

IS THERE A TRANSFER “PENALTY” IN ONTARIO PSE? INSIGHTS FROM AN ADMINISTRATIVE LINKAGE

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Abstract

Studies have explored the relationship between travelling non-linear post-secondary (PSE) pathways and student achievement in multiple jurisdictions. This research aims to overcome some of the major challenges faced by scholars in this area by leveraging a new administrative linkage in Ontario, Canada containing detailed information on students' academic performance at the high school level, while also holistically capturing their subsequent trajectories through PSE. Our analyses allow us to estimate the presence of a transfer penalty with respect to graduation rates that survives all available controls. We discuss the implications of this penalty for both future research and policy making in Ontario and comparable jurisdictions.

Keywords: transfer, graduation, quantitative methods, stratification, Ontario, Canada

Résumé

Des études ont exploré la relation entre les parcours postsecondaires non linéaires et la réussite des étudiants dans de nombreux territoires. Cette recherche vise à surmonter certains des principaux défis auxquels sont confrontés les chercheurs dans ce domaine en tirant parti d'un nouvel ensemble de données administratives en Ontario, au Canada, qui contient des informations détaillées sur les résultats scolaires des élèves au niveau secondaire, tout en présentant de manière holistique leurs trajectoires ultérieures dans l'enseignement postsecondaire. Nos analyses nous permettent d'estimer la présence d'une « pénalité » de transfert en ce qui concerne les taux de diplomation, laquelle survit à tous les contrôles disponibles. Nous discutons des implications de cette pénalité pour les recherches futures et l'élaboration de politiques en Ontario et dans des territoires comparables.

Mots-clés : transfert; diplomation; méthodes quantitatives; stratification; Ontario; Canada

INTRODUCTION¹

Interest in the academic outcomes of students travelling non-linear pathways through post-secondary education (PSE) stretches back to at least the 1960s in Canada (Dennison & Jones, 1968; Falkenberg, 1969) and the 1940s in the United States (e.g., Lehman, 1943) (see Pizarro Milian & Zarifa, 2021 for a review). Historically, there has been much scholarly skepticism about the prospective benefits of traveling PSE pathways that require students to transfer between organizations, particularly from community colleges to four-year universities (e.g., Brint & Karabel, 1989; Clark, 1963). Vigorous academic debate on this topic continues to this day—primarily within the American context—about the extent to which transfer has a detrimental net impact on various measures of student success or experience (e.g., Long & Kurlaender, 2009; Melguizo & Dowd, 2009; Melguizo et al., 2011; Monaghan & Attewell, 2015). Despite the inconclusive results produced through this empirical literature, transfer is uncritically embraced as a policy strategy by governments across a growing list of jurisdictions, often in the hopes that it will result in cost savings for all involved parties (e.g., government, students) and augmented access to university-level education for students from traditionally underrepresented groups (e.g., Anderson et al., 2006; Pizarro Milian et al., 2023a; 2023b; Roksa & Keith, 2008). This has been the case in Ontario, Canada, where provincial policy makers have invested more than \$100 million since 2011 into improving the province’s transfer system through a host of strategies.

This relatively recent introduction of transfer into the Ontario context is theoretically interesting for several reasons. First, unlike certain American (e.g., California) and other interna-

tional counterparts, the province’s PSE system was not designed to support transfer, with community colleges being created in the 1960s specifically to provide vocational training and *not* to serve as a stepping stone into the university sector (e.g., Skolnik, 2010, 2016). Second, and perhaps most germane to the focus of this study, the province’s underdeveloped data infrastructure (Gallagher-Mackay, 2017; Pizarro Milian, 2022; Robson, 2021) has prevented researchers from rigorously investigating the potential penalty associated with travelling transfer pathways through Ontario PSE. Research on transfer student outcomes in Ontario has historically relied on examinations of patterns within administrative data from single universities (e.g., Bell, 1998; Drewes et al., 2012; Gerhart & Masakure, 2016; Hurley & Mitchell, 2021; Nutter & Zapf, 1990; Percival et al., 2016; Stewart & Martinello, 2012; Martinello & Stewart, 2015). These datasets are far from ideal given that they generally lack detailed coverage of academic performance at the high school level or key demographic characteristics (e.g., family socio-economic status) that have been found to be correlated with educational attainment and later life outcomes (e.g., Alexander et al., 2014). At the time of writing, the state of the literature leaves policy makers and other interested stakeholders with a less-than-ideal evidence base to make key decisions about the province’s policy approach to transfer.

