EMBEDDED BARRIERS AND IMPENDING COSTS: THE RELATIONSHIP BETWEEN DISABILITY, PUBLIC SCHOOLING, POST-SECONDARY EDUCATION, AND FUTURE INCOME EARNINGS

GILLIAN PAREKH
YORK UNIVERSITY

ROBERT S. BROWN
YORK UNIVERSITY

DAVID WALTERS
UNIVERSITY OF GUELPH

RYAN COLLIS
YORK UNIVERSITY

NALENI JACOB
YORK UNIVERSITY

Abstract

In Canada, access to post-secondary education (PSE), which includes university, college, or apprenticeship programs, is becoming ever more important in terms of securing future employment, long-term health, and economic security. Kirby (2009) points to Canada's universal level of PSE access; however, also notes how access for students with disabilities continues to be more limited. With a focus on education, we grounded this study in critical disability theory to consider how disability is constructed and produced through social, environmental, and economic factors. This study built on earlier research that examined students' graduation from post-secondary education, primarily university and college, and explored disabled students' access to post-secondary education and their future earnings following PSE participation. Using a unique linked dataset between school board and federal data, our study revealed that disabled students are almost twice as likely to not access post-secondary education compared to their non-disabled peers. Across disability status, the outcomes of post-secondary credentials do not appear to result in future income parity, suggesting persistent ableism within the workforce.
Keywords: disability, post-secondary education, access, K–12 schooling, graduation, income

Résumé

Au Canada, l'accès à l'enseignement postsecondaire (EPS), qui comprend les programmes universitaires, collégiaux et d'apprentissage, est de plus en plus important du point de vue de l'emploi, de la santé à long terme et de la sécurité économique. Le Canada a atteint un niveau « universel » d'accès à l'EPS; cependant, l'accès des étudiants en situation de handicap reste plus limité. En mettant l'accent sur l'éducation, nous avons ancré cette étude dans la théorie critique du handicap afin d'examiner comment le handicap est construit et produit par des

facteurs sociaux, environnementaux et économiques. L'étude s'appuie sur des recherches antérieures qui portaient sur l'obtention d'un diplôme d'études postsecondaires, université et collège, et exploraient l'accès des étudiants en situation de handicap à l'enseignement postsecondaire ainsi que leurs revenus subséquents. Utilisant un ensemble unique de données couplées entre celles des conseils scolaires et celles du gouvernement fédéral, notre étude a révélé que les étudiants en situation de handicap étaient presque deux fois plus susceptibles de ne pas accéder à l'enseignement postsecondaire que leurs pairs sans handicap. Quel que soit le type d'incapacité, l'obtention d'un diplôme d'études postsecondaires ne semble pas se traduire par une parité des revenus futurs, ce qui suggère la persistance du capacitisme à l'égard de la main-d'œuvre.
Mots-clés : situation de handicap, éducation postsecondaire, accès, enseignement préscolaire, primaire et secondaire, diplomation, revenu

INTRODUCTION

In Canada, access to post-secondary education, which includes university, college, or apprenticeship programs, is becoming ever more important in terms of securing future employment, long-term health and well-being, and economic security. Statistics Canada has suggested that over 75% of future jobs will be in high skills sectors and require post-secondary education (PSE) (Government of Canada, 2017). Longitudinal studies have also reinforced the emerging imperative of accessing post-secondary education in terms of long-term health and economic independence (Ballingall, 2015; Fonseca & Zheng, 2011; Irwin, 2015; Kearney et al., 2015). Kirby (2009) points to Canada's universal level of PSE access; however, also notes how access for students with disabilities continues to be more limited. In earlier studies, we examined barriers that students with disabilities encounter in their pursuit of PSE, as well as how they access PSE, their graduation rates, and their future income earnings (Parekh et al., 2022a; 2022b). In Canada, it is well documented that disabled students face reduced access to post-secondary education (Arim & Frenette, 2019), however, there is scant literature on how students' experiences through public school, particularly high school, might play a role in their future post-secondary access and future earnings. Should the results of such studies indicate a strong relationship between public school factors and students' academic and economic futures, intentional interventions in K–12 education may result in more equitable outcomes. Based on a unique dataset of over 43,000 students, we examined students' secondary and post-secondary pathways. Of importance, we queried whether disabled students were accessing post-secondary education on par with their non-disabled peers and whether the attainment of post-secondary education led to equitable income earnings for both students with and without disabilities.

THINKING CRITICALLY ABOUT DISABILITY AND EDUCATION

Theoretical Framework and a Note on Language

The research in our study was grounded in critical disability theory. As a theoretical framework, critical disability theory asks us to consider how disability is constructed and produced through social, environmental, and economic factors (Erevelles et al., 2006; Meekosha & Shuttleworth, 2009; Oliver 1990). Instead of conceptualizing disability as an individual impairment, sociological understandings of disability recognize how the experience is shaped by intersecting identities and positionalities (Erevelles et al., 2019). As such, language related to disability is evolving. Further, in government, rights, and international conventions, person-first language is typically used (e.g., the UN Convention on the Rights of Persons with Disabilities).

However, many within the disability community adopt identity-first language, such as the term "disabled," as a way to highlight the social, environmental, and political disablement people with various forms of impairment face. Although we drew on data from special education for this analysis, there has been a significant push to discontinue terms such as "special education needs" or "special needs" in relation to students (see National Centre on Disability and Journalism, 2021, and Associated Press Stylebook, 2022). Therefore, to further attend to how disability is constructed both inside and outside of schools (Underwood, 2009) as well as align with the aims of the disability community and disability justice, we adopted both identity- and person-first language throughout this work (see Annamma & Morrison, 2018; Sins Invalid, 2019).

Addressing Disability Discrimination in Education

Section 15 of the Canadian Charter of Rights and Freedoms identifies disability as a protected status (Government of Canada, 1982). The Ontario Human Rights Commission (OHRC; 2018) has stated that despite integrated supports into schools, "a significant number of students with disabilities continue to face obstacles in their attempts to access educational services in Ontario" (p. 7). In addition, the OHRC (2018) has claimed, "'Disability' continues to be the most often cited ground of discrimination under the [Human Rights] Code in human rights claims made to the Human Rights Tribunal of Ontario (HRTO), with significant systemic issues being raised in disability and education claims" (p. 4). The OHRC (2018) has also noted, "The belief that disability is an abnormality has been used to rationalize the exclusion, neglect, abuse and exploitation of people with disabilities in various different contexts. It may also inform paternalistic and patronizing behaviours towards students with disabilities" (p. 20). In addition, due to flawed perceptions of ability and biased notions of who deserves or belongs in academic communities (Ladwig & McPherson, 2017; Parekh et al., 2018), students with intersecting identities including racialized students, students from lower-income communities, and male students are more likely to be denied access to key academic opportunities required for post-secondary access and subsequent achievement (Cooc & Kiru, 2018; Ferguson, 2019; James & Turner, 2017; Queiser & De Araujo, 2017). Therefore, throughout this article, when we consider disability, we include students who have been systemically *disabled* through ability-based programming or decisions related to future academic opportunities.

School-Based Factors

Special education and streaming into non-Academic programming have both been shown to be negatively related to post-secondary access (Brown & Parekh, 2010; Brown et al., 2013; Parekh & Brown, 2019). In combination with other factors, such as low achievement on Grade 6 Education Quality and Achievement Office (EQAO) assessment, and suspension (Brown et al., 2013), as well as in combination with higher absenteeism and suspension (Brown et al., 2020), studies have demonstrated significantly limited access for disabled students reaching post-secondary education. In a recent study, two-thirds of parents and guardians reported that appropriate curriculum choices were not made available to their children with disabilities (Reid et al., 2018) and that students faced notable attitudinal barriers, bullying, and discrimination (OHRC, 2018; Provincial Advocate for Children and Youth, 2016). Students accessing special education services were also disproportionately suspended from school, more often and for longer, than their non-disabled peers (Brown et al., 2013; OHRC, 2018; Ontario Ministry of Education, 2019; Zheng & De Jesus, 2018).

