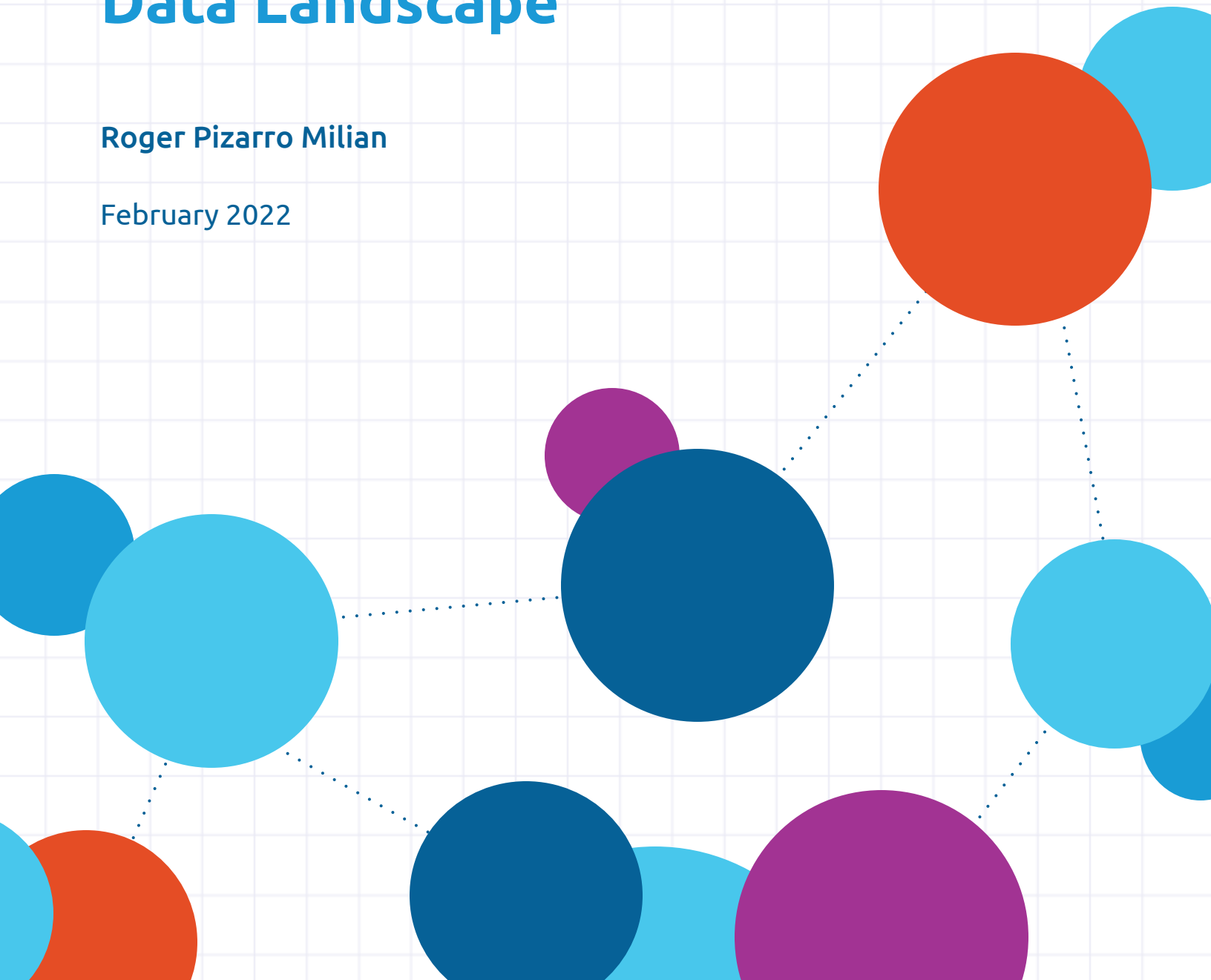


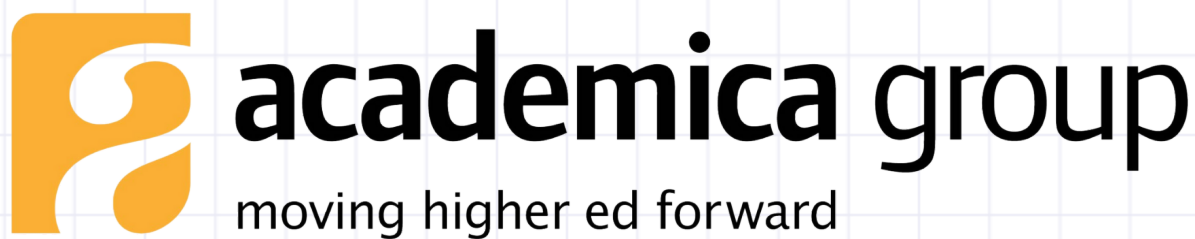
A Statistical Analysis of Transfer and Student Mobility
in Ontario: What the University/College Applicant Survey™ Tells Us