Since the late 2010s, the creation of Statistics Canada’s Education and Labour Market Linkage Platform (ELMLP) has greatly improved our capacity to study PSE student mobility in Canada given its incorporation of the Postsecondary Student Information System (PSIS) records.² This novel platform has already allowed a small group of researchers (e.g., Finnie et al., 2020, 2021; Hillier et al., 2023; Sano et al., 2023) to follow students as they transition across the Ontario public PSE sectors, offering

1 This research was funded by the Ontario Council on Articulation and Transfer (ONCAT). The views expressed within this article do not necessarily reflect those of ONCAT, the Ontario provincial government, nor the authors’ employers. A preliminary version of this manuscript was published as a policy report and presented through ONCAT channels in the spring of 2021.

2 The PSIS files are essentially a census of all enrolled students at each Canadian public college or university during the “count” date within the fall term.

more extensive coverage of student trajectories than any previous studies.³ However, at the time of writing, outside of British Columbia, Statistics Canada has yet to introduce K–12 academic data to the ELMLP environment.⁴ As such, one key weakness of existing studies of transfer student outcomes within Ontario that draw on the ELMLP has been their lack of coverage of a long list of potential confounders.

Through this study, we analyze a custom administrative linkage between student records from the Toronto District School Board (TDSB) and two datasets within the ELMLP. Through this custom linkage we are able to follow a group of nearly 9,000 TDSB students as they move through the Ontario PSE system from 2009 to 2017. This longitudinal dataset allows us to statistically model the relationship between travelling a full range of PSE pathways and a student's propensity to graduate, net of a long list of controls for high school academic performance and demographics captured within TDSB records. In doing so, these data allow us to overcome serious limitations in Canadian student mobility research and help us to bridge the sizeable gap between it and American counterparts (e.g., Li, 2010; Lichtenberger & Dietrich, 2017; Wang, 2009) that have long been able to exploit robust longitudinal administrative and survey data. Through our analyses we observe a sizeable penalty associated with travelling transfer pathways within the Ontario context. We discuss the implications of our findings for future research and policy making in Canadian PSE.

TRANSFER PATHWAYS AND ACADEMIC ACHIEVEMENT

Since the late 1960s (e.g., Burford, 1972; Dennison & Jones, 1968; Sheehan & Reti, 1974), Canadian researchers have explored the academic consequences of non-linear PSE pathway uptake by students (for a recent and detailed review of this literature, see Pizarro Milian & Zarifa, 2021). One strand of this work in Ontario has focused on transfer students' grade point average (GPA) relative to direct entry counterparts using single university case studies. Both Percival et al. (2016) and Hurley & Mitchell (2021) found evidence that incoming transfers into their universities achieved higher GPAs than their direct entry counterparts. However, Martinello & Stewart (2015) observed that the GPA gap between incoming college transfers and direct entries into their university disappeared after adjustments for a handful of controls (e.g., gender, program). On the other hand, Gerhardt & Masakure (2016) estimated that the first-term GPA of incoming transfers was higher, even after the addition of available controls. A similarly mixed set of findings have been observed through a set of reports recently funded by the Alberta Council on Articulation and Transfer (ACAT) using administrative records from various universities, including MacEwan, Mount Royal, the University of Alberta, and University of Lethbridge (e.g., Drinkwater et al., 2018a, 2018b, 2018c, 2018d). The conclusion to be drawn from such studies in Alberta, which use very comparable modelling and controls, is that the transfer GPA gap varies depending on where you look.

A second overlapping empirical body of literature has focused on graduation and persistence rates as metrics of academic performance. Drewes et al. (2012), for example, explored dropout rates among students travelling various pathways into Trent University, finding that those who entered the university via articulation agreements with community colleges or originating from another university outperformed those who entered directly from high school. However, transfers from a college that did not enter via an articulated pathway did not differ in their propensity to drop out from direct

3 The Atlantic provinces were early participants in the PSIS, a move which facilitated some early research on student mobility and persistence with that data (see Finnie & Qiu, 2009).

4 This changed in early 2024, while this article underwent copy editing, when Statistics Canada announced the availability of new administrative files containing information on high school students for Ontario.

entries. Finnie et al. (2013) modelled retention among students that transferred—in both directions—between Algonquin College and the University of Ottawa. At the latter organization, they found that there was no net pathway-based differences in retention after student characteristics (e.g., age, gender, rurality) were accounted for. Meanwhile, at the former, once they controlled for both student demographics, field of study, and high school grades, they observed that transfers into Algonquin College were more likely to drop out. The authors emphasized that these findings illustrate the importance of “taking account of an extended set of factors when analysing the relative leaving rates of direct entry and transfer students” (Finnie et al., 2013, p. 11). This is a sentiment that has been repeated in several recent studies (e.g., Davies & Pizarro Milian, 2020; Pizarro Milian et al., 2024).

