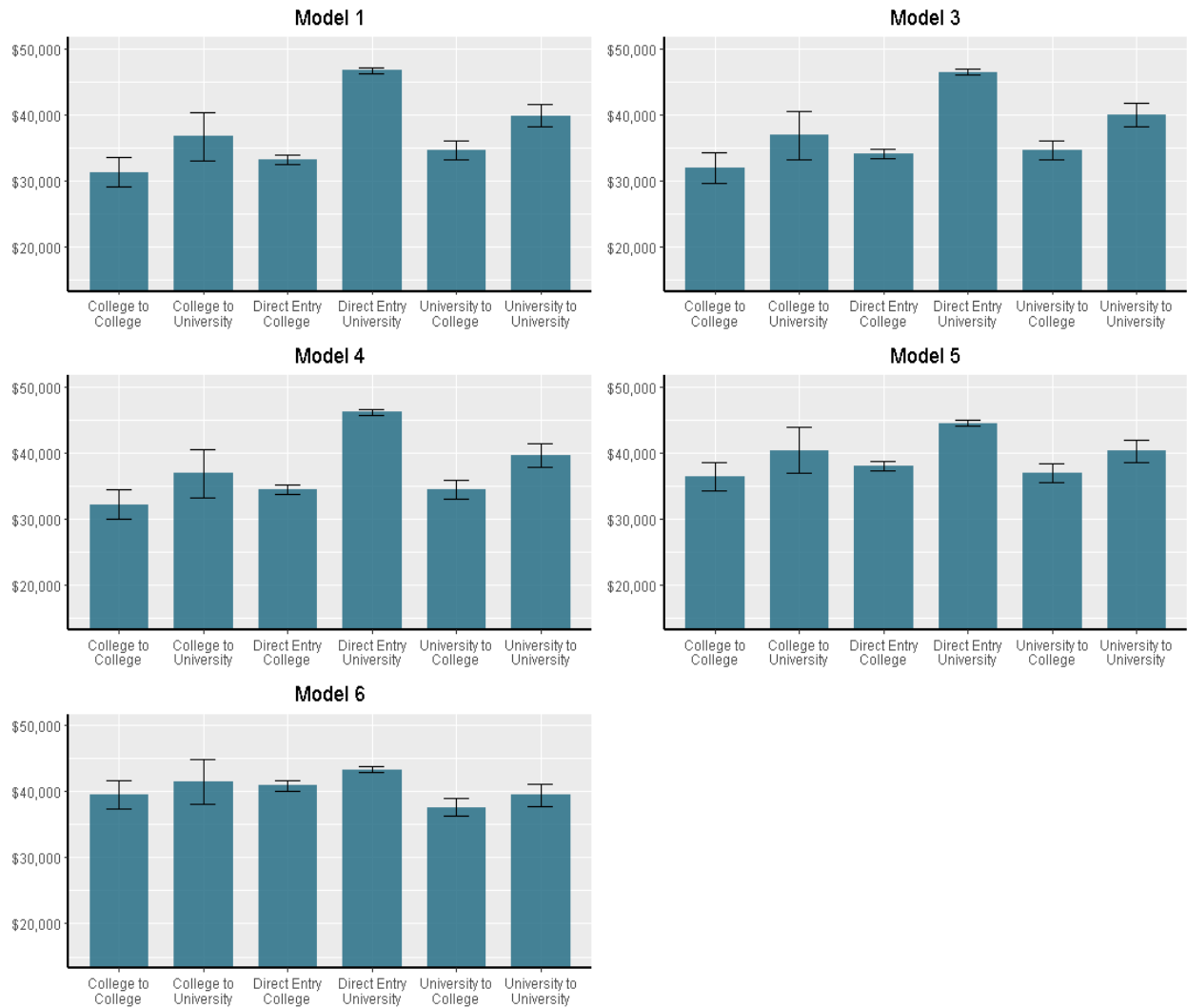
Figure 8 displays the predicted incomes for students based on disability status. Without controls in Model 2, students with disabilities were predicted to earn more than $10,000 less than their peers ($32,728 compared to $43,300 for students without disabilities). In Model 6, with all the controls, students with disabilities were predicted to earn $39,110 and students without disabilities were predicted to earn $42,568.

Figure 8: Predicted Income Based on Disability Status (*n* = 22,550)

	Model 2	Model 3	Model 4	Model 5	Model 6
No Disability	$43,300.40	$42,901.70	$42,918.40	$42,763.90	$42,567.80
Disability	$32,727.90	$36,201.10	$36,056.00	$37,401.60	$39,110.00

■ No Disability ■ Disability
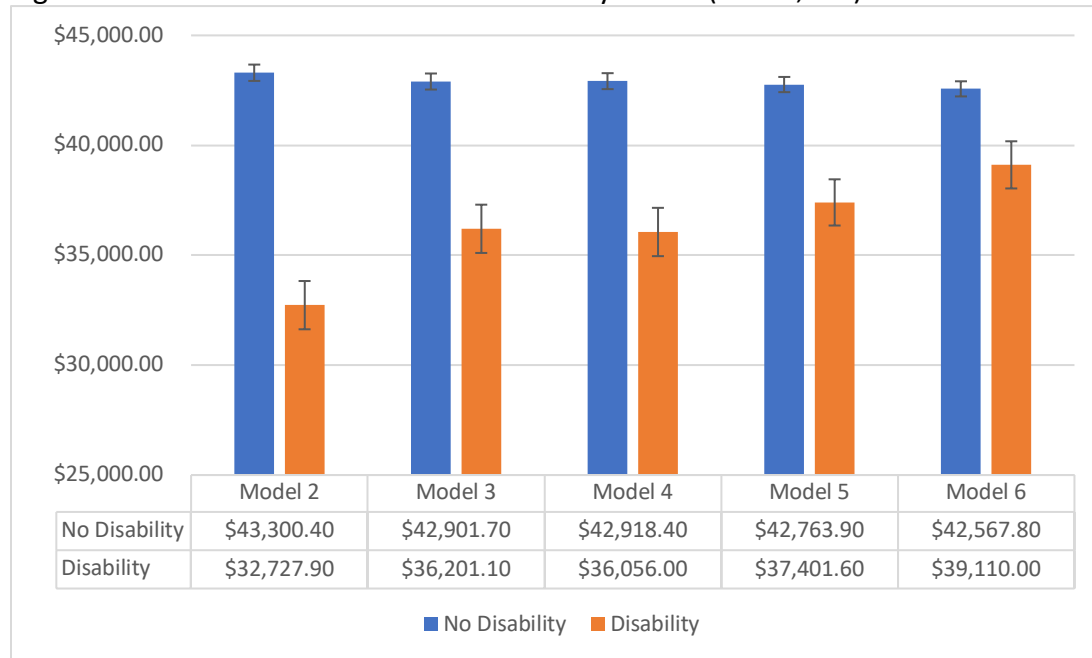
The predicted earnings displayed in **Figure 9** are derived from the interaction between transfer pathways and disability status, with and without controls. Without controlling for the other variables in the model, direct entry university students with disabilities were predicted to earn $37,699 compared to those without disabilities who earned $47,256. In comparison, university to university transfer students with disabilities earned $32,507, less than their peers without disabilities ($40,791). University to college transfer students with disabilities earned $29,399, compared to those without disabilities who earned $35,172. Direct entry college students with disabilities earned $29,999 and those without disabilities had predicted earnings of $34,151. Students with disabilities who transferred from college to college ($27,333) or from college to university ($28,312) were also predicted to earn less than their peers ($32,271 and $37,967, respectively).