Streaming has a cumulative effect, and once students are placed in a "low ability" group, that placement tends to be permanent (Mitchell, 2015). Importantly, the level of high school courses students pursue (Grades 9 and 10 Academic, Grades 11 and 12 University) plays a role in post-secondary access (Gallagher-McKay et al., 2023; Parekh et al., 2021; Parekh et al., 2020; Quan & James, 2017). In fact, course level or academic program appear to be even more

strongly related to post-secondary access than achievement (see Brown et al., 2018; Parekh & Brown, 2019). In addition to stratified outcomes related to the program, bias can also influence how ability is understood and perceived in others (Parekh et al., 2018). As such, bias can influence how students are organized across ability-based courses and programs. The disproportionate overrepresentation of historically marginalized groups is evidenced in both special education (Brown & Parekh, 2010; Connor, 2017; De Valenzuela et al., 2006; Erevelles et al., 2006; Ferri & Connor, 2005; Reid & Knight, 2006) and secondary school streaming (Archer et al., 2018; Domina et al., 2017; James & Turner, 2017; Parekh, 2013). Students with disabilities; students from low-income families; Black, Latinx, and Indigenous students; and students who are learning English are disproportionately overrepresented in non-Academic high school pathways (Follwell & Andrey, 2021; Parekh, 2013).

Barriers in Accessing and Succeeding in Post-Secondary Education

According to Statistics Canada, access to post-secondary education continues to be a barrier for disabled students. For non-disabled Canadian youth, approximately 77% will enroll in PSE by their early 20s; however, that figure drops to 60% for youth with a diagnosed neurodevelopmental disorder, and even further down to 48% for youth diagnosed with a mental health condition (see Arim & Frenette, 2019). The levels of enrolment drop even lower for students with both a mental health condition and a neurodevelopmental condition, with only 36% moving on to post-secondary education (Arim & Frenette, 2019). Funding is another significant barrier, particularly around accommodations and disability-related costs (Pierre, 2016), and disabled students are more likely to carry higher rates of debt (Chambers et al., 2011). A survey on the experiences of navigating the accommodations process revealed that students often felt uncomfortable disclosing disability or the need for accommodations to their professors or to students who may be filling accommodation supports (scribing, etc.) (Pierre, 2016). Other studies revealed such barriers as lack of access to assistive and other critical forms of technology (Fichten et al., 2012; Shanouda & Spagnuolo, 2021), disability-related costs (Pierre, 2016), limited financial supports (Collis, 2022), higher debt (Chambers et al., 2011), access to accommodations (OHRC, 2016; Parsons et al., 2021), accessibility barriers on campus (National Educational Association of Disability Students [NEADS], 2012), and ongoing stigma and lack of positive disability representation within PSE institutions (Gault et al., 2020; Prema & Dhand, 2019).

Graduation from Post-Secondary Education

A recently completed study for the Ontario Council of Articulation and Transfer (ONCAT; Parekh et al., 2022a) examined post-secondary[1] pathways, transfer, and graduation rates with a focus on disabled students. The results revealed the importance of integrating students' sociodemographic, program, and school-based variables into the analysis in order to accurately identify the gap in graduation between students with and without disability. For instance, when only examining whether students transferred[2] between post-secondary institutions and disability, the gap in graduation was 14%, with 62% of disabled students graduating compared to 76% of their non-disabled peers. Accounting for students' sociodemographic characteristics, this gap dropped to 11% and then again to 6% with the control for students' field of study. When students' school-based, largely secondary school, variables were accounted for, the gap in graduation between students with and without disability was reduced to 1% (or negligible). Further, following the control for students' sociodemographic, program, and school-based variables, there were key indicators that remained

1 Note that post-secondary education referred to college and university programs.

2 Note that the initial analysis for ONCAT included transfer as a primary factor.

significant in relation to students' graduation from post-secondary education. These were:

- Whether or not students transferred between post-secondary education institutions
- Whether students spoke another language other than English
- Whether students were born outside of Canada
- Gender
- Neighbourhood decile of income
- When students started post-secondary education in relation to graduating from high school
- Field of study students pursued
- Whether students had ever been suspended in their K–12 schooling
- Students' academic program of study in Grade 9
- The proportion of absenteeism in Grade 9
- Grade 9 average marks

Interestingly, disability was a significant variable until students' school-based variables were integrated into the regression model, then disability lost its significance entirely. This is important because disability, as an isolated variable, was no longer significant in predicting post-secondary graduation. This finding suggests that much of what explains the initial gap in graduation across disability status is explained by the experiences students have had in public school.

METHODS AND DATA[3]

The data for our study was derived by drawing on elaborate data linkages among the Toronto District School Board's (TDSB) Grade 9 Cohort Dataset, the Postsecondary Student Information System (PSIS), and Statistics Canada's T1 Family File (T1FF) tax files[4] The full sample used in this study included 43,390 student records. The analyses included students who started their secondary schooling in the TDSB in 2004, 2005, or 2006, and entered a community college or university undergraduate degree program in Ontario beginning in 2009, 2010, or 2011. Employment earnings were derived from tax records for the year 2017[5]. The analyses included both descriptive statistics and a series of least squares regression models.

The primary purpose of the statistical analyses was to assess the impact of having a disability on accessing post-secondary education and future earnings of persons with disabilities with various post-secondary credentials. The dependent variable in the regression analyses was employment earnings (in 2017 dollars)[6] derived from the T1FF. Disability status was our focal independent variable. Students were assessed as disabled if they were identified as having a disability or received support through special education within the TDSB, or if they had received a permanent disability grant from the Canada Student Loan Program (CSLP), or if they claimed a disability amount in their 2017 income tax (DISDN).

Other key independent variable captured the post-secondary pathway during the study period and consisted of five possible categories:

1. No post-secondary education
2. Some college education, but did not graduate
3. Some university education, but did not graduate
4. Graduated college
5. Graduated university

3 For detailed information on variable descriptions, please see the report written for and published by ONCAT (Parekh et al., 2022a).

4 Further information relating to the data linkages can be found in Walters et al. (2021).

5 One limitation of using tax information derived through the T1FF was that it was not possible to capture hours worked or distinguish between full-time or part-time workers. Students who were registered in a college or university program in 2017 were excluded from the analyses, as were students who obtained a second PSE credential after their initial program.

6 Only cases with positive 2017 earnings less than $200,000 were included in the analyses. Sensitivity tests were employed to confirm that unusual and outlying observations did not have a significant influence on the statistical estimates.

Several sociodemographic control variables used in this study were derived from the TDSB data set, which included gender, whether the students started their secondary program on time (14 years of age), their first language (English), and their country of birth. We also included a variable capturing students' neighborhood income deciles based on their matched postal code and income information from Environics Analytics. Some models also included TDSB variables that other research had found to be important predictors of not completing high school or transitioning into PSE (Brown & Parekh, 2013; Brown et al., 2020). These included variables such as whether students passed the Ontario Secondary School Literacy Test (OSSLT), had been suspended in secondary school, or took most of their Grade 9 courses in applied or academic streams. We also included variables that captured the number of credits earned in Grade 9, the percentage of time each student was absent in Grade 9, and their overall Grade 9 average. Finally, in analyses pertaining only to students who entered PSE during the study period, we included the post-secondary field of study derived from the PSIS data set. This variable defined a field of study as liberal arts, STEM, business, health, or other fields of study. Further information on these variables can be found in Walters et al. (2021).

