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RESEARCH BRIEF

Transfer Student Outcomes at the University of Toronto: GPA, Access to STEM, and Graduation

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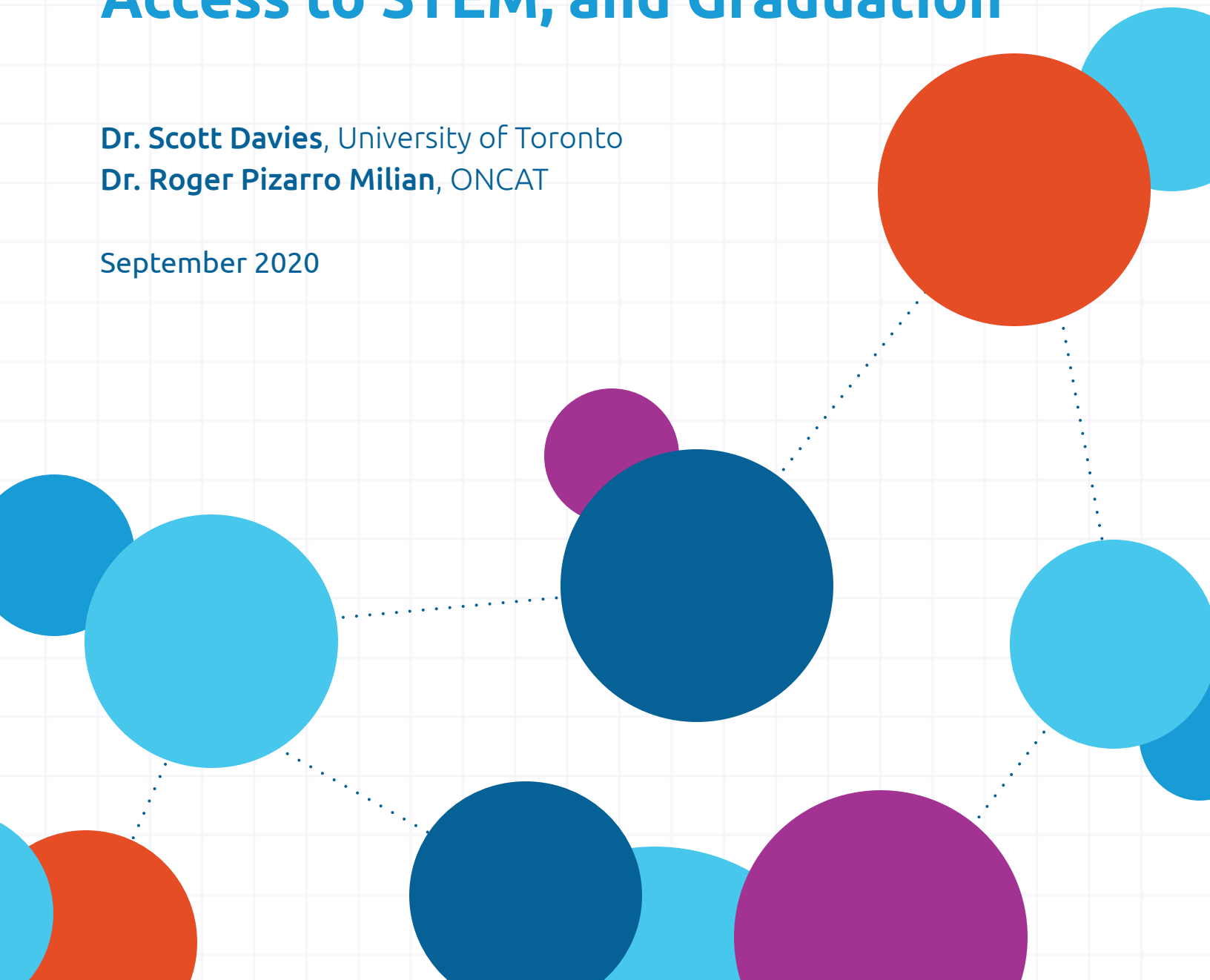

Last week, we looked at how TDSB students who transfer into UT compare to their direct-entry counterparts across a range of academic and demographic variables. We developed a sense of the various 'flavours' of transfer, using the institutions that they originated from as guiding categories. Today, we'll provide an in-depth look at their academic outcomes at UT, including their cumulative grade point averages (CGPA), access to STEM fields, and eventual graduation rates.

Before we get started, a quick note on our methods:

First, we present a descriptive overview of the various outcomes across transfer student categories, along with difference in means tests that indicate whether observed differences between groups are statistically significant.