The differences based on both disability status and transfer pathways shrink when including controls for sociodemographic variables, postsecondary program information, and secondary school factors. With controls, direct entry university students, as always, had the highest earnings for both groups: $39,279 for those with disabilities and $43,786 for those without. For students without disabilities, those who transferred from college to university earned $42,157, while those who directly entered college earned $40,939. They were followed by students who transferred from one university to another ($40,238), one college to another ($39,996), or from a university to a college ($37,918). For students with a disability, the highest predicted earnings after direct entry university were direct entry college ($38,950), followed by those who transferred from college to university ($36,277), college to college ($35,894), university to college ($34,796), and university to university ($33,155).

Figure 9: Predicted Income Based on Interaction between Pathway and Disability (*n* = 22,550)
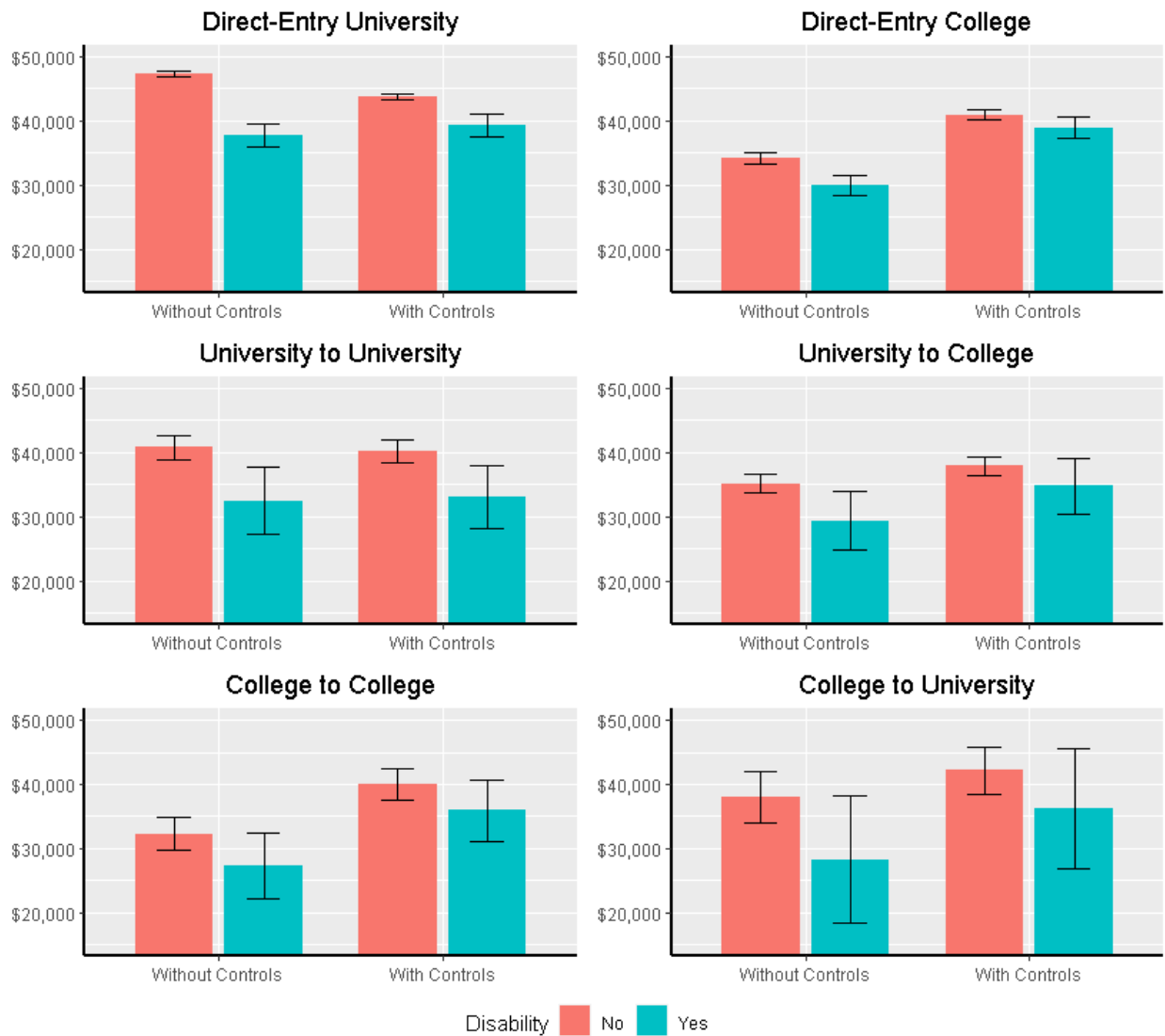
Transfer Pathway and Disability: Graduates Only

Finally, **Table 10** displays a series of least squares regression models to examine the effect of pathways and disability status on income, with and without controls, but only for those students who graduated from their postsecondary programs. In **Model 1**, the direct entry college pathway decreased earnings compared to the direct entry university ($p \leq 0.001$), the reference category. Moreover, transferring university to university, university to college, or college to college were all associated with increased earnings ($p \leq 0.001$), relative to the reference category. The college to university pathway did not significantly differ from direct entry university among postsecondary graduates. **Model 2** provides the zero order estimates for disability status. Students with disabilities earned less than their counterparts without disabilities ($p \leq 0.001$), and the above effects hold in **Model 3,** when both pathways and disability status were included.