Disability Variable

The disability variable[7] distinguished between those with and without a disability as constructed through the following identity and experiential markers. We classified those within the disability category if they were identified as having a disability in any of the linked datasets according to the criteria below:

- Students accessing TDSB's special education services/supports (excluding gifted).[8]
- Students who did not have experience in special education but applied for the Canadian Student Grant for Students with Permanent Disabilities when accessing post-secondary 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 Family File (T1FF) tax files.

With the exception of neighbourhood income, Grade 9 average, and Grade 9 absenteeism, which were treated as continuous, all other variables were treated as categorical. Dummy (0/1) variables were used for categorical predictors. For each set of regression models, the independent variables were entered in a series of stages, where Model 1 included only the focal predictors, Model 2 added the sociodemographic control variables, and Model 3 included the school-related control variables.

7 The description of the disability variable was largely drawn from a report written for and published by ONCAT (see Parekh et al., 2022a, pp. 9–10).

8 While there is sometimes disagreement as to whether "special education needs" can be conceptually synonymous with "disability," it is important to consider how the terms were themselves constructed. As noted earlier, in education, the term "special" or "special education needs" is often used to describe students who have failed to meet developmental, academic, or behavioural expectations in school (Underwood, 2009). More broadly, disability outside of school is often understood as failure to meet normative expectations. Therefore, "the distinction between school-based disabilities and experiences of disability outside of school are simply a matter of who is constructing the category of disability and how" (Underwood, 2009, p. 4). Therefore, we drew on Underwood's (2009) explanation as justification for including special education students within the disability variable.

RESULTS

Accessing Post-Secondary Education

Examining the interrelation between different characteristics can be helpful in identifying systemic issues around academic pathways and access to post-secondary education. Exploring PSE access outcomes across the intersection of gender and disability revealed disparate patterns. Figures 1 through 4 provide visual displays of our descriptive statistics based on cross-tabulations among disability and several of the key variables in our study.

Figure 1 reveals that, overall, male students were less likely to access PSE than female students. When adding the disability variable, male students with disability were notably less likely to attend PSE (45% attendance rate) than both non-disabled male students (69%) and female students with disability (61%). The proportion of female students not attending PSE (20%) close to doubled for female students with disability (39%).

Figure 2 shows that students who spoke another language other than English, both with and without disability, were more likely to access PSE compared to their peers who spoke only English. For students with disability, just over a third (39%) of students who spoke another language other than English did not attend PSE, compared to over half (54%) of students with disability who spoke only English.

Interestingly, Figure 3 reveals there was a much more subdued difference in PSE attendance between disability statuses when accounting for students' Grade 9 program of study. In fact, among students who took most of their courses at the Academic level, the vast majority of students went on to PSE, but the difference between students with and without disability was about 3%. Likewise, of students who did not take Academic-level courses in Grade 9, less than half went on to PSE, and the difference between students with and without disability was 5%. It appears that program pathways nearly all but collapsed the differences typically attributed to disability. This finding seems to support the research literature that program pathways play an integral role in students' access to PSE (Parekh, 2013), likely due, in part, to how students are organized across ability-based opportunities in school, as well as how those course/program features function as gatekeepers to higher education (Gallagher-McKay et al., 2023).

9 Please note that the available gender variable was a binary variable (male/female).

Figure 1

Gender[9] and Disability across PSE Attendance

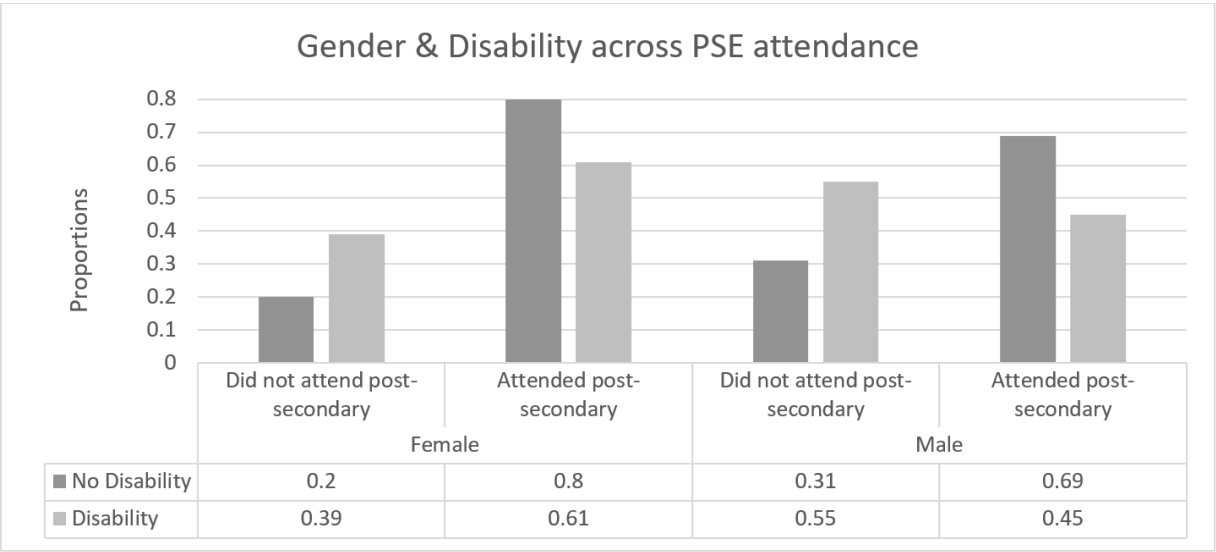


Figure 2

Language and Disability across PSE Attendance

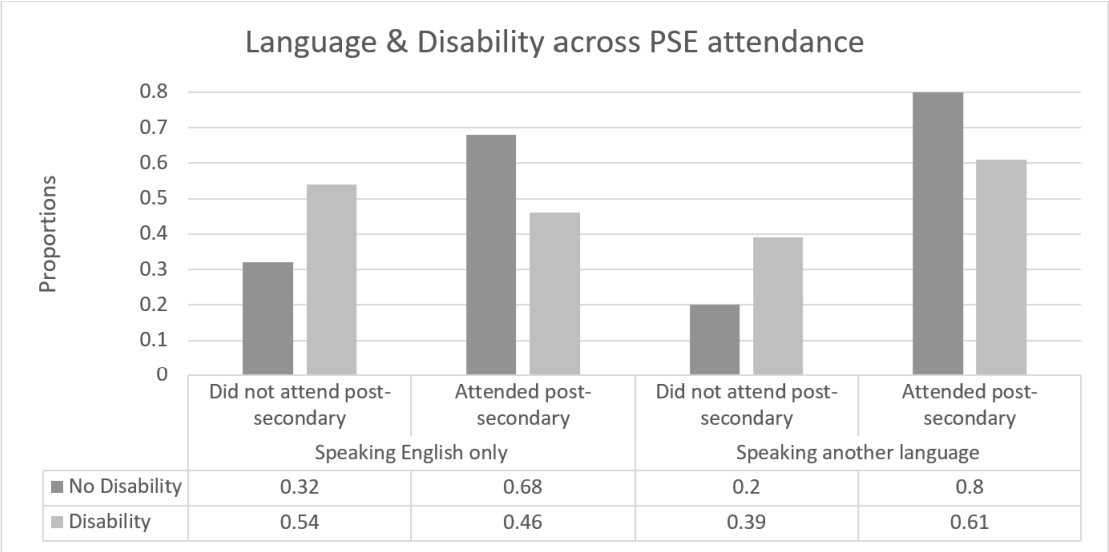
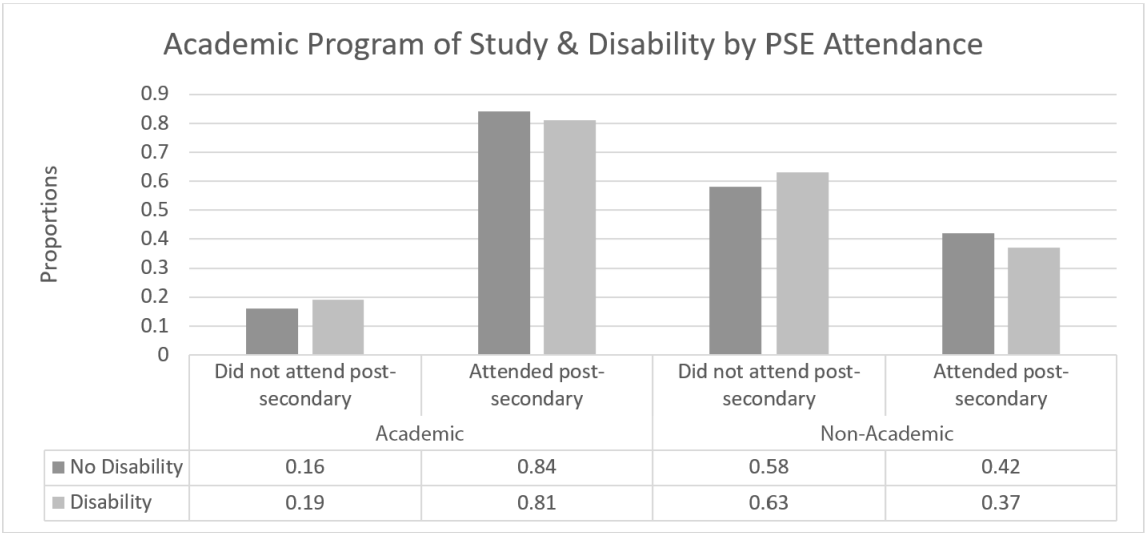