More recently, Finnie et al. (2020) used PSIS data from all Ontario universities to estimate disparities in graduation among direct entrants and lateral university transfers. They found that direct entrants outperformed transfers by 18–27% after four years, but the gap was reduced to only 6–7% at the six-year mark, highlighting the importance of utilizing a large enough observation window to study graduation rates. Below such average system-level graduation rates, considerable heterogeneity has been found to exist in the outcomes of students travelling disparate transfer pathways (Pizarro Milian & Zarifa, 2021). Indeed, detailed tables published by the British Columbia Council of Admissions and Transfer (Plaid Consulting, 2020) show that while transfers generally graduate at a higher rate than direct entries in that province, the gap varies wildly depending on which sending and receiving organization dyad we focus on.

The abovementioned group of Ontario studies, though certainly insightful, suffer from serious limitations—some of which we have already mentioned—which limit their ability to inform provincial policy making within Ontario. Perhaps most importantly, most draw on data from single colleges or universities, or pairs of organizations. In doing so, the generalizability of their findings is brought immediately to question. As Church (2005) noted nearly two

decades ago, the performance of transfer students vis-à-vis direct entries at any given institution is a function of the caliber of high school and transfer applicants it is able to attract. Second, these studies typically do not adjust for academic performance at the high school level. This is true both for recent work in Ontario drawing on PSIS data (e.g., Finnie et al., 2020) as well as descriptive reports coming out of British Columbia. The absence of such controls is worrisome, as studies have repeatedly shown that early academic success casts a long shadow on both achievement and student mobility patterns (e.g., Alexander et al., 2014; Davies & Pizarro Milian, 2020). At the time of writing, we are unaware of any Canadian study of transfer that simultaneously overcomes both these limitations, despite this bar being commonly met within the American context (e.g., Long & Kurlaender, 2009; Melguizo & Dowd, 2009; Melguizo et al., 2011; Monaghan & Attewell, 2015).⁵

Through this study, we use a custom linkage between student records from the Toronto District School Board (TDSB) and various datasets in Statistics Canada’s ELMLP to trace the PSE pathways travelled by a sample of TDSB students from 2009–2017. We statistically model the relationship between travelling all plausible transfer pathways and graduation while accounting for—among other controls—their Grade 9 English and Math course grades, Grade 12 course average, and neighbourhood income deciles.

DATA AND METHODS

Our custom administrative linkage incorporates a wealth of information from three distinct data sources: TDSB student records, the PSIS, and Canada Student Loans Program (CSLP). Data from the TDSB administrative system span 13 years and contain information for 231,563 students that attended Grade 9 at the board be-

5 Due to delays in the publication process, a follow-up to this study (Pizarro Milian et al., 2024) drawing on comparable data was published (online, ahead of print) in advance of this study.

tween September 2000 and September 2012. Such data was linked to the PSIS and CSLP datasets within the ELMLP by Statistics Canada’s Social Data Linkage Environment (SDLE) unit, using funding generously provided by the Ontario Council on Articulation and Transfer (ONCAT).

The PSIS is an administrative dataset which compiles information on students and graduates from all public colleges and universities in Canada, including basic demographic traits, fields of study, and other program information, including whether a student graduates. System-wide reporting for the PSIS within Ontario began during the 2009–2010 academic year. One limitation of the PSIS is that for earlier years roughly 40% of Ontario colleges did not report unique identifiers for their students, rendering it impossible to link these observations across years.⁶ As in other studies performed by Statistics Canada (e.g., Frenette, 2019a, 2019b), we drop these observations from our analysis. Even with this gap in coverage, the PSIS affords

the best coverage of student mobility within Ontario. Indeed, there is no alternative, publicly available source for researchers wishing to comprehensively study the uptake and consequences of transfer in Ontario at the supra-institutional level.

The CSLP dataset contains student borrowing information for that program from the 2003–2004 to 2016–2017 academic years. The CSLP is a program that works in tandem with the Ontario Student Loans Program (OSAP) to provide financial support for residents to participate in PSE. Given that the CSLP offers needs-based support, and that the eligibility criteria includes parental income (Wright et al., 2013), effectively excluding higher-income families, some would suggest that it provides us with an indirect proxy for socio-economic background. However, CSLP borrowing will also directly reflect the cost of education pursued by individuals. American research has produced mixed evidence on the effect of student loans programs on degree completion (Baker et al., 2017), and evidence of their impact in Canada is lacking.

6 The primary impact of these missing identifiers on the college side is that our sample sizes across pathways starting in the college sector will be artificially depressed. As this problem was rectified in later PSIS years, we suspect it would not heavily impact transfers into the college sector (e.g., U2C). An inspection of graduation rates among Ontario colleges with and without missing identifiers, as reported in Frenette (2019b), and using KPI measures published by Colleges Ontario (2016), does not reveal sizeable differences in the graduation rates across these two groupings. As such, we do not expect this will heavily bias the graduation rates in our sample. Nevertheless, it will be important for future researchers to replicate our analyses once future PSIS files become available. It is also worth noting that robustness checks performed by Sano and Zarifa (2022) using the old and corrected PSIS files did not demonstrate sizeable differences in their estimates of PSE pathway uptake.