Situating the UCAS™ Dataset within the Ontario PSE Data Landscape

Roger Pizarro Milian

February 2022

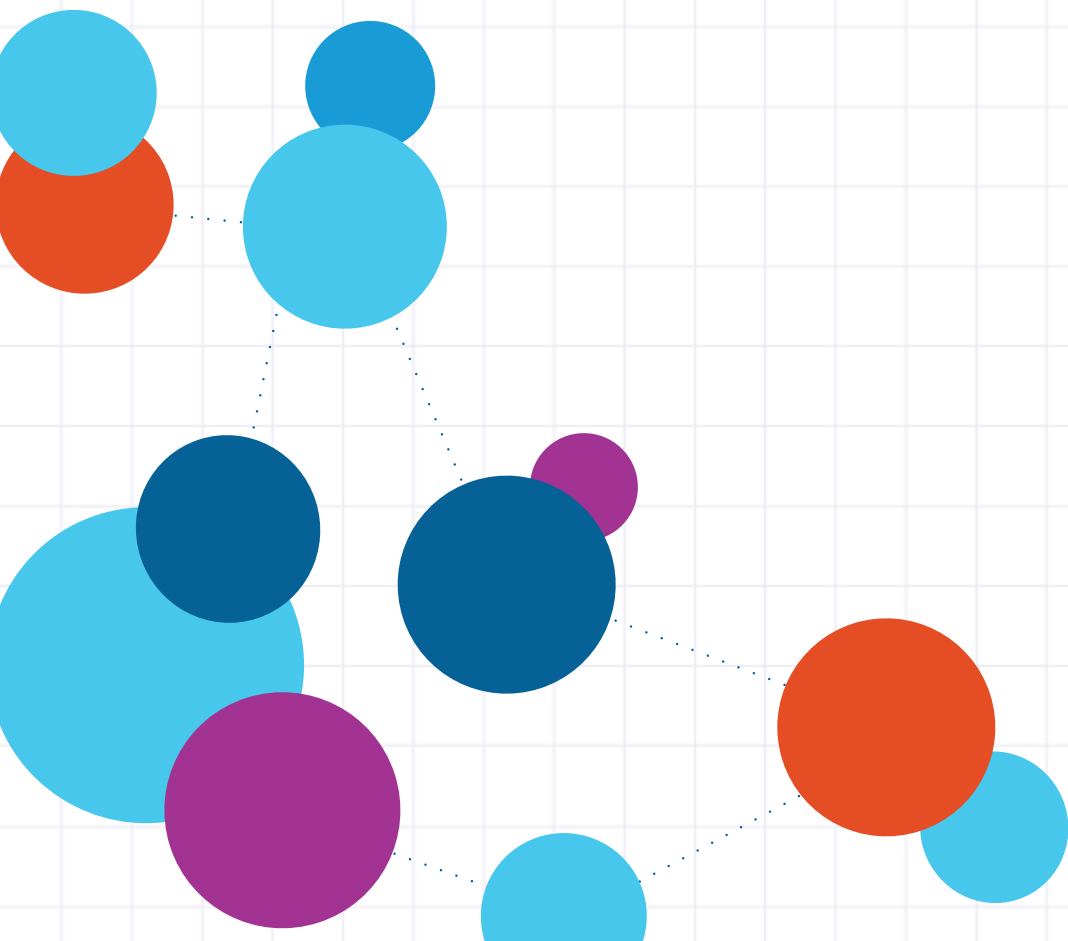




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The authors wish to thank the Academia Group for providing them with access to the UCAS™



Foreword

Rod Missaghian, ONCAT

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In the spring of 2020, Academica Group graciously provided ONCAT with access to one of the richest and largest educational datasets in Canadian postsecondary education (PSE): The University/College Applicant Survey™ (UCAS). This proprietary data source provides impressive coverage of hundreds of data fields capturing postsecondary applicants' demographic characteristics, educational background and aspirations, usage of various information sources, decision-making, and other relevant topics. The UCAS™ has been conducted annually by Academica since the mid-2000s and has been fine-tuned over the years in consultation with PSE stakeholders to capture emerging topics of interest. During this period, the UCAS™ has been completed by hundreds of thousands of applicants to 100+ Canadian colleges, polytechnics, and universities. To date, the UCAS™ remains one of the most trusted data sources for institutional decision-makers across Canada.

ONCAT is now releasing a series of briefs and papers that outline the initial statistical analysis of transfer and student mobility in Ontario based on this UCAS™ dataset. The analysis presented in this series was developed by the ONCAT research team in partnership with researchers from across the sector and a cross-sector panel of external reviewers. This work builds on previous ONCAT-funded research (Henderson & McCloy, 2017) that also used UCAS™ data. This series contains an introductory paper followed by three briefs:

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It is our hope that this statistical research will advance transfer research and instigate useful discussions at multiple levels within policy and administrative circles.

Introduction

Researchers routinely lament the barriers to empirically studying student mobility within Ontario postsecondary education (PSE) (e.g., Maier & Robson, 2020). In jurisdictions like British Columbia, the Student Transitions Project has long leveraged unique identifiers to merge records across K-12 and PSE and facilitate the longitudinal study of student pathways (e.g., Heslop, 2016). However, in Ontario, performing comparable analyses of student mobility typically requires privileged access to highly guarded data within provincial Ministries. Lacking access to such government records, we have seen Ontario researchers routinely use creative “workarounds” to study student mobility. Through this introductory brief, we aim to provide a (relatively) expedient overview of the data “landscape” in Ontario, as it pertains specifically to student mobility research.¹ We engage in this exercise to identify the relative merits and limitations of the UCAS™ data used in briefs within this series, which to our knowledge is the most comprehensive postsecondary applicant survey in Canada. We hope that this piece is both instructive for those wishing to understand existing data sources in this field, while also providing the necessary context to appreciate the potential uses of the UCAS™ dataset.