Figure 3

Academic Program of Study and Disability by PSE Attendance



The relationship between suspension, disability, and PSE attendance is highly relevant, as displayed in Figure 4. The suspension variable nearly or more than doubled the rate of PSE non-attendance for students with and without disability. For instance, for non-disabled students who had never been suspended in high school, 19% did not attend PSE. This figure jumped to over half (51%) of non-disabled students who had been suspended. In the absence of suspension, disability close to doubled PSE non-attendance. PSE non-attendance jumped from 19% to 38% when disability was considered and jumped to 65% for students who were also suspended. It is important to note that the experience of suspension itself may not be the incident that makes the difference, but the outcome of suspension may be indicative of an ongoing negative relationship with the school.

Figure 5 reveals that there was a clear linear relationship between PSE participation and neighbourhood income. There was a sustained 24–25% difference in PSE access between students with and without disability up to the 5th decile of neighbourhood income. As income levels rose, the gap in access for disability status shrank to a 14% difference for the highest income decile. This finding supports the research literature that shows how wealth can play a tremendous role in students' access to PSE.

Figure 4

Suspension and Disability across PSE Attendance

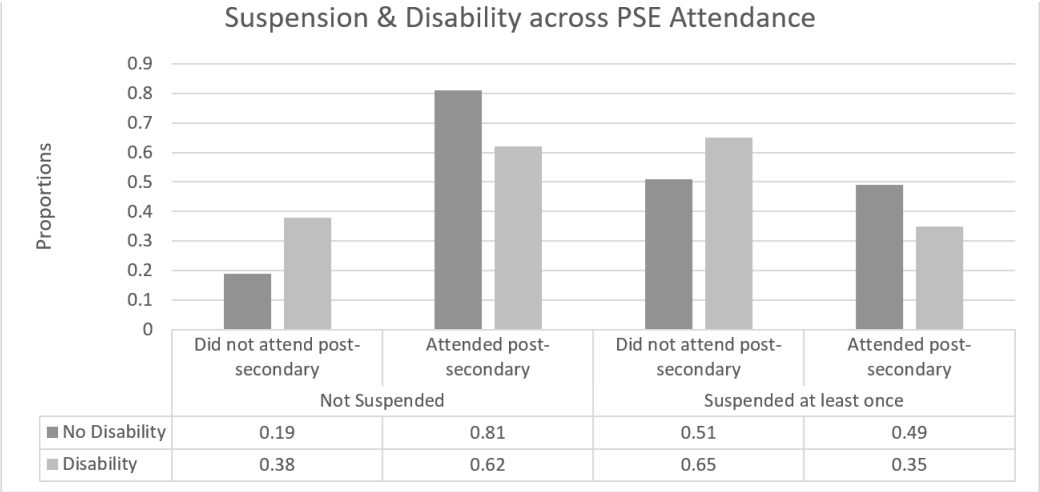
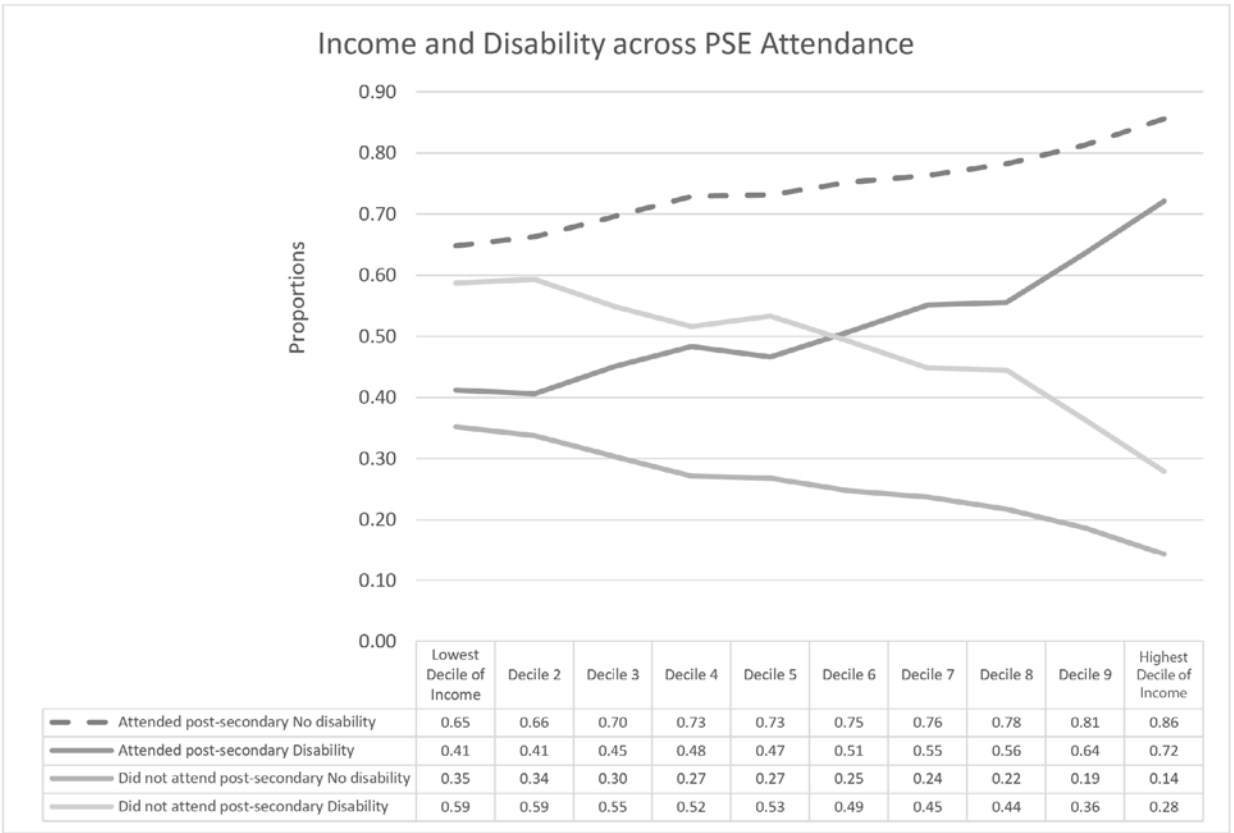