Second, we perform an in-depth analysis of graduation rates, using several statistical modelling strategies to develop a more refined understanding of how transfer is related to such an outcome. At this point, you'll hear us routinely mention the term **predicted probabilities**. This refers to the estimated likelihood that graduation will occur, assuming a set of circumstances. These predicted probabilities are produced using multivariate models that include not only a variable representing transfer (yes/no), but also a wide range of the academic and demographic variables we discussed in the last brief.

What are multivariate models?

Multivariate statistical models allow analysts to focus on more than two variables at a time. Hence, for example, you can analyze the relationship between **A** and **B**, while accounting for the effect of **C**, **D**, and **E**. This is different from **bivariate** analysis, which would focus only on the relationship between **A** and **B**, ignoring everything else.

A Broad Look at Differences in Outcomes

Scanning raw CGPA, access to STEM, and graduation rate differences between direct-entry and transfer students as a whole, as well as across transfer sub-categories, reveals several notable trends that coincide with much of the existing research on these topics.

First, we see that transfers as a group tend to outperform direct-entry students with respect to CGPA—and by a significant margin. However, when we break CGPA down by transfer category, we see that the story is far more nuanced. In our sample, transfers from Ontario and Canadian universities academically outperform direct-entry students by a wide margin.[1] In contrast, transfers from Ontario colleges generally under-perform relative to direct-entry students.

This finding makes sense given the trends described in last week's brief, which found that transfers from Ontario colleges tend to have weaker academic performance in high school. Interestingly, the broad direct-entry/transfer GPA gap survives a wide range of controls within our multivariate models[2]—meaning it was not the singular product of observed demographic or high school performance differences between these groups. Of course, it is still plausible that unobserved factors could account for these differences, but we are confident that our findings are robust.

TABLE 1. Raw Outcomes

	Direct Entry (n=26,916)	All Transfers (n=1,223)	Ontario University (n=689)	Ontario College (n=275)	Other Canadian University (n=174)	Internat'l University (n=64)
CGPA	2.62	2.73	2.85	2.29	3.00	2.72
STEM	0.395	0.268	0.300	0.219	0.197	0.344
Graduation Rate	0.685	0.527	0.569	0.407	0.569	0.531

LEGEND: Significantly More | Significantly Less | Not Significant

1. This finding corresponds with previous research on transfer students GPA done by Steward & Martinello, 2012.
2. This is an ordinary least squares regression model with CGPA serving as the dependent variable. Predictors include transfer (0/1), if a student was ever suspended, average high school marks, absenteeism, whether they were considered gifted or special needs, English and math EQAO scores, success on their first attempt at the Ontario Grade 10 literacy test, whether they ever switched high schools, if they ever dropped out of high school, their gender, neighbourhood income, age, self-identified race (white/other), parental occupation, parental education, family structure, sexual orientation, place of birth, and field of study at the University of Toronto. We ran these models exclusively with those students in B.A. degree programs, and including those in undergraduate-level diplomas/certificate programs. The overall findings did not differ.

With respect to access to STEM fields, we see that direct-entry students lead the pack at nearly 40%, with only 27% of transfers entering STEM. However, once we begin breaking these figures down by transfer sub-categories, we can observe considerable within-group variance. Ontario (30%) and international university (34%) transfers achieve the highest levels of access to STEM, followed by Ontario colleges (22%) and Canadian universities (20%). In our multivariate models, the direct-entry/transfer access to STEM gap survived controls for HS academics, gender, age, and median neighbourhood family income. However, it disappeared entirely after a last block of demographic controls were introduced. This means that raw direct-entry/transfer STEM gaps are likely a product of group differences and not the transfer process itself.

Looking at raw graduation rates, we see that direct-entry students outperform the aggregate transfer group by almost 16 percentage points. Breaking the transfer group into sub-categories reveals that the direct-entry/transfer gap varies significantly and is generally in-line with GPA differences. Transfers originating from Ontario colleges tend to graduate at only a 41% rate. Meanwhile, those from Ontario (57%), Canadian (57%) and international (53%) universities tend to graduate at much closer rates to direct entry students (69%).

The raw differences in graduation rates presented above, though interesting, do not take into account the demographic and HS academic differences of these groups. As we learned last week, these vary greatly and can partly explain differences in this all-important outcome. In the next section, we use multivariate models to drill down deeper and produce estimates that take everything that we know about each group into account.