Administrative Data

If you wish to study student mobility within Ontario PSE, the “gold standard” would be a longitudinal data source that follows students across time, detecting their switching of postsecondary institutions, and containing details on both student demographics and program information. Presently, data with these qualities exist in two locations:

1. Linked enrollment files (e.g. CSER, USER)² gathered by the Ontario Ministry of Colleges and Universities (MCU) from each public college and university in the province. These files are submitted to MCU multiple times a year, providing census-level coverage of students in the province. They also contain data fields essential to the study of student mobility in Ontario, including the credit transfer flag (indicates whether transfer credit was indeed awarded to a student at a receiving institution) – which are not present in other data sources, including Statistics Canada datasets discussed later on. It is important to note that access to Ministry student records has and continues to be highly discretionary (Gallagher-Mackay, 2017). To our knowledge, these records have never been used by researchers external to the Ministry to study student mobility. However, they can be linked across years using unique identifiers (e.g., OEN) to provide the most complete and high-definition picture of student mobility possible.

¹For a broader discussion of this topic – published after the completion of this brief – see Robson (2021).

²A reporting guide for the College Statistical Enrollment Report (CSER) is available here. Unfortunately, we know of no publicly available documents discussing the contents of the University and Statistical Enrollment Reporting (USER) files.

2. Statistics Canada's Research Data Centers (RDCs) where researchers can obtain access to the relatively new Education and Labour Market Linkage Platform (ELMLP).³ This environment contains the Postsecondary Student Information System (PSIS)⁴ files, which are annual snapshots of student enrollments gathered from every public college and university in the country since the mid-2000s. These student-level records can be linked across years, allowing for student tracking and measurement of basic PSE outcomes (e.g., graduation). By linking PSIS and tax file information, both parental income and labor market outcomes can be included in statistical analyses. The main limitation of the ELMLP is that the PSIS files lack many fields available within Ministry enrollment files (e.g., credit transfer flag), as well as extensive demographic information. They also reflect a count date sometime within the Fall term, and thus, miss a sizable number of students that first enroll during other semesters. In addition, there are well-documented gaps in the earlier PSIS files within the Ontario the college sector.

Over the past two years, several ONCAT-funded studies have leveraged the ELMLP to study student mobility, and several future studies are planned. Discussions for ONCAT to gain access to Ministry enrollment records are also ongoing. However, the bulk of the existing literature on student mobility in Ontario draws from institutional-level administrative records.

Using institutional records that capture students' previous institution (e.g., high school, college, university), researchers have been able to categorize students enrolled at their institutions into direct entry and various transfer types. For example, at Trent University, one study (Drewes, Maki, Lew, Willson & Stringham, 2012) used administrative records to examine GPA and graduation rate differences between direct entry, college-to-university and university-to-university transfers. They were also able to differentiate among those that transferred in via articulated pathways from those that did not. ONCAT continues to support the analysis of administrative records at particular institutions as a source of intelligence for both recruitment or retention, and has most recently supported this work through funding available via our [DataPilot](#) stream.

Drawing on institutional administrative data has the advantage of providing greater depth in the coverage of data fields not contained in either the PSIS or Ministry enrollment files. For example, there are a host of relevant metrics captured by institutions, such as grade point average (GPA), transfer credits awarded, and available linkages to internal student and graduate surveys, which are not available elsewhere. However, relying on administrative records from single institutions necessarily restricts analyses to incoming transfer flows, and prevents the analysis of those who transfer out to other institutions.

³See <https://crdcn.org/datasets/elmlp-education-and-labour-market-longitudinal-linkage-platform>

⁴See <https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5017>

Some have overcome this limitation by linking administrative data at two or more proximate institutions. Seneca College and York University are leaders in this space (McCloy, Steffler & Decock, 2017; Smith, Decock, Lin, Sidhu & McCloy, 2016), having conducted multiple studies of student flows and outcomes between their institutions. A primary disadvantage of such bilateral linkages is that estimates of the predictors of transfer and student outcomes are not generalizable across other institutional pairings, or the system at large.

Survey Data

Beyond administrative records, transfer research in Ontario has also drawn extensively from survey data. Most notably, we have seen the use of the college graduate satisfaction survey (GSS), which queries respondents about their educational and work status six months after graduation. A primary benefit of the GSS is that it contains a detailed transfer supplement. The GSS has been used extensively in reports published by Seneca's Centre for Research in Student Mobility (CRSM), as well as in several HEQCO reports. However, it has important limitations. First, it excludes those that transfer prior to graduating or after the six-month period. Second, and perhaps most importantly, it does not randomly sample the population, thus raising questions about response bias and representativeness. Nevertheless, the GSS serves as one of the best sources to study the post-graduation educational pathways of college graduates in the province.

A second survey which has been used to study student mobility in Ontario is Statistics Canada's National Graduate Survey. One older ONCAT-funded report used the 2013 NGS to examine student flows across program areas (Lennon et al., 2016). Meanwhile, more recent ONCAT-funded research (Dhuey, Seward & Walters, 2021) has explored the relationship between obtaining multiple credentials (e.g., college diploma + university degree) and labour market outcomes, including income and underemployment. This inclusion of labor market information is a primary strength of the NGS, as it allows for the linking of pathways to graduate outcomes. As with the GSS, one limitation of the NGS is that it only focuses on graduates, excluding non-completers. However, its sampling techniques are rigorous, thus providing a greater degree of representativeness for its target population (graduates).