Figure 5

Income and Disability across PSE Attendance



Pathways to and through Post-Secondary Education

Table 1 presents the results for the cross-tabulation between disability status and educational pathway. The results of this table reveal that among the TDSB students who completed their programs in 2004 through 2006, disabled students were nearly twice as likely than non-disabled students (49% versus 26%) to not attend a post-secondary institution (college or university) during the study period. They were also nearly twice as likely to attend, but not complete, a community college program (13.54% versus 7.5%). In contrast, those without disability were more likely than those with disability to attend university, but not complete their programs (11.66% versus 7.28%). Likewise, those with disability were more likely to graduate from college (15.66%) compared with those without disability (12.14%). However, the most remarkable comparison was observed among university graduates, where TDSB graduates without disability were almost three times more likely to complete university than those with disability. Approximately, 44% of the study population without disability completed university, compared to just under 15% of those with disability.

Benefiting from Post-Secondary Education

Table 2 presents the bivariate regression results comparing the earnings of those with and without disability.[10] The results revealed that in 2017, disabled workers who entered secondary school in the TDSB between 2004 and 2006 earned approximately $30,000 per year in 2017. In comparison, non-disabled workers earned approximately $41,000. Hence, those with disability earned approximately $11,000 less than their counterparts.

The estimates in Table 3 are predicted earnings, with corresponding 95% confidence intervals, for the interaction between disability status and post-secondary pathway variables, across

10 The estimates in Table 2 and Table 3 are based on observations with and without PSE.

Table 1

Disability Status by Transition Pathway

	Disability Status	
Pathway	No Disability	Disability
No post-secondary in Canada	25.76%	48.89%
College but did not graduate	7.50%	13.45%
University but did not graduate	10.66%	7.28%
Graduated College	12.14%	15.66%
Graduated University	43.94%	14.72%

Table 2

Income by Disability Status

Disability	Earnings	95% Interval	
No	$40,940.48	$40,592	$41,289
Yes	$29,715.96	$28,832	$30,599

Table 3

Income by Disability and PSE Status with and without Controls

	Model 1 (Zero order)			Model 2 (Sociodemographic)			Model 3 (School-based variables)		
	Earnings	95% Interval		Earnings	95% Interval		Earnings	95% Interval	
No disability									
No post-secondary in Canada	$28,065.95	$ 27,302	$ 28,830	$28,058	$ 27,287	$ 28,828	$ 33,033	$ 32,184	$ 33,882
College/Did not graduate	$30,061.62	$ 28,849	$ 31,274	$29,965	$ 28,760	$ 31,170	$ 32,914	$ 31,708	$ 34,120
University/Did not graduate	$31,038.20	$ 29,983	$ 32,094	$30,445	$ 29,396	$ 31,493	$ 29,656	$ 28,612	$ 30,700
Graduated college	$36,880.46	$ 36,000	$ 37,761	$37,415	$ 36,541	$ 38,289	$ 38,278	$ 37,410	$ 39,145
Graduated university	$50,270.32	$ 49,808	$ 50,733	$50,315	$ 49,845	$ 50,786	$ 46,685	$ 46,152	$ 47,217
Disability									
No post-secondary in Canada	$24,981.61	$ 23,665	$ 26,299	$24,840	$ 23,511	$ 26,168	$ 32,173	$ 30,721	$ 33,624
College/Did not graduate	$27,770.79	$ 25,565	$ 29,976	$27,548	$ 25,355	$ 29,742	$ 32,426	$ 30,213	$ 34,639
University/Did not graduate	$25,399.96	$ 22,295	$ 28,505	$24,724	$ 21,646	$ 27,801	$ 26,523	$ 23,485	$ 29,561
Graduated college	$31,429.55	$ 29,557	$ 33,302	$31,775	$ 29,916	$ 33,634	$ 35,029	$ 33,159	$ 36,899
Graduated university	$41,175.93	$ 39,250	$ 43,102	$40,482	$ 38,570	$ 42,393	$ 39,291	$ 37,402	$ 41,179

three models.[11] For all models, those with disability reported lower earnings than those without disability; however, the earnings gap fluctuated across pathways. The results from Model 1 (without controls) reveal that among workers without a post-secondary education, disabled workers earned approximately $3,000 less than those without disability. The gap drops to approximately $2,300 for those who had some college education but increases to approximately $5,600 among those with some university education. Among college graduates, disabled workers earned approximately $5,400 less than their non-disabled counterparts, while the greatest gap in earnings was observed among graduates with a university degree; university graduates with disabilities earned just over $9,000 less than their non-disabled counterparts ($41,175 versus $50,270).

The earnings estimates and corresponding confidence intervals displayed in Model 2 and Model 3 were derived after adding control variables in stages and were calculated by holding the control variables constant at typical values (means are used for quantitative variables and proportions are used for categorical variables). Thus, the predicted earnings were averaged across the sample. When adding the sociodemographic control variables in Model 2, the predicted earnings were very similar to those provided in Model 1.[12] However, when adding students' school-based variables relating to secondary school disruption and performance available in the TDSB data set, the earnings gap between those with disability and those without closed substantially across the pathways. For example, the earnings gap among those who did not attend PSE between those with a disability and those without dropped from approximately $3,100 (Model 1) to $860 when students' school-based variables were added in Model 3. Likewise, among those with some college education, the difference in earnings between those with and without disability was not statistically significant when students' school-based variables were taken into consideration.

Among those with some university education, students without disability earned approximately $3,100 more than their disabled counterparts. Likewise, when adding students' school-based variables to the model, the predicted earnings for college graduates with disability was approximately $3,250 less than it was for non-disabled college graduates ($35,029 versus $38,278). Finally, among university graduates, the discrepancy in earnings between those with and without disability, which was approximately $9,000 in Model 1, was reduced to approximately $7,400 ($46,685 versus $39,291) when all the variables were included in the model. The regression estimates in Table 4 also controlled for field of study. Thus, this model applied only to students with at least some post-secondary schooling.[13] The predicted earnings displayed in this table reveal that field of study captured only a very modest amount of difference in earnings between non-disabled and disabled workers. The most substantial change was observed among university graduates, where disabled graduates earned approximately $5,900 less than those without disability.

Finally, the regression estimates in Table 4 extended the results from Model 3 of Table 3 but were also controlled for field of study. Thus, the sample for this analysis only included observations of students who attended PSE. The pattern of estimates in Table 4 was similar to those observed in Model 3 of Table 3, suggesting that field of study choices in PSE did not have a powerful impact on explaining differences in earnings between those with and without disability.

In sum, the regression analyses revealed that disabled students had lower earnings across all pathways; however, the largest gap

11 To preserve space, the estimates for the control variables have been removed, but are available upon request.

12 When not otherwise stated, the predicted earnings were calculated and were interpreted as holding the control variables constant at typical values.

13 The higher overall earnings in Table 4 were attributable to the values of the control variables being held constant for this subsample, as students who entered PSE were likely in advantaged positions with respect to many of the sociodemographic and school-based variables.