Multivariate Analysis of Graduation

Surprisingly, using multivariate models to account for other factors beyond transfer types does not radically alter the narrative presented above nor the relative success of each group. Table 2 has the raw graduation rates discussed earlier in Column 1. In subsequent columns, the predicted probability of each transfer group graduating from UT is estimated using various modelling strategies.[3] These help ensure that our findings

3. These are binary logistic regression models with graduation (0/1) serving as the dependent variable. Predictors include transfer types, if a student was ever suspended in high school (HS), average HS marks, HS absenteeism, whether they were considered gifted or special needs in HS, English and math EQAO scores, success on their first attempt at the Ontario Grade 10 literacy test, whether they ever switched HSs, if they ever dropped out of HS, gender, median family neighbourhood income, age, self-identified race (white/other), parental occupation, parental education, family structure, sexual orientation, and place ...

are not a product of modelling assumptions and sampling restrictions. In particular, we predict each group's likelihood of graduating by:

1) Assuming their academic/demographic characteristics were all at the sample mean (Column 2);

2) Considering the actual characteristics of each sub-group (Column 3); and

3) Repeating such strategies but using only the earlier TDSB cohorts (2000–2006), which had a longer timeframe to transfer (Columns 5 and 6).
This provides greater consistency in the measurement of graduation between transfer types requiring longer time to completions.

TABLE 2

	Raw Rate	Model, Sample Means	Model, Group Means	Raw Rate	Model, Sample Means	Model, Group Means
	All Cohorts			2000–2006		
Direct Entry Baseline	0.685	0.683	0.683	0.752	0.79	0.793
All Transfers Aggregate	0.527	0.522	0.524	0.571	0.696	0.623
Ontario Universities	0.569	0.515	0.544	0.62	0.688	0.656
Other Canadian Universities	0.569	0.597	0.665	0.598	0.727	0.695
Ontario C. Colleges	0.407	0.491	0.374	0.442	0.663	0.432
International Universities	0.531	0.448	0.463	0.611	0.716	0.66

... of birth. We re-ran these models with and without field of study, and they (surprisingly) made little difference on the relationship between disaggregated transfer categories and graduation. We present the predicted probabilities of the former model.

As visible through Columns 2–3—which take into account the actual characteristics of each sub-group—the predicted probabilities of graduating from UT differ only slightly for the direct-entry and aggregate transfer category, regardless of the modelling strategy that we use. Each varies by less than a percentage point. However, important differences emerge for specific sub-categories. If we assume that college transfers have the same characteristics as the broader sample of students, their graduation rate goes up by 8%. Meanwhile, their graduation rate drops by 3% once we assume their actual characteristics. Similar fluctuations are observable across other sub-groups, including for students from other Canadian and international universities. They hint at how intertwined demographic characteristics and academic background are to the outcomes of various types of transfer.

Raw graduation rates in Column 4 are based exclusively on earlier cohorts (2000–2006). Focusing on this sub-sample increases raw graduation rates across the board, as this group has had greater opportunity to graduate. However, raw graduation gap between direct-entry and transfer students swells to roughly 18%. Ontario college transfers also remain bottom of the pack (44%).

However, when we focus on predicted probabilities from models estimated using only earlier cohorts that assume broader sample means (Column 5), the story shifts somewhat. The direct-entry/transfer gap is reduced to only roughly 9%. The likelihood of Ontario college transfers graduating also pulls much closer to that of their peers (66%). We interpret this to mean that their lower graduation rates are in part attributable to their different academic/demographic profiles, as well as their longer time to completion. We speculate that the latter is potentially tied to limited transfer credit once they arrive at UT, but further research is required here.

Summary

Using the TDSB-UT linkage, we are able to explore a series of outcomes for TDSB students who took the transfer and direct-entry routes into UT. We are able to do so while controlling for an extensive set of academic and demographic variables that are measured during students' high school years. This allows us to produce estimates of the effect[4] of transfer that are less biased by the characteristics of these groups.

4. We use this term loosely, as our methods only allow for us to establish correlations rather than causal relationships.

In line with our conclusions about the existence of various 'flavours' of transfer students, we similarly observe that outcomes vary considerably across each transfer sub-category—with college transfers being the worst performing group at UT. Such findings obviously require further investigation. What is the experience of these students? What are the factors that account for their lower performance? We know that their high school academic performance is relatively poor, but there may be other elements at play that we cannot account for. Nevertheless, assuming that these findings can be validated by further work, they have important implications for how we make sense of and support college-to-university transfer in places like UT.

Next week, we attempt to wrap this all up and provide some concluding thoughts on this project. In addition, we will announce a follow-up data-sharing pilot that aims to extend this linkage across all GTA PSE institutions and K–12 school boards.

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oncat.ca/en/projects/tdsb-ut-linkage-and-transfer-project

Established in 2011, the Ontario Council on Articulation and Transfer (ONCAT) was created to enhance academic pathways and reduce barriers for students looking to transfer among Ontario's public colleges, universities, and Indigenous Institutes.

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