There are several surveys which Ontario researchers have yet to tap specifically for work on student mobility. First, there is the National Survey of Student Engagement (NSSE), a survey which is held in high esteem by university administrators. The NSSE contains an extensive set of metrics on student life in and out of the classroom, measuring things like satisfaction with faculty and campus services.⁵

⁵A current ONCAT-funded pilot at Nipissing University is pooling data from multiple waves of the NSSE to study differences in engagement among students traveling diverging pathways into that university.

Student satisfaction surveys like these could one day be linked with Ministry enrollment or application records (OUAC/OCAS) to measure the likelihood of out-transfer for students differentially satisfied with their first-year experience. Second, there is the Ontario University Graduate Survey – a rough equivalent to the GSS in the university sector – which captures whether these graduates pursue further education (and what type). Unfortunately, neither of these surveys (consistently) use systematic sampling methods. Nevertheless, they contain information that can compliment existing student research in Ontario.

Cross-Sectoral Linkages

Over the last decade, we have also seen creative efforts to link student data across sectors. Such projects have greatly extended our understanding of student mobility. For example, Robson, Brown, Maier & Ranjbar (2016) connected TDSB student records with corresponding post-secondary application data provided by OCAS and OUAC to explore the PSE pathways traveled by TDSB students from 2010-14. Using such data, Robson and her team were able to estimate the number of students that traveled various pathways over that period.

More recently, Brown, Davies, & Chakraborty (2019) constructed a linkage between administrative records at the TDSB and the University of Toronto. Using the TDSB academic and demographic data fields, and the 'previous institution' field in the University of Toronto records in this dataset, Davies & Pizarro Milian (2020) were able to predict the likelihood of TDSB students traveling indirect pathways into the university. This included not just transfers from other Ontario institutions, but also, international colleges and universities.

In 2019, ONCAT also funded a linkage of TDSB student records with files in Statistic Canada's ELMLP. This allowed researchers to follow students as they made their way through Ontario PSE, and to estimate the relationship between pathways and student loan borrowing from the Canada Student Loans Program (CSLP) (Walters et al., 2021). The benefits of using TDSB records as a "base" for any linkage is that they contain detailed demographic and academic performance across their entire student population. The obvious disadvantage is that TDSB students are not representative of the Ontario population.

Generally, these custom linkages are not rendered accessible to the research community at large. Indeed, strict protocols typically restrict direct access only to a small project team, mainly driven by fears that even anonymized records may be misused to identify students or to portray institutions in a negative light.

The UCAS™

Considering the existence of the abovementioned data sources, readers may be curious about what new and exciting lines of inquiry the UCAS™ may enable, along with its relative strengths/weaknesses. Below, we highlight several noteworthy characteristics of the UCAS™, particularly as it pertains to the study of student mobility.

- 1. Detailed Pathway Information.** Perhaps most pertinent to the study of student mobility, the UCAS™ contains detailed information on the type of institutions to which an individual applied (e.g., college, university), their first/second-choice institutions, and the primary program area to which they applied. It also captures information on where the individual was enrolled during the past academic year (e.g., high school or another PSE), as well as their educational attainment. Using this combination of previous education and application/preference data, we can derive their intended pathways, and isolate populations of interest (e.g., college-to-university applicants with/without a completed credential). This is something which often is not feasible through institutional administrative records that only possess information about the previous institution an individual attended.
- 2. Extensive Demographic Coverage:** The UCAS™ contains demographic information that exceeds what is typically contained in institutional administrative, MCU or PSIS records. Indeed, it even rivals what is contained in linkages drawing on rich TDSB data (e.g., Davies & Pizarro Milian, 2020). This includes not just common variables like age, gender, primary language, and citizenship status, but also, detailed ethno-racial groupings, disability types, country of birth, marital status, whether the applicant had dependents, parental education, household income, their forward sortation area and other fields. This information not only allows for the isolation of specific populations, but also offers a diverse set of controls when modeling pathways.
- 3. Essential K-12 Information:** It would make little sense for the UCAS™ to re-gather academic information already supplied by respondents to institutions through their applications (e.g., via high school transcripts). But it does capture some key pieces about their early academic history. This includes their (self-reported) average marks during Grade 12 and the type of high school they attended, be it public, private, or religious. The former has been found as a key predictor of postsecondary pathways, yet it is entirely missing from the PSIS and most studies drawing on administrative records from single institutions.
- 4. Information Sources:** Where the UCAS™ really separates itself from other data sources is in its in-depth coverage of the information sources used by applicants during their search process. This includes an array of web portals (e.g., ontariocolleges.ca, cicic.ca), social media (e.g., Facebook, Instagram) and more traditional sources, such as campus tours, university/college fairs, and viewbooks or brochures. Perhaps most importantly, it asks questions about how influential these sources were to their decision. This information is absent from traditional administrative records and could be leveraged to inform the strategic recruitment of transfer students.
- 5. Sample Sizes:** The UCAS™ gathered data from approximately 460,000 individuals during the 2005 to 2019 period. More than 280,000 of those responses are from applicants in Ontario. Such sample sizes overshadow the size of most datasets used in studies of student mobility in Ontario. This allows us to explore the characteristics and pathways of structurally small groups (e.g., mature students), and to focus on very homogenous sub-samples when performing statistical analyses.