Table 4

Income by Disability by PSE Education (Only Students Who Entered PSE)

	Model (All Controls)		
	Earnings	95% Interval	
No Disability			
College/Did not graduate	$36,581.53	$35,239	$37,924
University/Did not graduate	$33,279.38	$32,200	$34,358
Graduated college	$40,596.85	$39,674	$41,520
Graduated university	$47,043.10	$46,523	$47,564
Disability			
College/Did not graduate	$35,682.14	$33,305	$38,059
University/Did not graduate	$30,496.17	$27,363	$33,629
Graduated college	$37,392.21	$35,404	$39,380
Graduated university	$41,120.62	$39,181	$43,061

in earnings was among university graduates, followed by graduates of community colleges (Table 4). Thus, not only were TDSB graduates with disability far less likely to earn a university degree (Table 1, similar to Parekh et al., 2022a), but those who did graduate from university were not able to achieve earnings parity with their counterparts without disability (see Table 3 and Table 4). While the students' high school-based variables played a significant role in reducing the earnings gap between workers with and without disability, a sizeable gap remained in the first few years after graduation among university graduates.

DISCUSSION/CONCLUSION

Disability discrimination can take many forms; however, ableism, the privileging of ability, is pervasive in education sectors and can lead to the belief that disabled students have lower status than their non-disabled peers (Silvers & Francis, 2005). However, ableism is not limited to the education system alone, but is deeply embedded within our social institutions and workplaces. Duncan-Andrade and Morrell (2008) have drawn the connection between our education systems and the resultant stratified outcomes by arguing that our education system functions as a de facto sorting mechanism positioning inequitable outcomes as natural or neutral.

Our current research study reaffirms this connection by showing how disabled students continue to experience immense barriers in accessing post-secondary education (see Arim & Frenette, 2019; Kirby, 2009) and also challenges the popular narrative that post-secondary education is the "great equalizer" for disabled students. This study lends important evidence to the ongoing inequity that disabled students face in accessing and benefiting from their post-secondary programs. Even when successfully admitted and having graduated from their program, disabled students continue to experience decreased wages, that, unlike the study on post-secondary graduation noted above (Parekh et al., 2022a), cannot be explained by secondary school factors. After controlling for the sociodemographic and school-based predictors, income parity appears to be only possible when students do *not* obtain post-secondary education credentials. Although achieving PSE credentials resulted in an overall increase in earnings, a post-secondary credential, particularly a university degree, im-

proved earnings for non-disabled workers more than their disabled colleagues.

From our research, there are clear barriers embedded within the public education system that are deeply connected to students' access to post-secondary education and future income earnings. These barriers include ability-grouping students early on in their education as it significantly impacts students' academic achievement, social belonging, and engagement in school (see Barron et al., 2022). Similarly, streaming, or organizing students along ability-based pathways, is "counter-evidential" (Archer et al., 2018, p. 119), yet this continues to be a common practice in K–12 education systems. Additionally, biased notions of ability, assessment, and their implications on placement can play a major role in students' access to post-secondary education (Brown et al., 2020; Parekh et al., 2018). Bias around race, gender, class, and other intersectional identity characteristics can shape perceptions of ability and can result in the academic exclusion of marginalized students (Connor, 2017; De Valenzuela et al., 2006; Erevelles et al., 2006; Ferri & Connor, 2005; Reid & Knight, 2006). Despite decades of research on disproportionality, Black students (Domina et al., 2017; James & Turner, 2017), Indigenous students (Swarup & Strangway, 2021), and students identifying as 2SLGBTQ+ (Yau et al., 2015) continue to be overrepresented within special education and placed in self-contained programming.

Drawing on the field of Disability Studies in Education, our current research study highlights evidence of the critical factors that collude to *disable* students' participation in post-secondary education and access to equitable income earnings. In addition to disability status, our study finds that access to post-secondary education is highly related to other intersecting variables such as gender, language, and income. For instance, female students access PSE at greater rates than their male counterparts. School-based variables also have a notable relationship with PSE access and may reveal potential points for intervention. Interestingly, the difference in disability status and access to PSE was not so pronounced in relation to students' academic program in Grade 9, offering further evidence of how ability grouping can potentially exacerbate limited opportunities for disabled students.

Accessing PSE is an important milestone, but a review of established research shows that even when disabled students get in and enrol in their selected post-secondary programs, there continue to be barriers that disproportionately impact their participation, such as limited access to course material, services and supports, additional costs and debt, mobility through campus, and experiences of stigma (Collis, 2022; Chambers et al., 2011; Fichten et al., 2012; Gault et al., 2020; NEADS, 2012; OHRC, 2016; Parsons et al., 2021; Prema & Dhand, 2019; Pierre, 2016; Shanouda & Spagnuolo, 2021). The process of acquiring accommodations is often fraught with challenges related to assessment, documentation, implementation, cost, and feasibility (see Jacob & Parekh, 2022, for more information). Collis's (2022) review of provincial and territorial investments revealed that disability-related supports for post-secondary students were often tenuously and conditionally tied to other factors. For instance, financial aid could be tied to student loans or to work-focused programs and only cover particular aspects of students' costs. Depending on where students live, there could also be interactions between disability support programs and student loans. Additionally, initiating access to financial support and debt-reduction programs can be highly bureaucratic and time consuming (Deller & Tamburri, 2019). Unlike the results for PSE, where the inclusion of school-based experiences largely explained the difference in PSE outcomes, the same was not found in relation to equitable earnings in the workplace, suggesting disabled graduates are not enjoying the same benefits from their credentials as their non-disabled peers. It is critical to attend to how the labour of disabled graduates and workers is valued and ensure that practices for pay equity are in place.

Recognizing and identifying systemic barriers for disabled students and workers is an important step, however, institutional action is required to address ongoing inequities. There have been several suggestions as to how to effect change in the PSE pipeline, particularly

for marginalized students. A report published by the Higher Education Quality Council of Ontario examined barriers to PSE and suggested that interventions in K–12 may result in larger impacts on PSE access than interventions targeting the PSE sector itself (Deller & Tamburri, 2019). Interestingly, one of the report's recommendations was to eliminate academic streaming in Grades 9–10.[14] It is important to note that, although official streaming is often attributed to high school, elementary school experiences that organize students by ability (like streaming) have also been shown to be hugely correlated to PSE access (Brown et al., 2013, 2020). Therefore, we would also recommend introducing interventions that target ability-grouping practices at the elementary level as well as challenge exclusionary and pervasive notions of ability that frequently circulate in education systems (Parekh & Brown, 2019; Parekh et al., 2018).

ACKNOWLEDGEMENTS

This research was generously funded by Employment Social Development Canada (ESDC), the Ontario Council on Articulation and Transfer (ONCAT), and the Social Science and Humanities Research Council (SSHRC). Data analyses were made possible thanks to the Toronto District School Board and Statistics Canada. Please note that aspects of this article were drawn from a recent report to ESDC entitled *Supports for Student Learning Program Research Series: Barriers Faced by Students with Disabilities*, as well as a series of reports submitted to ONCAT entitled *Predicting Transfer Pathway Uptake and Associated Income Profiles. A Second Look at the TDSB-PSIS Linkage: Focus on Disability* (Parekh et al., 2022c).

14 The Ontario Ministry of Education has since moved to de-stream Grade 9 courses, however, a recent study found that only boards in Ontario had, or had plans to, de-stream Grade 10 (People for Education, 2023).

REFERENCES

Associated Press. (2022). *The Associated Press stylebook (56th ed.)*. Associated Press.