These effects also remained after adding sociodemographic controls in **Model 4**. Among the demographic control variables, being 15 years of age or older at the beginning of secondary

school related to decreased incomes ($p \leq 0.05$), while being male ($p \leq 0.001$), having higher neighbourhood income ($p \leq 0.001$), and being born outside of Canada ($p \leq 0.05$) were all statistically significant to having higher earnings. In **Model 5**, when adding controls for postsecondary program information, the effects of pathways and disability status remained. Moreover, beginning postsecondary studies in 2010 or 2011 rather than 2009 decreased income ($p \leq 0.001$), while obtaining credentials in business, STEM, health, or other fields was associated with higher incomes, in comparison with graduates of the liberal arts ($p \leq 0.001$), the reference category.

The estimates in **Model 6** reveal that when adding controls for secondary school factors, the direction and significance of pathways' and disability status' effects remained, with the exception that the significance of the effect of transferring from college to college were slightly reduced ($p \leq 0.01$).

Figure 10 displays predicted earnings based on transfer pathway based on the estimates in **Table 10**. The estimates from **Model 1**, without controls, reveal that direct entry university students earned the most ($49,230), followed by university to university ($44,907), college to university ($43,895), and university to college ($36,467) transfer students. In contrast, direct entry college students ($35,682), and college to college transfer students earned the least ($33,430). These differences were reduced, and some of the ordering of predicted incomes changed, as sociodemographic, postsecondary, and secondary school controls were added. In **Model 6**, with all controls, direct entry university students continued to have the highest predicted earnings ($46,970), followed by college to university transfer students ($45,841), direct entry college students ($43,451), and university to university transfer students ($43,243). College to college transfer students earned $41,784, while university to college transfer students had predicted incomes of $39,649.

Figure 10: Predicted Income Based on Postsecondary Transfer Pathway for Graduates Only (*n* = 17,470)
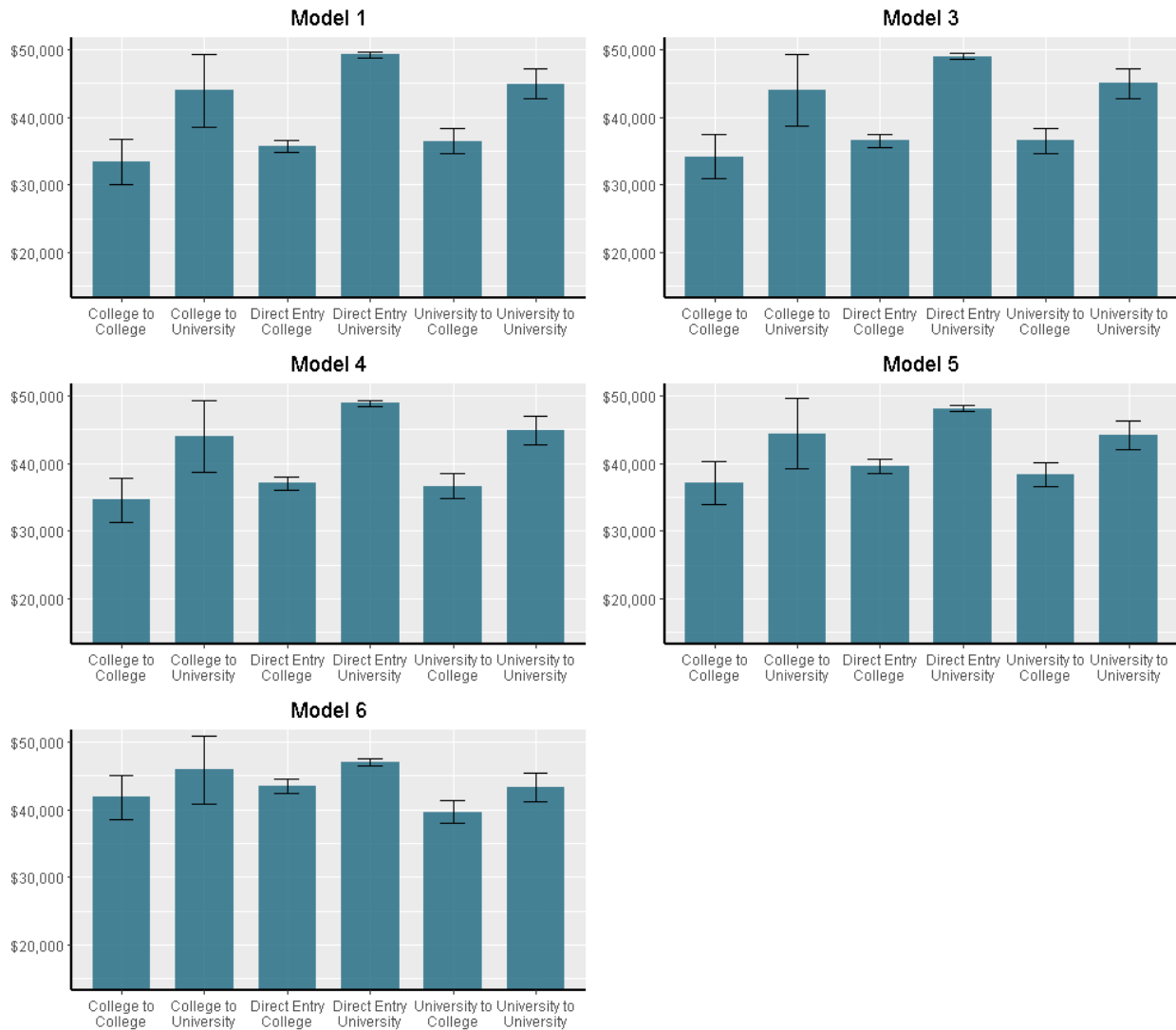
Figure 11 displays predicted earnings based on disability status. Without controls (**Model 2**), students with disabilities earn $35,940 while students without disabilities earned $46,695. This gap was slightly reduced when controlling for transfer pathways and adding controls for sociodemographic variables, postsecondary information, and secondary school factors in **Model 4**, **Model 5**, and **Model 6**, respectively. In **Model 6**, students with disabilities had predicted earnings of $42,309 while students without disabilities were predicted to earn $46,101.