Analytic Sample

We apply several restrictions to arrive at the analytic sample used through the present study. First, we focus on TDSB students who started their post-secondary education in September of 2009 within an Ontario community college or university (see Appendix 1 for descriptive statistics)—this is the first year covered by the PSIS, and afforded us the ability to follow students for the longest time frame available at the time of writing. We further focus on those who were between 17 and 19 years old when they first enrolled in PSE. Students who significantly delay PSE enrolment in Canada have long been known to differ systematically—in ways we are unable to control for (e.g., parental status, marital status)—from those who enroll immediately after high school (e.g., Hango & Debroucker, 2007; Tomkowicz & Bushnik, 2003). As such, excluding them from the analytic sample grants

us access to a more homogenous group.⁷ Additionally, we restrict our focus on those that completed the entirety of their high school studies within the TDSB, as we would otherwise lack information on their Grade 12 course performance if they completed their studies at another school board.⁸ This also ensures further homogeneity in the pre-PSE pathways travelled by students in our sample. Lastly, a small proportion of students who had multiple records (at more than one institution) of PSE enrolment in the fall of 2009 were excluded from the analyses.⁹ The final sample used in our model consists of 8,950 students.

We follow this set of students from their point (a) of first enrolment in September 2009 and to the point (b) at which they graduate for the first time from a PSE program,¹⁰ or (c) to the point at which they are last recorded as being enrolled, until the end of the 2016–2017 academic year. As such, we provide an analysis of

student pathways leading up to the point of first credential completion, as we focus on mobility prior to credential completion. This provides a strong and useful contrast to recent Canadian research utilizing the National Graduates Survey (Dhuey et al., 2021) and the Longitudinal International Study of Adults (St-Denis et al., 2021) to study the correlates of non-linear PSE pathways or “recycling” (Walters, 2003), as well as work looking at college-to-university transfer using the College KPI Survey (e.g., McCloy et al., 2017). It also contrasts American research that has explored the impact of completing a credential (prior to transferring) on subsequent success (Shapiro et al., 2013).

Regression Models

To model the relationship between post-secondary pathways and graduation, we rely on logistic regression techniques commonly used within the social sciences for binary dependent variables (see Long & Freese, 2006). Our approach entails first fitting a zero-order model with only our PSE pathways predictor, and then sequentially adding blocks of controls from various segments of the TDSB-PSIS-CSLP linkage. This allows us to observe fluctuations in the estimated coefficients for our focal pathway predictor as we account for sets of potential confounders.

Our PSE pathway variable is derived from information within the PSIS records, through contrasts of the first and last recorded type of institution (college or university) a student was enrolled in:

1. Direct Entry to University,
2. University to University (lateral transfer),
3. College to University (vertical transfer).
4. Direct Entry to College,
5. College to College (lateral transfer), and
6. University to College (reverse transfer)

This coding of pathways mirrors recent Ontario transfer research drawing on PSIS files (e.g. Pizarro Milian et al., 2023a; Zarifa et al., 2020). Our second model then incorporates a set of student demographic characteristics drawn from both TDSB and PSIS files, including binary controls for sex (male/female), age (17–18, 19 years

7 Recent reports drawing on TDSB data suggests that among those who began Grade 9 at the board in 2005, 55% confirmed an offer at either an Ontario college or university during the year of high school graduation (Robson et al., 2019). As such, our analytic sample excludes a sizeable group of TDSB students that failed to transition into Ontario PSE in an expedient fashion. We leave the analyses of their pathways and outcomes to future research.

8 Again, according to recent reports (Robson et al., 2019), only roughly 70% of those who began Grade 9 at TDSB in 2005 graduated from a school within the board. Others either do not graduate or switch to a school outside of the TDSB prior to doing so. The latter are excluded from our analyses.

9 As reported by Wall (2019) and elsewhere, there are a small number of students (<1%) in the PSIS files who are enrolled in multiple programs during the snapshot date. These students are routinely excluded in analyses drawing on these files.

10 It is possible that students in our sample may have graduated later. But, in practice, such a group constitutes a very small minority of the population. Indeed, both the Ontario Ministry of Colleges and Universities and various other bodies utilize a seven-year window when assessing graduation rates in their key performance indicator schemes.

old), country of birth (Canada, outside of Canada), as well as a neighbourhood income decile measure. The latter is a measure produced by the TDSB research unit using the Canadian census (2001), with each student being assigned the average economic family income associated with their postal code. Our second model also includes a set of dummy variables capturing a student’s first recorded field of study in PSE,¹¹ as well as the length of time they were enrolled (derived from program start and end dates). Both of these fields are derived from PSIS files.