Annamma, S., & Morrison, D. (2018). Identifying dysfunctional education ecologies: A DisCrit analysis of bias in the classroom. Equity & Excellence in Education, 51(2), 114–131. https://doi.org/10.1080/10665684.2018.1496047

Archer, L., Francis, B., Miller, S., Taylor, B., Tereshchenko, A., Mazenod, A., Pepper, D., & Travers, M.-C. (2018). The symbolic violence of setting: A Bourdieusian analysis of mixed methods data on secondary students' views about setting. *British Educational Research Journal*, *44*(1), 119–140. https://doi.org/10.1002/berj.3321

Arim, R., & Frenette, M. (2019). *Are mental health and neurodevelopmental conditions barriers to postsecondary access?* (No. 2019005e). Statistics Canada, Analytical Studies Branch.

Ballingall, A. (2015, November 3). Education, age important in post-recession Toronto, report says. *The Toronto Star*. https://www.thestar.com/news/gta/2015/11/03/education-age-important-in-post-recession-toronto-report-says.html

Barron, K., Collis, R., Gordon, A., Marshall, N., Richmond, A., Parekh, G., & Brown, R. S. (2022). *Examining the impact of self-contained special education classes on students' academic achievement, social belonging and engagement in school: A systematic literature review*. York University.

Brown, R. S., & Parekh, G. (2010). *Special education: Structural overview and student demographics* (Report No. 10/11-03). Toronto District School Board.

Brown, R. S., & Parekh, G. (2013). *The intersection of disability, achievement, and equity: A system review of special education in the TDSB* (Report No. 12/13–12). Toronto District School Board.

Brown, R. S., Gallagher-Mackay, K., & Parekh, G. (2020). Redefining risk at school: Elementary school factors predicting post-secondary access. *Educational Policy Analysis and Archives, 28*(21), 1–25. https://doi.org/10.14507/epaa.28.4200

Brown, R. S., Parekh, G., & Gallagher-MacKay, K. (2018). *Getting through secondary school: The example of mathematics in recent TDSB grade 9 cohorts* [Presentation]. Higher Education Quality Council of Ontario.

Brown, R. S., Parekh, G., & Presley, A. (2013). *The TDSB grade 9 cohort 2006–2011: Special education* (Fact Sheet No. 4). Toronto District School Board.

Brown, R. S., Gallagher-Mackay, K., & Parekh, G. (2020). Redefining risk at school: Elementary school factors predicting post-secondary access. *Educational Policy Analysis and Archives, 28*(21), 1–25. https://doi.org/10.14507/epaa.28.4200

Brown, R. S., Parekh, G., & Gallagher-MacKay, K. (2018). *Getting through secondary school: The example of mathematics in recent TDSB grade 9 cohorts* [Presentation]. Higher Education Quality Council of Ontario.

Brown, R. S., Parekh, G., & Presley, A. (2013). *The TDSB grade 9 cohort 2006–2011: Special education* (Fact Sheet No. 4). Toronto District School Board.

Chambers, T. C., Sukai, M., & Bolton, M. (2011). *Assessment of debt load and financial barriers affecting students with disabilities in Canadian postsecondary education: Ontario report*. Higher Education Quality Council of Ontario.

Collis, R. (2022). *Supports for student learning program research series: Barriers faced by students with disabilities. Scan of provincial/territorial governments programs and services.* Prepared for submission to Employment and Social Development Canada.

Connor, D. J. (2017). Who is responsible for the racialized practices evidenced within (special) education and what can be done to change them? *Theory into Practice*, *56*(3), 226–223. https://doi.org/10.1080/00405841.2017.1336034

Cooc, N., & Kiru, E. W. (2018). Disproportionality in special education: A synthesis of international research and trends. *The Journal of Special Education*, *52*(3), 163–173. https://doi.org/10.1177/0022466918772300

De Valenzuela, J. S., Copeland, S. R., Qi, C. H., & Park, M. (2006). Examining educational equity: Revisiting the disproportionate representation of minority students in special education. *Exceptional Children*, *72*(4), 425–441. https://doi.org/10.1177/001440290607200403

Deller, F., & Tamburri, R. (2019). *Early supports for accessing postsecondary education: Good, bad or indifferent?* Higher Education Quality Council of Ontario.

Domina, T., Penner, A., & Penner, E. (2017). Categorical inequality: Schools as sorting machines. *Annual Review of Sociology*, *43*, 311–330. https://doi.org/10.1146/annurev-soc-060116-053354

Duncan-Andrade, J. M. R., & Morrell, E. (2008). *The art of critical pedagogy: Possibilities for moving from theory to practice in urban schools* (Vol. 285). Peter Lang.

Erevelles, N., Grace, E. J., & Parekh, G. (2019). Disability as meta-curriculum: Epistemologies, ontologies and transformative praxis. *Curriculum Inquiry*, *49*(4), 357–372. https://doi.org/10.1080/03626784.2019.1664078

Erevelles, N., Kanga, A., & Middleton, R. (2006). How does it feel to be a problem? Race, disability, and exclusion in educational policy. In E. A. Brantlinger (Ed.), *Who benefits from special education? Remediating (fixing) other people's children* (pp. 77–100). Lawrence Erlbaum Associates.

Ferguson, R. J. (2019). *Hidden among the under-represented: Foster youth access and persistence in Ontario post-secondary education* [Unpublished doctoral dissertation]. University of Toronto.

Ferri, B. A., & Connor, D. J. (2005). Tools of exclusion: Race, disability, and (re) segregated education. *Teachers College Record*, *107*(3), 453–474. https://doi.org/10.1111/j.1467-9620.2005.00483.x

Fichten, C. S., Asuncion, J. V., Wolforth, J., Barile, M., Budd, J., Martiniello, N., & Amsel, R. (2012). Information and communication technology related needs of college and university students with disabilities. *Research in Learning Technology*, *20*. https://doi.org/10.3402/rlt.v20i0.18646

Follwell, T., & Andrey, S. (2021, June 24). Ontario's new "de-streamed" math is a good start, but it shouldn't be the end. *Globe and Mail*. http://www.theglobeandmail.com/opinion/article-ontarios-new-de-streamed-math-is-a-good-start-but-it-shouldnt-be-the/

Fonseca, R., & Zheng, Y. (2011). *The effect of education on health: Cross-country evidence* [Working paper]. Rand Labor and Population.

Gault, M. A., Raha, S. S., & Newell, C. (2020). Perception of disability as a barrier for Canadian medical students. *Canadian Family Physician*, *66*(3), 169–171. https://pubmed.ncbi.nlm.nih.gov/32165461/

Gallagher-Mackay, K., Brown, R. S., Parekh, G., James C. E., & Corso, C. (2023). "*I have all my credits – now what?": Disparities in postsecondary transitions, invisible gatekeeping and inequitable access to rigorous upper year curriculum in Toronto, Ontario*. Jean Augustine Chair in Education, Community and the Diaspora at York University. https://www.yorku.ca/edu/jean-augustine-chair/wp-content/uploads/sites/708/2023/05/I-have-all-my-credits-now-what_Report.pdf

Government of Canada. (1982). *Guide to the Canadian Charter of Rights and Freedoms*. https://laws-lois.justice.gc.ca/eng/Const/page-12.html

Government of Canada. (2017). *Imbalances between labour demand and supply (2019-2029)*.

Irwin, N. (2015, April 21). Paltry pay: Why American workers without much education are being hammered. *New York Times*. https://www.nytimes.com/2015/04/22/upshot/why-workers-without-much-education-are-being-hammered.html

Jacob, N., & Parekh, G. (2022). *Supports for student learning program research series: Barriers faced by students with disabilities: A review of literature*. Prepared for Employment and Social Development Canada.

James, C., & Turner, T. (2017). *Towards race equity in education: The schooling of Black students in the Greater Toronto Area*. York University.