The above-mentioned characteristics illustrate the many exciting lines of inquiry that can be pursued through the UCAS™, despite some of the limitations that we identify below. First, given that it is a proprietary survey, the UCAS™ is fielded only to applicants of colleges and universities that subscribe to the survey within a given year, with varying institutional participation across years. As such, though certainly more potentially representative than data from a single institution, research findings produced through the analysis of the UCAS™ are not as generalizable as those produced using PSIS records – given that the latter includes *all* postsecondary institutions in the province.⁶

Second, the UCAS™ is sent to all applicants at participating institutions, rather than a random sub-sample. As such, it is a voluntary census that may not be representative of the population of applicants to each institution. In addition, though survey weights are produced to render the obtained sample more representative of the pool of applicants at each institution, no system level weights are produced. This is to be expected given that the UCAS™ is strategically designed to generate insights at the institutional rather than system level.

Third, and perhaps most obvious, the UCAS™ allows us to examine applications, but cannot follow students across time as they make their way through postsecondary education. As such, there may be key differences between application and enrollment pathways that need to be further explored.

Given these limitations, and as with any other data source, care needs to be taken when interpreting the findings produced with the UCAS™. Through the briefs we have produced in this series, attempts are repeatedly made to cross-reference findings with existing research, and where substantial deviations exist in findings, a critical eye is directed towards them. We find the UCAS™ an incredibly useful source to both i) explore the relationship between applicant pathways and topics which have received limited attention in Ontario due to data limitations, and ii) to attempt to replicate findings produced through the use of other data sources.

It is our hope that the analyses presented through this report advance our collective understanding of student mobility, providing thoughtful direction for future researchers and actionable insights for both policymakers and institutional leaders.

⁶Nevertheless, it is important to note that the UCAS™ is particularly strong in its coverage of particular sectors of Ontario PSE during specific periods. In Ontario, applicants of all 24 Ontario colleges were surveyed from 2008-2017 when Colleges Ontario was the client. On the university side, it is also worth pointing out that a majority of Ontario universities have participated in the survey at some point during the last ten years.

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oncat.ca/statistical-analysis-transfer-and-student-mobility-ontario



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.

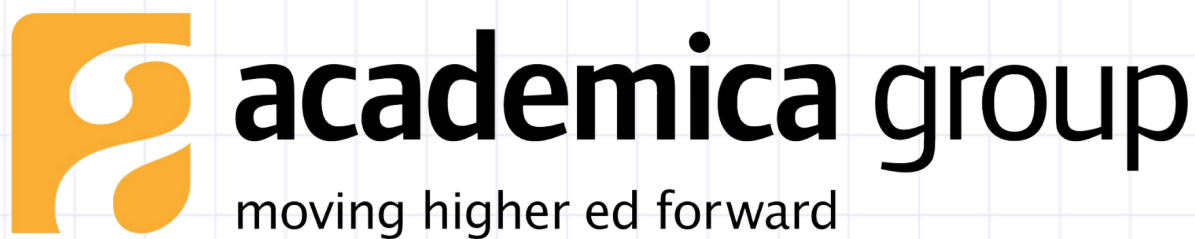
A Statistical Analysis of Transfer and Student Mobility
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Brief 1: Regional Disparities in Transfer Intent Among Ontario College Applicants: Insights from Academica's University/College Applicant Survey™

Roger Pizarro Milian, ONCAT
David Zarifa, Nipissing University
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February 2022