Our third model then introduces three measures of high school academic performance from the TDSB portion of our dataset: Grade 9 English and Mathematics course marks, both of which were included as categorical variables (< 70%, 70–79%, and >80%), and the average of the six highest final marks obtained in Grade 12 (a continuous measure). These specific measures were included as they have been found to be strong predictors of PSE pathways and graduation in previous studies (e.g., Davies & Pizarro Milian, 2020). Our fourth and final model then includes a three-category variable capturing the extent to which students borrowed from the CSLP to help finance their PSE (no loan, borrowed less than the median, borrowed above the median).

FINDINGS

Table 1 contains estimates from our various statistical models. The results in Model 1 show that direct entry university students are more likely to graduate during our observation window than students traveling any other pathway ($p \leq 0.001$). The size of estimated differences across pathways shrinks once we introduce demographic and PSE controls in Model 2, but remain statistically significant nonetheless ($p \leq 0.001$). We interpret this as being a function of the added controls being strongly associated with graduation. Females, for example, are more likely to complete their programs than male counterparts ($p \leq 0.001$). Similarly, younger students (aged 17–18) are more likely to graduate than older counterparts ($p \leq 0.001$). Canadian-born students are also more likely to graduate than those born outside of Canada ($p \leq 0.05$). Students living in postal codes with higher family income are also more likely to graduate ($p \leq 0.01$). Turning to the PSE-level variables in Model 2, we see that students who were enrolled in their programs for five years were more likely to graduate than those enrolled for only four or fewer years ($p \leq 0.001$). However, those enrolled for seven or more years were significantly less likely to graduate ($p \leq 0.001$). In addition, compared to those in the social sciences, students enrolled in STEM ($p \leq 0.01$) or fields classified as “other” ($p \leq 0.05$) were more likely to graduate from their programs during the study period.

The PSE pathways coefficients generally shrink once again in Model 3, which includes measures of academic performance at the high school level, but significance levels remain entirely unaffected. Further, we see no statistically significant relationship between Grade 9 English marks and graduation. But, we see that those who achieved 80% or more in Grade 9 Math were more likely to graduate than those with marks lower than 70% ($p \leq 0.001$). The Grade 12 course average was also found to increase the likelihood of graduation ($p \leq 0.001$). The addition of this set of academic performance measures reduced the significance levels of both age and neighbourhood income deciles, while at the same time boosting the statistical significance of many fields of study dummies.

11 Our coding of the field of study variable reflects an amalgamation of CIP primary groupings. The primary difference being that we collapse the “STEM” groupings (e.g., engineering, mathematics, physical sciences) into a single category, while also classifying other small program groupings (e.g., agriculture, leisure, protective and transportation services) under “Other.” Also, education (not Bachelor of Education, which were excluded as they are a second entry program), were grouped under social sciences. While a more granular set of field of study categories would have been useful, sample sizes forced us to aggregate to maintain the integrity of our model.

Table 1

Logistic Regression Predicting Student Graduation by Pathway Type - 2009 Cohort (n = 8,940)

Variables	Model 1			Model 2			Model 3			Model 4		
	b	SE(b)	p	b	SE(b)	p	b	SE(b)	p	b	SE(b)	p
Pathway Type												
Direct Entry University (ref)												
University to University	-1.326	0.111	***	-0.882	0.128	***	-0.875	0.133	***	-0.892	0.136	***
College to University	-2.596	0.353	***	-2.078	0.397	***	-1.533	0.417	***	-1.431	0.416	***
Direct Entry College	-1.271	0.080	***	-1.256	0.091	***	-0.536	0.101	***	-0.274	0.103	**
College to College	-2.332	0.193	***	-1.979	0.217	***	-1.254	0.225	***	-0.970	0.228	***
University to College	-1.798	0.091	***	-1.322	0.105	***	-1.041	0.107	***	-0.861	0.109	***
Sex												
Male (ref)												
Female				0.532	0.063	***	0.413	0.066	***	0.390	0.067	***
Age												
17–18 years (ref)												
19 years				-0.495	0.063	***	-0.107	0.069		-0.112	0.070	
Country of Birth												
Outside of Canada (ref)												
Canada				0.149	0.065	*	0.156	0.068	*	0.234	0.070	***
Neighbourhood Income Decile				0.032	0.011	**	0.019	0.011		0.028	0.012	*
Field of Study												
Social sciences (ref)												
Fine arts				-0.144	0.141		-0.418	0.144	**	-0.430	0.145	**
Humanities				-0.294	0.101	**	-0.405	0.104	***	-0.380	0.105	***
Business				0.094	0.103		-0.029	0.106		-0.045	0.108	
STEM				0.282	0.102	**	-0.057	0.108		-0.099	0.109	
Health and related fields				0.079	0.136		-0.066	0.139		-0.083	0.142	
Other				0.380	0.163	*	0.348	0.167	*	0.335	0.169	*