Kearney, M., Hershbein, B., & Jacome, E. (2015). *Profiles of change: Employment, earnings and occupations from 1990-2013*. Brookings Institute. https://www.brookings.edu/articles/profiles-of-change-employment-earnings-and-occupations-from-1990-2013/

Kirby, D. (2009). Widening access: Making the transition from mass to universal post-secondary education in Canada. *Journal of Applied Research on Learning*, *2*, 1–17. https://www.researchgate.net/publication/238721275_Widening_Access_Making_the_Transition_from_Mass_to_Universal_Post-Secondary_Education_in_Canada

Ladwig, J. G., & McPherson, A. (2017). The anatomy of ability. *Curriculum Inquiry*, *47*(4), 344–362. https://doi.org/10.1080/03626784.2017.1368352

Meekosha, H., & Shuttleworth, R. (2009). What's so "critical" about critical disability studies? *Australian Journal of Human Rights*, *15*(1), 47–76. https://doi.org/10.1080/1323238X.2009.11910861

Mitchell, D. (2015). *Education that fits: Review of international trends in the education of students with special educational needs* (2nd ed.). University of Canterbury. https://www.education.vic.gov.au/Documents/about/department/psdlitreview_Educationthatfits.pdf

National Centre on Disability and Journalism. (2021). *Disability language style guide*. https://ncdj.org/style-guide/#:~:text=AP%20style%3A%20%E2%80%9CDisabled%E2%80%9D%20is,describing%20someone%20as%20%E2%80%9Chandicapped.%E2%80%9D

National Educational Association of Disability Students. (2012). *Enhancing accessibility in post-secondary education institutions: A guide for disability service providers. General physical accessibility.* https://www.neads.ca/en/norc/eag/physical_access_general.php

Oliver, M. (1990). *The politics of disablement*. Palgrave Macmillan.

Ontario Human Rights Commission. (2016). *Inquiry addressing systemic barriers at post-secondary institutions in Ontario*. https://www.ohrc.on.ca/en/learning-mind-inquiry-report-systemic-barriers-academic-accommodation-post-secondary-students-mental/inquiry-addressing-systemic-barriers-post-secondary-institutions-ontario

Ontario Human Rights Commission. (2018). *Policy on accessible education for students with disabilities*. https://www.ohrc.on.ca/en/policy-accessible-education-students-disabilities

Ontario Ministry of Education. (2019). *2019-20 education funding: A guide to the special education grant*. http://www.edu.gov.on.ca/eng/funding/1920/SpecialEducationGuide2019-20.pdf

Parekh, G. (2013). *Structured pathways. An exploration of program of study, school-wide and in-school programs, as well as promotion and transference across secondary schools in the Toronto District School Board (Report No. 13/14-03)*. Toronto District School Board.

Parekh, G., & Brown, R. (2019). Changing lanes: The relationship between special education placement and students' academic futures. *Educational Policy*, *33*(1), 111–135. https://doi.org/10.1177/0895904818812772

Parekh, G., Brown, R. S., & Abdulkarim, F. (2021). *Streaming: Thinking beyond grade 9.* York University. Prepared for the Toronto District School Board.

Parekh, G., Brown, R. S., & James, C. E. (2020). *Who comes to York? Access, participation and graduation trends*. York University.

Parekh, G. Brown, R. S., Walters, D., Reynolds, D., Jacob, N. & Abdulkarim, F. (2022a). *Predicting Transfer Pathway Uptake and Associated Income Profiles. A Second Look at the TDSB-PSIS Linkage: Focus on Disability.* FINAL REPORT. Ontario Council of Articulation and Transfer. Ontario.

Parekh, G. Brown, R. S., Walters, D., Reynolds, D., Jacob, N. & Abdulkarim, F. (2022b). *Predicting Transfer Pathway Uptake and Associated Income Profiles. A Second Look at the TDSB-PSIS Linkage: Focus on Disability.* INTERIM REPORT. Ontario Council of Articulation and Transfer. Ontario.

Parekh, G., Brown, R.S, Walters, D., Collis, R., & Jacob, N. (2022c). *Supports for student learning program research series: Barriers faced by students with disabilities.* Employment and Social Development Canada. York University.

Parekh, G., Brown, R. S., & Zheng, S. (2018). Learning skills, system equity and implicit bias within Ontario, Canada. *Educational Policy*, *35*(3), 395–321. https://doi.org/10.1177/0895904818813303

Parsons, J., McColl, M. A., Martin, A. K., & Rynard, D. W. (2021). Accommodations and academic performance: First-year university students with disabilities. *Canadian Journal of Higher Education*, *51*(1), 41–56. http://dx.doi.org/10.47678/cjhe.vi0.188985

People for Education. (2023). *Implementation of de-streaming in Ontario hampered by lack of time and resources*. https://peopleforeducation.ca/our-work/implementation-of-de-streaming-in-ontario-hampered-by-lack-of-time-and-resources/

Pierre, D. (2016). *Experiences of students with disabilities at Ontario's universities: Students with disabilities survey report*. Ontario Undergraduate Student Alliance.

Prema, D., & Dhand, R. (2019). Inclusion and accessibility in STEM education: Navigating the duty to accommodate and disability rights. *Canadian Journal of Disability Studies*, *8*(3), 121–141.

Provincial Advocate for Children and Youth. (2016). *We have something to say*. https://ocaarchives.files.wordpress.com/2019/01/we-have-something-to-say-report-en.pdf

Quan, D. & James, C. E. (2017). *Unlocking student potential through data: Final report*. Ontario Ministry of Education.

Queiser, S., & De Araujo, S. (2017). *Still streamed: How high impact decisions are shaping students' futures*. Social Planning Toronto.

Reid, D. K., & Knight, M. G. (2006). Disability justifies exclusion of minority students: A critical history grounded in disability studies. *Educational Researcher*, *35*(6), 18–23. https://doi.org/10.3102/0013189X035006018

Reid, L., Bennett, S., Specht, J., White, R., Somma, M., Li, X., & Patel, A. (2018). *If inclusion means everyone, why not me*. ARCH Disability Centre in conjunction with Community Living Ontario, Western University, Brock University, Brockville and District Association for Community Involvement, and Inclusive Education Canada.

Shanouda, F., & Spagnuolo, N. (2021). Neoliberal methods of disqualification: A critical examination of disability-related education funding in Canada. *Journal of Education Policy*, *36*(4), 530–556. https://doi.org/10.1080/02680939.2020.1712741

Silvers, A., & Francis, L. P. (2005). Justice through trust: Disability and the "outlier problem" in social contract theory. *Ethics*, *116*(1), 40–76. https://doi.org/10.1086/454368

Sins Invalid. (2019). *Skin, tooth, and bone. The basis of our movement is our people: A disability justice primer* (2nd ed.). Sins Invalid.

Swarup, R., & Strangway, L. (2021). *Directive 9: Annual equity accountability report card: Baseline data on the equity gap in student outcomes*. Peel District School Board.

Underwood, K. (2009). *The construction of disability in our schools: Teachers and parents' perspectives on the experiences of labelled students*. Sense Publishers.

Walters, D., Brown, R. S., Parekh, G., Reynolds, D., & Einmann, T. (2021). *Postsecondary borrowing patterns and graduation among transfer students in Ontario: The role of high school academic performance: Evidenced based on TDSB-PSIS-CSLP data linkages*. Ontario Council of Articulation and Transfer.

Yau, M., Rosolen, L., & Archer, B. (2015). *Census portraits: Understanding our students' backgrounds: Students with special education needs report* (Report No. 14/15-25). Toronto District School Board. https://www.tdsb.on.ca/Portals/research/docs/reports/Portrait_Census2011-12_StudWithSpecEdNeeds_FINAL_report.pdf

Zheng, S., & De Jesus, S. (2018). *Effects of restorative practices on suspended pupils' school engagement, academic achievement, and post-secondary destinations*. Toronto District School Board.