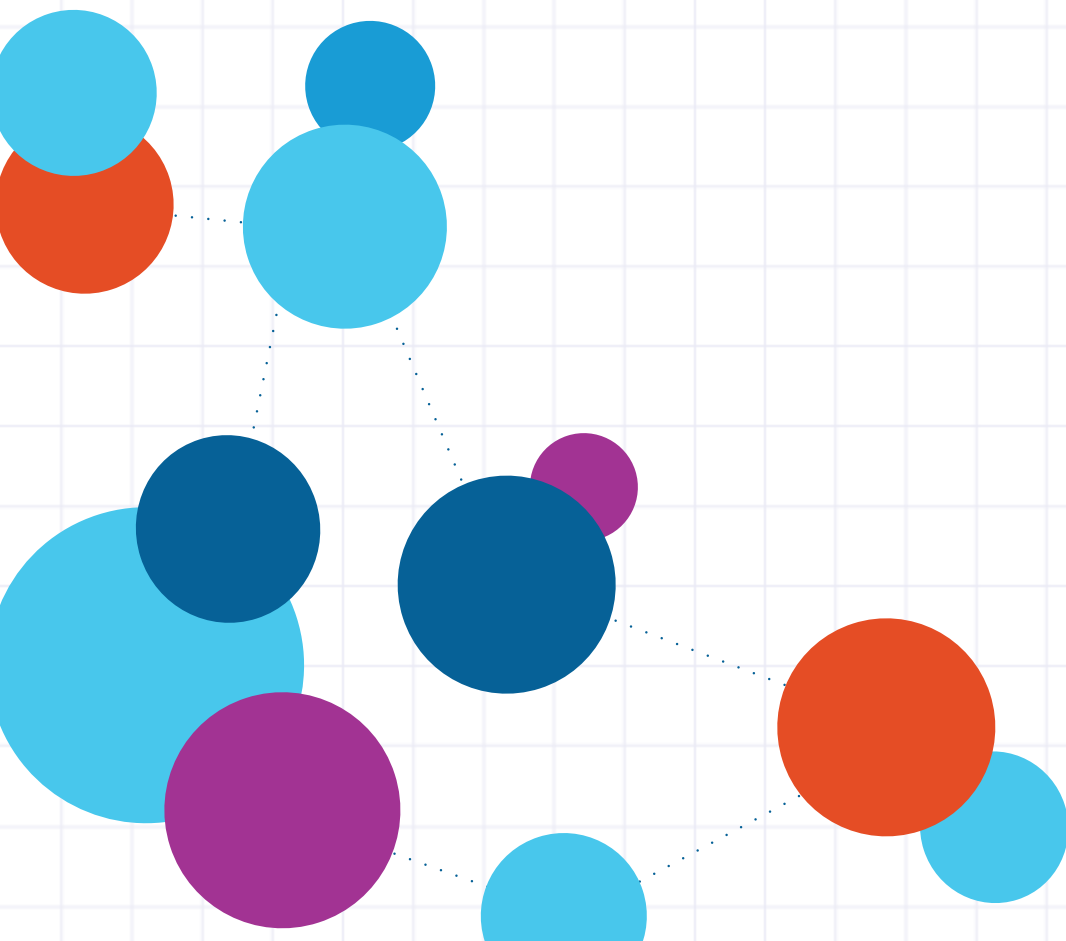




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Introduction¹

Each year, thousands of individuals apply and are accepted into colleges across Ontario, gaining access to world-class training opportunities primarily at the sub-baccalaureate level.² The OECD (2012; 2014) has highlighted the instrumental role that colleges in Canada play in promoting an inclusive skills development ecosystem. With the growth of articulation agreements between Ontario colleges and universities, colleges now also represent a viable pathway to an abundance of university degree programs. In the United States, 2-year community college (CC) student aspirations for 4-year degree programs have been well documented (see Chan & Wang, 2020; Wang & Lee, 2019). In Canada, however, there's less research on this subject – a fact attributable to the absence of survey data on this topic. The lack of work on this subject in Ontario is unfortunate, as research has found that student aspirations are an important predictor of transfer out behavior (McCloy, Steffler & Decock, 2017, p. 10).

Studying degree aspirations among college applicants is particularly useful intelligence for policy development. At a provincial level, examining regional disparities in degree aspirations could inform the design of targeted strategies, such as regional articulation hubs, to promote seamless transfer. Of course, an understanding of demand for degrees among college applicants can also inform the further development of applied degree programs within the college sector itself, a market which is in its early stages of development within the province.

In this brief, we examine degree aspirations among a sample of 31,000 first-time Ontario college applicants within Academia's University/College Applicant Survey™ dataset (2013-2019). We focus on disparities that exist across the various geographical regions in Ontario, while accounting for the unique characteristics of these sub-populations. A regional focus is warranted given that research finds that both PSE attainment, skills development, and student mobility rates differ significantly across regions, with the provincial north being particularly disadvantaged (Zarifa, Seward, & Pizarro Milian, 2019; Zarifa, Hango & Pizarro Milian, 2018; Zarifa, Sano & Hillier 2020a; 2020b). We explore this topic using a combination of descriptive statistics and logistic regression modelling.

¹Disclaimer: The authors acknowledge the financial support provided by the Ontario Council on Articulation and Transfer (ONCAT), funded by the Ontario Ministry of Colleges and Universities, to develop this publication. The authors also wish to thank the Academia Group for providing them with access to the UCAS™. The first author of this brief contributed to this piece during his employment at ONCAT (2019-2021). The views and interpretations expressed in this publication are those of the authors and do not reflect those of the Academia Group, Government of Ontario, Statistics Canada, or any other affiliated entity.

²Though Ontario colleges are now able to grant degrees, reports suggest that college degree-granting programs account for only a small fraction (2%) of the provinces' degree-level enrollments (Hicks et al., 2013). More recent Ministry of Colleges and University (2020) data for the 2019-20 academic year show that only 6% of degree-level enrollments in Ontario are in the college sector. Moreover, Statistics Canada reports note that college degrees are "generally concentrated in more specific, applied areas than university bachelor's degree programs" (Frenette, 2019, p. 7). Thus, we operate under the assumption that for most students, completing a degree at an Ontario college is not an option due to limited availability.

The Relevance of Regional Disparities in Aspirations

American research finds that anywhere from 60-80% of community college students aspire to obtain a 4-year degree (Bailey & Morest, 2006; Hoachlander, Sikora, Horn, & Carroll, 2003; Wang & Lee, 2019). It has also found disparities in aspirations across various demographic categories (e.g., Buchmann & Dalton, 2002; Howley, 2006; Kao & Tienda, 1998; Pascarella, 1984; Raabe & Wölfer, 2019; Sewell & Shah, 1968; Zimmermann, 2020). As well, a substantial body of research has found a link between aspirations and early life-course trajectories (Irvin, Byun, Meece, Reed & Farmer, 2016, p. 178). For ONCAT, degree aspirations serve as a useful proxy for transfer intent during or after the completion of a college certificate or diploma.

Canadian studies have repeatedly shown that individuals in remote regions possess lower levels of educational attainment (Zarifa et al., 2018; Alasia, 2003, p. 1). An early study, focusing on rural-urban gaps in education from 1981-1996, concluded that a "major divide" existed in Canada, with southern and western regions eclipsing northern and eastern regions when it comes to educational attainment. Research has also found that northern and rural Canadians have lower rates of access to university STEM programs (Hango, Zarifa, Pizarro Milian & Seward, 2021). These regional disparities are far from a Canadian problem, with similar disparities also being documented across other countries (e.g., Dickerson & McIntosh, 2013; Gibbons & Vignoles, 2012; Spiess & Wrohlich, 2010; White & Lee, 2019). The argument has been made that education and skill development policies suitable for urban centres are often disconnected from the challenges faced by communities in peripheral geographical regions (Pizarro Milian, Seward & Zarifa, 2020). Such facts necessitate that policymaking and analysis carefully consider regions as a primary dimension along which inequities in education and training exist.