Length of Study

2012/13 (4 years) (ref)

2013/14 (5 years)

2014/15 (6 years)

2015/16 & 2016/17 (7+ years)

0.604	0.083	**	0.743	0.086	***	0.676	0.087	***
0.155	0.109		0.426	0.113	***	0.377	0.114	***
-1.770	0.086	***	-1.533	0.089	***	-1.606	0.092	***

Grade 9 English Grade

< 70% (ref)

70–79%

> 80%

0.017	0.077		0.017	0.078
0.107	0.090		0.129	0.092

Grade 9 Math Grade

< 70% (ref)

70–79%

> 0%

0.043	0.078		0.024	0.079
0.294	0.088	***	0.268	0.089
0.061	0.004	***	0.060	0.004

Grade 12 Top 6 Average**Borrowed from CSLP**

No loan (ref)

Borrowed less than the median

Borrowed more than the median

-0.316	0.076	***
0.796	0.089	***

Constant	1.862	0.035	1.506	0.123	-3.305	0.320	-3.467	0.330
Log Likelihood	-4055.82		-3593.77		-3407.92		-3315.93	
LR χ^2	738.30		1662.39		2034.09		2218.07	
Prob > χ^2	***		***		***		***	

* $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$

Adding a control for CSLP borrowing in our fourth and final model prompts only minor additional shrinkage in some of the estimated pathway coefficients. Coefficients for other controls are also relatively unaffected. However, the CSLP variable itself proves highly significant. Those who borrow less than the median amount are found to be less likely to graduate than those who did not borrow from the CSLP ($p \leq 0.001$). Meanwhile, those that borrowed more than the median value were more likely to graduate than those with no CSLP loan ($p \leq 0.001$).

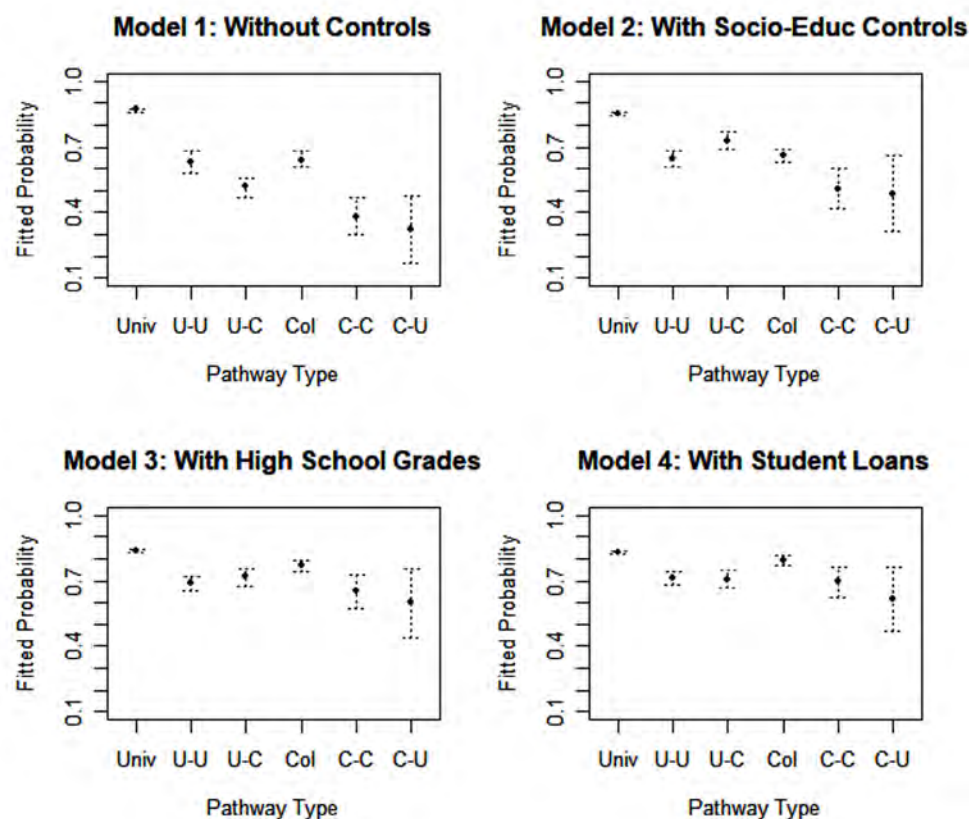
To aid in the interpretation of estimated coefficients for our focal predictor, predicted probabilities of graduating were calculated from the estimates (logits) from Models 1 to 4

and displayed in Figure 1¹². The estimates were calculated while holding all control variables constant at their means or proportions. Doing so allows us to see that differences in the predicted probability of graduation by PSE pathways narrowed considerably after accounting for sex, age, country of birth, income, field of study, and length of study (Model 2). The gaps further converged when high school academ-