Figure 11: Predicted Income based on Disability Status for Graduates Only (*n* = 17,470)

	Model 2	Model 3	Model 4	Model 5	Model 6
No Disability	$46,694.80	$46,372.10	$46,401.50	$46,296.70	$46,101.10
Disability	$35,939.90	$39,401.80	$39,086.10	$40,210.30	$42,309.00

■ No Disability ■ Disability

Figure 12 displays predicted earnings based on the interaction between pathways and disability status for students who graduated from a postsecondary institution (models available upon request). Again, the differences are starker without controls than with, suggesting that sociodemographic factors, postsecondary program selection, and secondary school factors account for much of the differences in income based on disability and transfer pathways. With controls, direct entry university students earned the most, at $42,980 for students with disabilities and $47,320 for those without disabilities. Students with disabilities who took the direct entry college pathway earned less ($40,860), followed by those who transferred from university to college ($38,924), and those who transferred from college to university ($38,415). Students with disabilities who made lateral transfers had the lowest predicted earnings, with college to college transfer students earning $35,619 and university to university transfer students earning $35,469. For students without disabilities, graduates who transferred from college to university earned $46,609 in 2017, followed by university to university transfer graduates ($43,998), direct entry to college graduates ($43,562), and college to college transfer graduates ($42,752). Finally, students without disabilities had the lowest earnings if they transferred from a university to a college ($39,690).

Figure 12: Predicted Income Based on Interaction between Pathway and Disability for Graduates Only (*n* = 17,470)
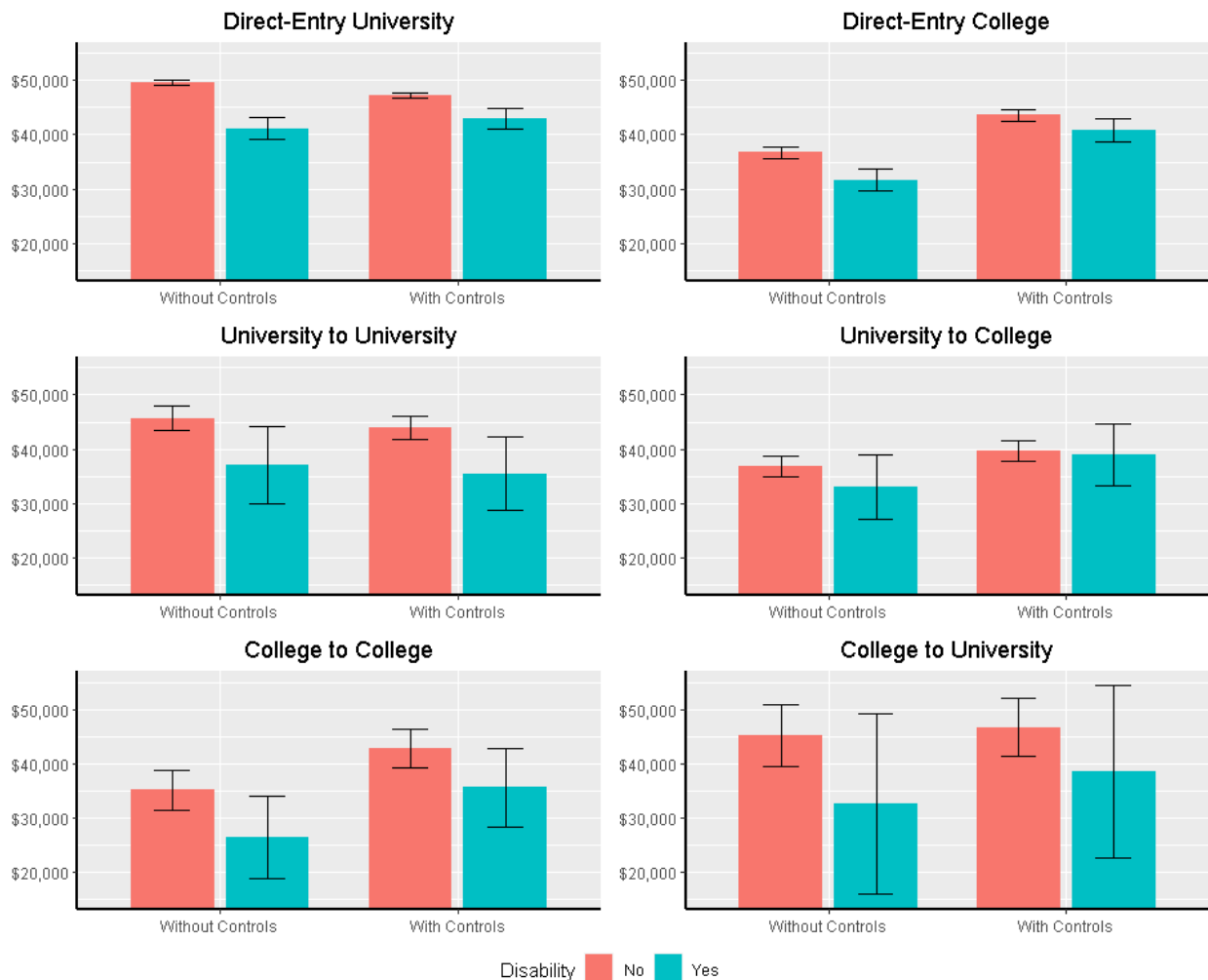
Discussion

This study examined disability, mobility pathways, PSE graduation, and students' predicted future income. Earlier research shows that students with disabilities face ongoing barriers in accessing and getting through PSE (Dolmage, 2017; NEADS, 2012; Parekh, et al., 2022a; Shanouda & Spagnuolo, 2021). To date, the literature is scant on the extent to which students' experience of disability, mobility pathways, program, and school-based variables have influenced students' future earnings. The current study showed that despite mobility, program, student and secondary school factors, students with disabilities had consistently lower earnings than students without disabilities. However, transference appears to play an interesting role in mitigating some of the income disparity for students with disabilities.

As a singular variable, mobility pathways held a significant relationship with students' future income earnings, with mobility linked to lower future income earnings. Broken down by individual pathways, with entering and staying at the same university as the reference category,

all pathways, with the exception of the college to university pathway, maintained statistical significance in models examining future income earnings for both non-graduate and graduates. Overall, earnings were less for students transferring between PSE institutions than their counterparts who did not transfer. Across each of these variables, students with disabilities earned less than their non-disabled peers. The only time students with disabilities came close to achieving parity with students without disabilities was among graduates who had transferred from university into college (Figure 12).

Even though transference was linked to lower income earnings, we found that the earnings gap experienced by transfer students is smaller for those with disabilities than it is for those without disabilities ($7,685 versus $3,730; see Figure 3). As earlier research has identified, students with disabilities are more likely to transfer (Parekh et al., 2022b) and transference is typically linked to lower graduation rates (Walters et al., 2021) as well as to lower predicted income earnings (as shown in this report). However, as seen in Figures 3 and 6, when the control variables were included in the model, the increase in earnings was larger for transfer students with disabilities than transfer students without disabilities, suggesting that if students are going to transfer, students with disabilities are more likely to benefit from transferring than their non-disabled counterparts. The literature suggests that, for students with disabilities, accessibility and accommodations are often key motivators for transference (Henderson & McCloy, 2017; O'Donnell et al., 2018; Williams & McCloy, 2019) and, perhaps, this finding, at least partly, reflects a mitigating effect of those transitions.