Focus of this Analysis

Through this brief, we address the following two questions:

1. Do the degree aspirations³ of first-time college applicants differ regionally in Ontario?
2. To what extent are regional disparities in aspirations attributable to student socio-demographic and other applicant characteristics?

We focus specifically on Ontario college applicants designated in the UCAS™ dataset as being "first-entry" or "delayed-entry" from high school, excluding those with any reported postsecondary-level studies.⁴

³We code those aspiring to a 4-year degree or graduate-level credentials (e.g., M.A, Ph.D.) as "aspirants" (=1), and others (e.g., college diplomas/certificates) as "non-aspirants" (=0). We experimented with including those aspiring to a post-graduate certificate in either group and it did not bias observed regional effects. Results presented here include them in the aspirant category.

⁴We purposely restrict our analysis to this relatively more homogenous group. Doing so hopefully limits some of the unobserved variance that comes along with more mature applicants.

We also exclude those respondents more than 30 years old at the time of application. We acknowledge the importance of these excluded groups, particularly mature and non-direct applicants, and leave it to future research to explore the nuances of their aspirations. These restrictions leave us with an analytic sample of approximately 31,000 individuals.⁵ We begin our analyses with descriptive statistics, and then move to logistic regression models. The latter is a common modelling strategy when trying to predict binary categorical dependent variables. In our case, whether a student aspires towards a 4-year degree (or more) versus those who do not (Long, 2014). Moreover, to further highlight our findings, we produce graphical displays of the predicted probabilities and 95% confidence intervals of aspiring to a degree (or more) across each of our regions.

Findings

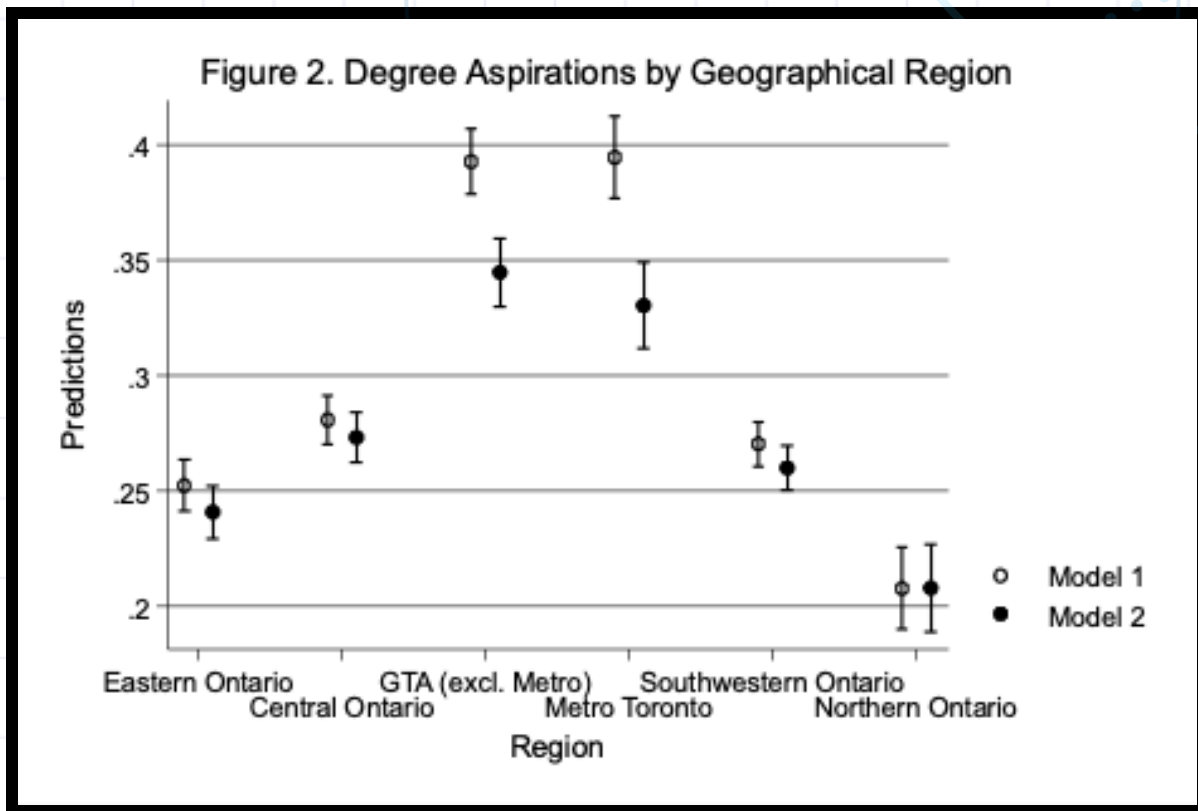
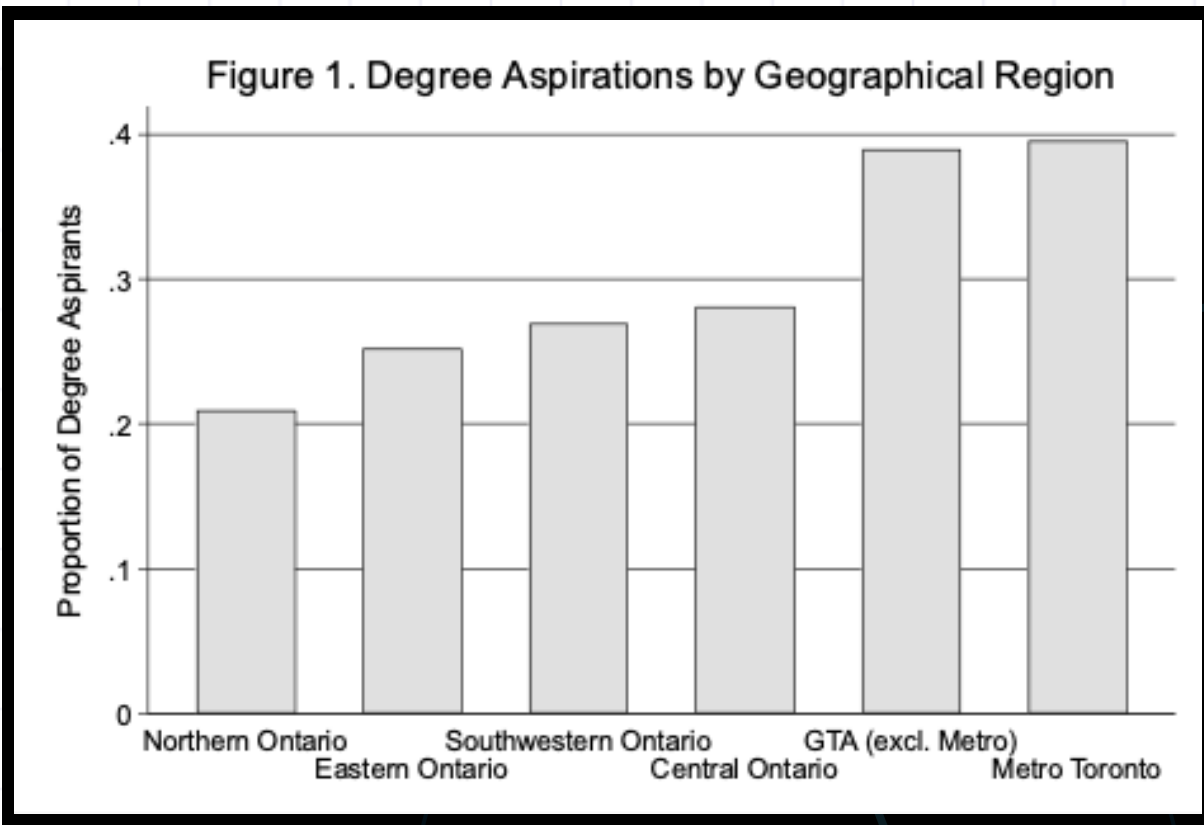
Basic descriptive statistics (see Figure 1) demonstrate great variability in the degree aspirations of first-time college applicants across regions of Ontario.⁶ We observe a gradual decline in aspirations by region, with over 15% separating the highest (Metro and Greater Toronto Area (GTA) and lowest (Northern Ontario). However, given that demographics differ markedly across regions, it is important to account for variations in ethno-racial groupings, immigrant status and other metrics when comparing regions. To do so, we fit an initial logistic regression model (Model 1) which incorporates only the regional variable and the year an individual applied, followed by a second model (Model 2) that accounts for a wide range of socio-demographic and academic predictors of degree aspirations.⁷