12 When interpreting these predicted probability plots, it is useful to keep in mind that estimates for which confidence intervals do not overlap tend to differ by a statistically significant margin. As such, this plot provides a better tool through which to compare pathway-based differences than eyeballing the regression output where coefficients are measured relative to a single reference category.

Figure 1

Predicted Probability of Graduating by Post-Secondary Pathway, Across Models



ic performance was held constant (Model 3). Then, only minor fluctuations occur in the final model. These findings suggest that much of the graduation gap initially observed across PSE pathways can be attributed to differences in the demographic composition of these groups, their field and length of study, and their academic performance in high school.

It is also worth emphasizing at this point—when comparisons between each pathway are easiest to make through Figure 1—that the estimated probability that a student will graduate is highest when they arrive at a sector through a direct entry pathway. This is true of both those entering the college and university sectors, despite the filtering which happens during the initial high school to PSE transition. In each case, the direct entry pathway proves to be the most advantageous.

DISCUSSION

This study leverages a custom administrative linkage to overcome several important historical limitations within Canadian transfer research. Through tapping into TDSB records, we can account for systematic differences in the high school academic performance of students travelling disparate PSE pathways. Through leveraging PSIS records, we follow students as they transfer across the entire provincial PSE system. As such, our findings are far more generalizable than those of the single institution studies that have thus far dominated the literature. Using this novel linkage, we estimate pathway-based disparities in graduation rates that survive an impressive list of controls. The relevance of these included controls is evidenced by the substantial reduction in estimated PSE pathway-based disparities in graduation rates as we move from our zero-order to final models.

Through our research, we uncover evidence of a strong transfer “penalty” in both sectors. Most notably, the predicted probability that college-to-university or “vertical” transfers will graduate during our observation window is .21 lower compared to those students travelling direct entry pathways into and through university. This finding is consistent with recent research drawing on a custom linkage between

TDSB and University of Toronto records, which similarly found a graduation gap of roughly 19 percentage points between direct entry and vertical transfers into the university (Davies & Pizarro Milian, 2020). Lateral transfers within each sector are also found to have a predicted probability of graduating that is .08–12 points lower than their direct entry counterparts. This, again, is generally consistent with recent work drawing on PSIS data alone, which estimates a 6–7% graduation gap between direct entry and lateral university transfers in Ontario (Finnie et al., 2020). Though generally consistent, we surmise that our estimates of pathway-based graduation differences are likely more generalizable than those observed in the existing literature focusing on Ontario PSE.

What are the policy implications of these findings? Given our wealth of controls for academic performance at the high school level, we hypothesize that observed differences are less likely to be a function of prospective “deficiencies” in the academic preparation of students and more likely to be a function of the structure of the PSE pathways they are travelling. More specifically, it is reasonable to expect that credit loss during the transfer process is a likely culprit contributing to pathway-based disparities in graduation rates. The amount of transfer credit awarded to an incoming transfer student at the receiving institution has the potential to either shorten or elongate the time required for credential completion and is a variable that is currently not usable within the PSIS for Ontario colleges or universities due to data quality issues. The improvement of this variable in future cycles of PSIS reporting could help us to isolate the degree to which it explains the pathway-based disparities we observe. Should it be proven that transfer credit awarded is indeed a barrier to graduation, intensified efforts to promote both program-to-program articulation and the establishment of course-based equivalencies could be a useful strategy to elevate the graduation rates of transfers.

Despite our confidence in the produced findings, there are important limitations to this research that need to be addressed through future work. First, the composition of our linkage necessarily limits our focus to students present

within TDSB records.¹³ While this is the largest school board in Canada and these records offer rich coverage of prospective confounders, the TDSB student population likely differs in important ways from that of rural and more remote school boards in the province. Indeed, the TDSB is far more demographically diverse—particularly with respects to ethnicity, nationality, and race—than surrounding regions in Ontario. Fortunately, work is currently under way to introduce high school academic performance and demographic data from the Ontario Ministry of Education to the ELMLP environment.¹⁴ This new dataset should become available to researchers in the coming years, rendering it possible for scholars to replicate our work at a provincial level. Second, ongoing improvements to the PSIS reporting process mean that future work will be able to draw on more complete data for the Ontario college sector.¹⁵ Third, our work focuses on pathways to first credential completion, and excludes transfer activity after the completion of a first credential. Now, while Canadian reports (Finlay, 1998) have traditionally told us

that “most students transfer without a completed credential” (p. 2), it remains true that we ignore an important population of post-graduation transfers. And, American work does tell us that those who transfer after achieving a credential go on to graduate at much higher rates (Shapiro et al., 2013). As such, future work would do well to include this broader population and control for credential completion prior to transfer.