Notably, in our earlier report (Parekh, et al., 2022b), including controls accounted for much of the gap in transference and graduation, but, as is shown in the current study, did not eliminate the gap in overall earnings between students with and without disabilities. Although the earnings gap for transfer and disability persisted, we also found that much of this gap is attributable to the control variables in our analyses. Without controls, the gap in earnings was stark across both transfer and disability variables. Figures 1 and 2 show that the inclusion of controls accounts for just under a 50% reduction in the gap in future income for transfer and 66% reduction in the gap for disability. This suggests that close to 50% of the gap attributed to transfer and 66% attributed to disability is explained through students' program, achievement, and school-based variables. These results may be picking up on other existing factors, obligations or circumstances that motivate or require students to transfer programs. Also, they are consistent with Chatoor's (2021) work which found that students with disabilities who graduated from PSE and entered the workforce felt overqualified and underpaid for their work.

We also found important differences in outcomes associated with university and college. For instance, without controls, the earnings gap between those with and without disabilities is highest among direct entry university students ($9,556), but considerably smaller for direct entry college students ($4,160) (see Figure 9). Finally, we discovered that direct entry university registrants without disabilities earned approximately $13,100 more than their non-disabled counterparts in community colleges, whereas students with disabilities earned approximately $7,710 less if they went to college rather than university (see Figure 9). The results of this study consistently reveal that universities, attended either directly or indirectly through transferring, represent the least equitable pathways for students with disabilities.

Education has long been described as a system that "levels the playing field" and enables historically marginalized communities to compete, but this has been based on a flawed notion of meritocracy (Duncan-Andrade & Morrell, 2008). As shown in this report, results demonstrate that regardless of the academic accomplishments that students with disabilities achieve and, regardless of their pathways to and through public and post-secondary education, disparities in income persist.

The Role of Intersectionality and Future Research

The research and data continue to demonstrate that students with disabilities face ongoing barriers within postsecondary education and workforce sectors. However, we also know that the experience of disability is not singular. Students' social locations, their positionalities, and the conditions in which they work and learn can impact their ability to access and complete PSE studies as well as secure employment within the labour force. Therefore, we believe that future research could, and should, integrate an intersectional analysis examining the relational role of identity and structural factors (demographic, program, mobility, etc.) as well as explore outcomes for both high school students who do and do not go on to pursue PSE. (See Appendix B for further analyses on structural and program-based variables and income.) Moreover, as many of the students in this analysis were recently out of school, it would be important to follow students once they enter the labour market to better track their early employment trajectories over time. Additionally, further research could examine the differences in experiences within the disability composite variable.

Conclusion

Despite comparing those with similar academic credentials who pursued similar PSE pathways, students who transfer programs and students with disabilities continue to have lower predicted future income earnings than their respective counterparts. However, the inclusion of controls explained a large part of the gap for both groups. This suggests that there could be salient points of early intervention within the public and postsecondary education systems. In the context of potential earnings, the inclusion of students' earlier academic experiences, as well as PSE and mobility factors reduced but did not eliminate the gap in students' earnings for both transfer students and students with disabilities. Transference appears to play an interesting role in relation to disability. Even though transference is often attributed to lower graduation and future income, if students are going to transfer, then students with disabilities appear to be receive a larger increase in earnings compared to, but not on par with, their non-disabled peers. These results urge researchers to further examine the barriers that students with disabilities continue to experience in the workforce, and the role that transfer plays in mitigating some of those barriers.

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Appendix A

Table 7: Ordinary Least Squares Regression Predicting Income Based on Mobility for all Students (*n* = 22,550)

Variables	Model 1 b	Model 1 SE(b)	Model 1 p	Model 2 b	Model 2 SE(b)	Model 2 p	Model 3 b	Model 3 SE(b)	Model 3 p	Model 4 b	Model 4 SE(b)	Model 4 p	M b
Mobility													
No (ref)													
Yes	-7447.95	536.89	***				-7213.08	533.41	***	-7240.61	529.25	***	-4489.42
Disability													
No (ref)													
Yes				-10572.52	591.28	***	-10373.34	589.09	***	-9989.70	591.14	***	-6650.45
Language													
English (ref)													
Other than English										2363.43	424.40	***	-358.78
Country of Birth													
Canada (ref)													
Outside Canada										1066.12	447.45	*	315.95
Gender													
Female (ref)													
Male										3747.67	356.65	***	4055.39
Age													
14 or Younger (ref)													
15 or Older										-5777.54	1070.85	***	-3494.46
Neighbourhood Income Decile										923.30	64.53	***	632.64
Start of Postsecondary													
2009 or Prior (ref)													
2010													-7707.24
2011													-14642.15
Field of Study													
Liberal Arts (ref)													
Business													8795.21
STEM													7911.84
Health													5041.68
Other													3379.22
Graduation from PSE													
No (ref)													
Yes													10818.88
Suspended in Public School													
Never (ref)													
At Least Once													
First OSSLT Attempt													
Passed (ref)													
Did Not Pass or Deferred													
Grade 9 Credits													
Seven (ref)													
Eight													

Nine									
Grade 9 Academic Level									
Academic (ref)									
Non-Academic									
Percent Absent Grade 9									
Grade 9 Average Marks									
Constant	43175.54	193.14	43300.44	189.74	44213.35	200.68	35519.70	538.85	30145.38
R-Square	0.009		0.014		0.022		0.038		0.144
Adjusted R-Square	0.008		0.014		0.022		0.038		0.144

$* p \leq 0.05$ $** p \leq 0.01$ $*** p \leq 0.001$

Table 8: Ordinary Least Squares Regression Predicting Income Based on Mobility for Graduates Only (*n* = 17,470)

Variables	Model 1 b	SE(b)	p	Model 2 b	SE(b)	p	Model 3 b	SE(b)	p	Model 4 b	SE(b)	p	M b
Mobility													
No (ref)													
Yes	-7307.27	686.44	***				-7059.66	682.72	***	-6919.35	676.98	***	-5815.38
Disability													
No (ref)													
Yes				-10754.96	742.69	***	-10560.12	740.69	***	-10478.01	740.91	***	-7932.24
Language													
English (ref)													
Other than English										1806.92	494.00	***	-569.85
Country of Birth													
Canada (ref)													
Outside Canada										1360.07	517.55	**	469.07
Gender													
Female (ref)													
Male										5321.63	414.12	***	3916.61
Age													
14 or Younger (ref)													
15 or Older										-4994.22	1333.60	***	-3530.23
Neighbourhood Income Decile										802.06	75.09	***	707.10
Start of Postsecondary													
2009 or Prior (ref)													
2010													-7829.68
2011													-17741.35
Field of Study													
Liberal Arts (ref)													
Business													10686.41
STEM													9470.15
Health													6133.96
Other													2472.82
Suspended in Public School													
Never (ref)													
At Least Once													
First OSSLT Attempt													
Passed (ref)													
Did Not Pass or Deferred													
Grade 9 Credits													
Seven (ref)													
Eight													
Nine													
Grade 9 Academic Level													
Academic (ref)													
Non-Academic													
Percent Absent Grade 9													

Grade 9 Average Marks

Constant	46525.03	219.52	46694.82	216.88	47400.22	226.73	38895.39	632.88	40429.25
R-Square	0.006		0.012		0.018		0.035		0.108
Adjusted R-Square	0.006		0.012		0.018		0.035		0.107

* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

Table 9: Ordinary Least Squares Regression Predicting Income Based on Pathway for all Students (*n* = 22,550)

Variables	Model 1			Model 2			Model 3			Model 4			M
	b	SE(b)	p	b	SE(b)	p	b	SE(b)	p	b	SE(b)	p	b
Pathway													
Direct Entry University (ref)													
University to University	-6850.21	919.53	***				-6478.20	917.55	***	-6577.70	912.41	***	-4225.06
University to College	-12078.32	763.98	***				-11828.75	762.17	***	-11717.52	758.18	***	-7529.92
Direct Entry College	-13454.70	429.72	***				-12385.21	438.85	***	-11719.83	445.13	***	-6506.34
College to College	-15413.46	1169.61	***				-14466.15	1169.35	***	-13990.89	1166.16	***	-8120.03
College to University	-10042.15	1889.33	***				-9523.31	1884.61	***	-9306.67	1874.67	***	-4119.92
Disability													
No (ref)													
Yes				-10572.52	591.28	***	-6700.65	593.13	***	-6862.42	594.12	***	-5362.28
Language													
English (ref)													
Other than English										979.16	421.18	*	-913.45
Country of Birth													
Canada (ref)													
Outside Canada										885.58	440.60	*	217.04
Gender													
Female (ref)													
Male										4132.59	351.44	***	4039.29
Age													
14 or Younger (ref)													
15 or Older										-4045.11	1056.42	***	-2882.95
Neighbourhood Income Decile										657.38	64.31	***	538.93
Start of Postsecondary													
2009 or Prior (ref)													
2010													-7383.85
2011													-12521.86
Field of Study													
Liberal Arts (ref)													
Business													9421.38
STEM													8112.51
Health													5774.98
Other													5242.78
Graduation from PSE													
No (ref)													
Yes													10015.40
Suspended in Public School													
Never (ref)													
At Least Once													
First OSSLT Attempt													
Passed (ref)													
Did Not Pass or Deferred													

Grade 9 Credits									
Seven (ref)									
Eight									
Nine									
Grade 9 Academic Level									
Academic (ref)									
Non-Academic									
Percent Absent Grade 9									
Grade 9 Average Marks									
Constant	46699.08	219.91	43300.44	189.74	47089.38	222.00	40413.79	561.41	32353.15
R-Square	0.051		0.014		0.057		0.068		0.152
Adjusted R-Square	0.051		0.014		0.056		0.067		0.151

* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

Table 10: Ordinary Least Squares Regression Predicting Income based on Pathway for Graduates Only (*n* = 17,470)

Variables	Model 1 b	SE(b)	p	Model 2 b	SE(b)	p	Model 3 b	SE(b)	p	Model 4 b	SE(b)	p	M b
Pathway													
Direct Entry University (ref)													
University to University	-4322.86	1137.28	***				-4049.71	1134.85	***	-4029.75	1127.11	***	-3965.89
University to College	-12763.29	960.30	***				-12491.76	958.38	***	-12237.59	952.43	***	-9750.52
Direct Entry College	-13547.75	538.79	***				-12487.10	549.32	***	-11834.60	553.74	***	-8543.20
College to College	-15799.79	1696.58	***				-14841.87	1695.51	***	-14251.10	1686.71	***	-11038.26
College to University	-5335.01	2735.54					-4989.65	2729.05		-4900.61	2710.93		-3688.98
Disability													
No (ref)													
Yes				-10754.96	742.69	***	-6970.26	745.78	***	-7315.47	745.38	***	-6086.40
Language													
English (ref)													
Other than English										693.61	489.91		-1184.81
Country of Birth													
Canada (ref)													
Outside Canada										1192.43	510.47	*	381.94
Gender													
Female (ref)													
Male										5429.64	408.42	***	3908.02
Age													
14 or Younger (ref)													
15 or Older										-3354.24	1317.24	*	-2649.70
Neighbourhood Income Decile										569.17	74.82	***	579.07
Start of Postsecondary													
2009 or Prior (ref)													
2010													-7442.42
2011													-14282.09
Field of Study													
Liberal Arts (ref)													
Business													11252.78
STEM													9461.57
Health													6902.04
Other													4636.14
Suspended in Public School													
Never (ref)													
At Least Once													
First OSSLT Attempt													
Passed (ref)													
Did Not Pass or Deferred													
Grade 9 Credits													
Seven (ref)													
Eight													

Nine									
Grade 9 Academic Level									
Academic (ref)									
Non-Academic									
Percent Absent Grade 9									
Grade 9 Average Marks									
Constant	49230.09	240.76	46694.82	216.88	49595.98	243.33	42980.52	651.65	42243.19
R-Square	0.044		0.012		0.049		0.062		0.120
Adjusted R-Square	0.044		0.012		0.048		0.061		0.119

* $p \le 0.05$ ** $p \le 0.01$ *** $p \le 0.001$

Appendix B

Analytical Procedure for Cross-tabulations

To perform the descriptive analysis and cross-tabulations, students were selected using the following criteria:
- They had been selected for the November 2021 Descriptive Report (that is, they started in Grade 9 in the TDSB in Fall 2004, 2005 or 2006);
- They attended postsecondary institutions in Canada (according to PSIS official enrollment data) up to and including the 2017–18 school year;
- They were not full-time postsecondary students in either 2016–17 or 2017–18;
- They had reported information for total income (tirc) in the 2017 TIFF file of more than 0 and less than $300,000.