Overcoming these and other hurdles to the rigorous empirical analysis of the relationship between PSE pathways and student outcomes should be a priority for both policy makers and academics alike. In recent decades, we have seen our systems expand and become increasingly complex (Schofer & Meyer, 2005), incorporating a more diverse group of educational providers than ever before. At the same time, institutions within our systems have made very public commitments to open their doors to students from historically underrepresented communities, many of which may lack the cultural capital to effectively maneuver through PSE (Armstrong & Hamilton, 2013). Within this context, where every year an increasingly heterogeneous mix of students is faced with a smorgasbord of PSE options, it seems likely that we will continue to see many relying on transfer to find an optimal fit for them. As such, identifying the challenges brought on by non-linear pathways and effective solutions may become a central step in improving student achievement within Ontario and similar jurisdictions.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

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13 This restriction was not a design choice on our team's end, but rather, a result of a lack of capacity and willingness on the part of other school boards we recruited for this project. We are indebted to the TDSB for rendering their data available to this project.

14 Since the completion of this study, Statistics Canada has also introduced new linkage keys for the merging of the PSIS and the 2016 and 2021 census that will allow for researchers to pull additional key demographic variables into analyses of PSE pathways, including Indigeneity, disability status, and various other demographic traits. Whether said linkages—which will only be possible for a subset of PSIS records (roughly 1-in-4)—will be useful for the modelling of structurally small transfer pathways remains to be seen. Nevertheless, this is an important avenue for future research.

15 Shortly after the completion of this project, it was announced that missing data issues in the Ontario college sector had been fixed dating back to 2013–2014. As such, once additional waves of the PSIS become available to facilitate a long enough observation window, it will be possible to analyze complete data for that sector.

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Appendix A

Characteristics of TDSB Students Entering Post-Secondary Education in Ontario in 2009, by Main Post-Secondary Pathway (n = 9,850)¹⁶

Variables	Direct Entry (n = 8,550)		Transfer (n = 1,300)	
	%	n	%	n
Pathways				
Direct Entry University	89	7,600	.	.
Direct Entry College	11	950	.	.
University to University	.	.	35	460
University to College	.	.	51	660
College to College	.	.	9	120
College to University	.	.	4	50
Sex¹⁷	.	.		
Male	45	3,850	49	640
Female	55	4,700	51	660
Age				
17–18 years	69	5,890	64	830
19 years	31	2,660	36	470
Country of Birth				
Canada	62	5,280	64	830
Outside Canada	38	3,280	36	470
Neighbourhood Income Decile	6	8,550	6	1,300
Grade 9 English Grade				
69 or less	28	2,370	40	520
70–79	31	2,670	33	430
80+	41	3,520	27	350

16 Due to disclosure protocols at Statistics Canada—designed to prevent disclosures that could threaten the anonymity of individuals in our dataset—it was not possible to disclose descriptive statistics for our analytic sample by detailed disaggregated PSE pathways. Descriptive statistics provided in this table are for the broader groups of direct entry and transfer students commencing their studies in the fall 2009 entrants (n = 9,850), without the exclusion of those who left TDSB prior to Grade 12, and without the application of listwise deletion for minimal amounts of missing data across the neighbourhood income variable (2%). Numbers may not add up to 100% due to rounding prior to disclosure.

17 Statistics Canada uses the term sex. Due to the availability of data, we are only able to provide estimates for males and females.

Variables	Direct Entry (<i>n</i> = 8,550)		Transfer (<i>n</i> = 1,300)	
	%	<i>n</i>	%	<i>n</i>
Grade 9 Math Grade				
69 or less	35	2,950	48	630
70–79	25	2,110	25	320
80+	41	3,490	26	340
Grade 12 Average	78	8,550	72	1,300
Graduation				
No	17	1,420	48	630
Yes	83	7,130	52	670
Loan Balance at End of Study Period				
No	36	3,080	32	410
Yes	64	5,480	68	890
Field of Study				
Fine arts, humanities, social sciences	39	3,350	42	550
Business	21	1,790	16	210
STEM, health and related fields, other	40	3,410	42	540
Length of Study				
2012/13 (4 years or less)	53	4,520	23	300
2013/14 (5 years)	31	2,620	23	300
2014/15 (6 years)	9	760	17	220
2015/16–2016/17 (7+ years)	8	660	37	480