This was the same selection criteria used in the tables and regression (although, due to listwise deletion, the number of students in the descriptives is slightly higher than the number of students in the regression tables.
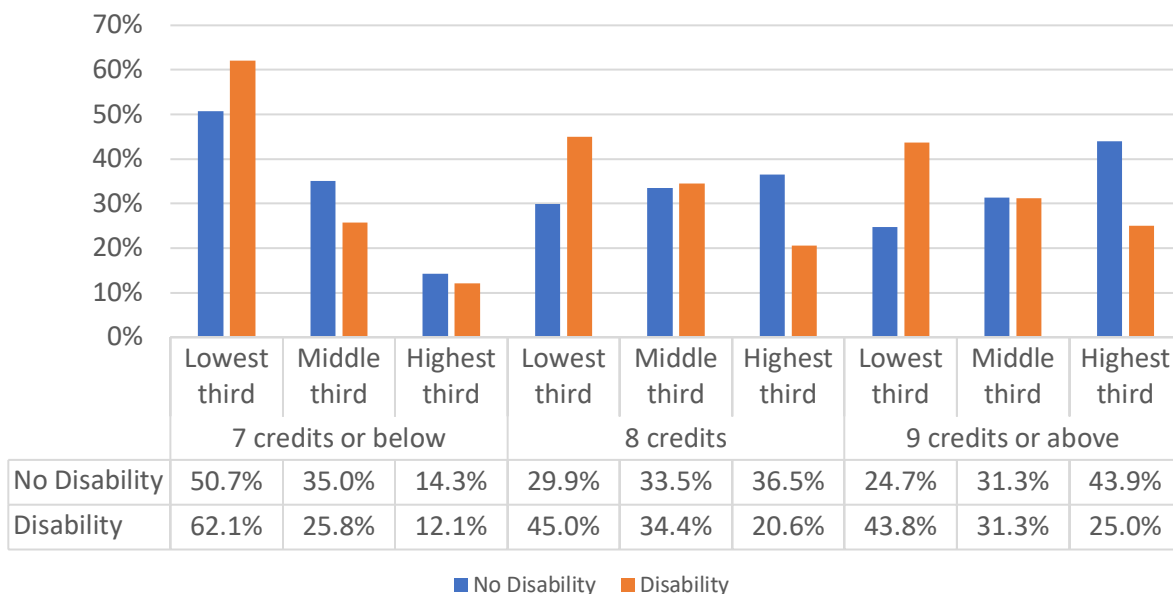
A series of three way cross-tabulations were prepared using thirds (tertiles) of 2017 income (as selected above), looking at tertiles of income, disability (No Disability/Disability) and then with postsecondary graduation; postsecondary field of study; Grade 9 credit accumulation; and Grade 9 program of study. Column percentages were reported. Assuming no differences, all groups should be distributed in the lowest third, middle third, and top third of income (that is, 33%, 33%, and 33% in each tertile).

Cross-tabulation Results

The first report in this series examined disability, transference, and graduation. One of the key findings of the report was the importance of school-based variables on the students' transference through and graduation from PSE. For the descriptive results section, we opted to focus on public and postsecondary school-based factors. First, we examine public school variables such as credit accumulation and program of study. Next, we examine PSE school-based factors such as field of study and graduation.
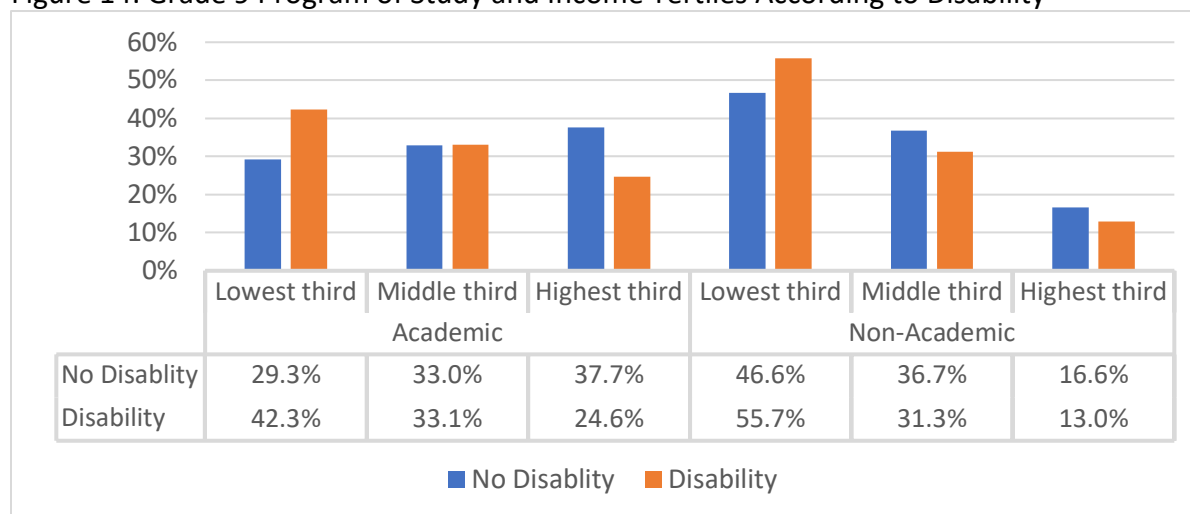
Credit accumulation, income, and disability: Interestingly, the number of credits students earned in Grade 9 had a strong relationship with future income, which was compounded by students' disability status. The majority of students, regardless of disability status, who earned seven or fewer credits in Grade 9 went on to earn income within the lowest tertile (51% for students without disability and 62% with disability). As shown in Table 6, 80% of students earned eight credits in Grade 9. While roughly a third of students, regardless of disability status, ended up earning incomes within the middle tertile, there were evident gaps within both the lowest and highest income tertiles with students with disabilities far more likely to earn lower incomes than their non-disabled peers. For students who had earned nine or more credits in Grade 9, the largest proportion of students without disabilities (44%) ended up earning incomes within the highest tertile, yet the converse is true for students with disabilities where the largest proportion (44%) continue to earn income within the lowest tertile.

Figure 13: Grade 9 Credit Accumulation and Income Tertiles According to Disability

	7 credits or below			8 credits			9 credits or above		
	Lowest third	Middle third	Highest third	Lowest third	Middle third	Highest third	Lowest third	Middle third	Highest third
No Disability	50.7%	35.0%	14.3%	29.9%	33.5%	36.5%	24.7%	31.3%	43.9%
Disability	62.1%	25.8%	12.1%	45.0%	34.4%	20.6%	43.8%	31.3%	25.0%

■ No Disability   ■ Disability

Grade 9 program of study, income, and disability: Similar to credit accumulation, there is a distinct relationship between the level of program students pursue in secondary school, their disability status, and their future income. The largest proportion (38%) of non-disabled students who pursue the Academic program in Grade 9 go on to earn incomes within the highest tertile. The opposite appears to be true for students with disabilities where the largest proportion (42%) who pursue the Academic program end up earning incomes within the lower tertile. However, for students who pursued a Non-Academic program of study in Grade 9, the largest proportion of students, regardless of disability status ended up earning incomes in the lowest income decile. For students with disabilities who took a Non-Academic program in high school, the majority (56%) ended up earning incomes in the lowest tertile.

Figure 14: Grade 9 Program of Study and Income Tertiles According to Disability

	Academic			Non-Academic		
	Lowest third	Middle third	Highest third	Lowest third	Middle third	Highest third
No Disablity	29.3%	33.0%	37.7%	46.6%	36.7%	16.6%
Disability	42.3%	33.1%	24.6%	55.7%	31.3%	13.0%

■ No Disablty   ■ Disability

Field of study, income, and disability: In an analysis of income and disability, field of study introduces another important factor. With the exception of arts and "other" field of studies, students without disabilities who pursue business, STEM, and health are most likely to earn within the highest income decile. In comparison, regardless of what students with disabilities pursue as a field of study, they are most likely to earn within the lowest income tertile. Students with and without disabilities, who pursued STEM as a field of study, seemed to be more likely to earn an income within the highest tertile than other fields; however, the income gap across the disability variable remained largely consistent. In fact, for students pursuing health and business, students with disabilities were less than half as likely to earn income within the highest income tertile as students without disabilities.
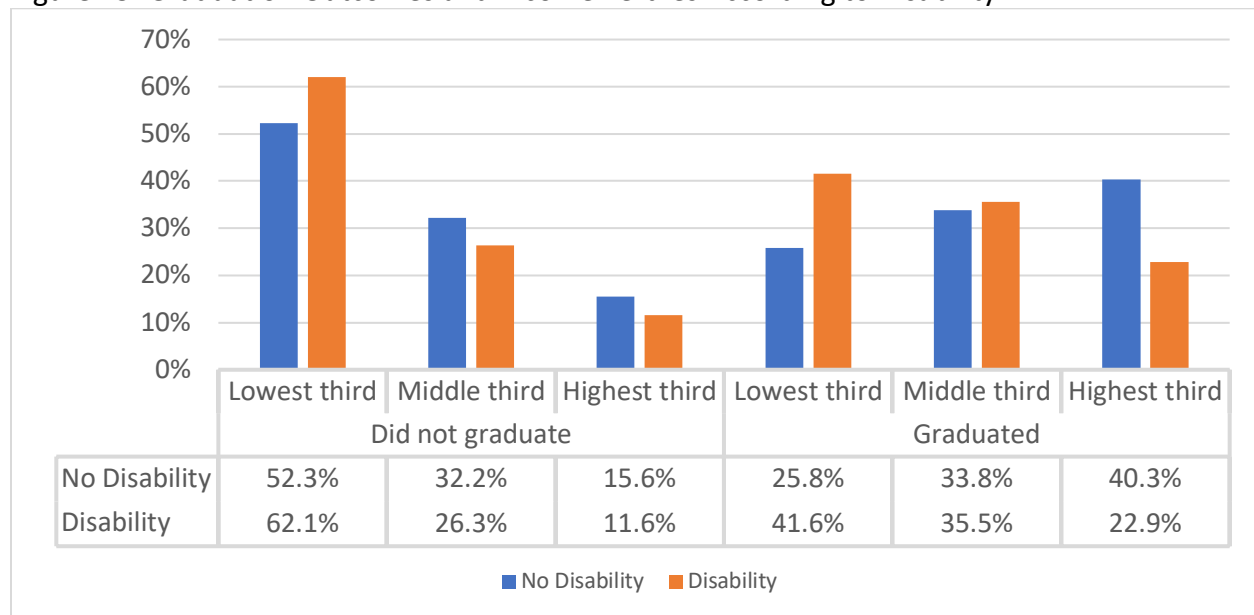
Table 11: Field of Study and Income Tertiles According to Disability

	No Disability	Disability
Liberal Arts (arts, humanities, and social sciences)		
Lowest third	36.6%	53.5%
Middle third	37.2%	31.7%
Highest third	26.2%	14.9%
Business		
Lowest third	25.6%	43.4%
Middle third	32.3%	35.8%
Highest third	42.1%	20.8%
STEM		
Lowest third	27.0%	42.6%
Middle third	28.8%	29.8%
Highest third	44.2%	27.7%
Health		
Lowest third	31.4%	47.1%
Middle third	32.0%	35.3%
Highest third	36.6%	17.6%
Other		
Lowest third	40.0%	53.5%
Middle third	35.3%	30.2%
Highest third	24.7%	16.3%

Graduation, income, and disability: The benefits of running cross-tabulations is that results can show important relationships between selected variables. When examining postsecondary graduation outcomes alongside future income and disability, it is clear that the three factors have a strong relationship. For students who started but did not graduate from PSE, there is a notable relationship with future income. For students without disability, the majority (52.3%) who did

not graduate ended up in the lowest income tertile. In contrast, again for students without disability who did graduate, the largest group (40.3%) ended up in the highest income tertile. However, for students with disabilities, whether they graduated or not, the largest proportion still fell within the lowest income tertile (62% for those who graduated and 42% of those who did not). Of students who graduated, just over 40% of students without disability ended up earning within the highest income tertile whereas the proportion of students with disability earning within the highest income tertile was close to almost half (23%). This supports arguments that despite earning postsecondary diplomas and degrees, students with disability continue to be disadvantaged in the labour market.

Figure 15: Graduation Outcomes and Income Tertiles According to Disability

| | Did not graduate | | | Graduated | | |
	Lowest third	Middle third	Highest third	Lowest third	Middle third	Highest third
No Disability	52.3%	32.2%	15.6%	25.8%	33.8%	40.3%
Disability	62.1%	26.3%	11.6%	41.6%	35.5%	22.9%

■ No Disability ■ Disability

There are clear relationships between school-based variables, both public and postsecondary factors, students' disability status, and future income. Earning extra credits and taking the Academic program in Grade 9, as well as pursuing business, STEM, and health as well as successfully graduating from PSE seem to skew students' future incomes towards the highest income tertile. Yet in this context students with disabilities continue to face a consistent and persistent gap in reaching similar levels of future earnings, compared to students without disabilities.