This analytical strategy allows us to compare how the estimated relationship between region and degree aspirations changes once we account for applicant characteristics (which differ across regions). In Model 1 (see Figure 2), like the descriptive data, we see those individuals in the Metro and GTA have significantly higher aspirations (.39), with others lagging significantly behind (.20-.28). Controlling for various demographic and academic factors in Model 2 shrinks the gap between these two groups, as the predicted probabilities for the Metro (.33) and Greater Toronto (.34) areas are reduced by roughly .05-.06 points. Nevertheless, these gaps remain statistically significant in the underlying regression models.

⁵The size of our analytic sample also reflects our use of listwise deletion to handle those observations with missing data and "don't know" responses across several predictors in our models. In some cases, we do retain these categories when they represent a sizable share (>3-5%) of responses.

⁶The region categories were created using individual's forward sortation area at the time of application. The distribution of our respondents across regions is: 6.5% North, 18.5% Eastern, 26.8% Southwest, 23.4% Central, 9.7% Metro, and 15.2% GTA (excluding Metro).

⁷This includes age, sex, place of birth, ethno-racial grouping, disability status, first language, marital status, whether they had dependents, parental education, parental income, approximate high school average in Grade 12, type of high school attended (e.g., public/private), and primary field of study applied to.



Discussion

Our analyses show that degree aspirations differ markedly among college applicants residing in different regions of Ontario and that these differences persist even after we control for their academic and demographic traits. Such findings prove remarkably robust,⁸ and raise several important questions, from both a research and policy standpoint. Researchers may question: what triggers these regional disparities in applicant ambitions? Let us assume that these disparities are not entirely a function of some unobservable demographic or attitudinal factors. One potential explanation may be that applicants are rationally adjusting their aspirations in accordance with available jobs in their region (Zarifa et al., 2020b). This would explain why those in the highly urbanized Metro and Greater Toronto Areas desire degrees at a higher rate – in line with local industries – than those in more remote and rural regions in the province. Economic theory tells us that individuals should stop consuming education once the returns to an additional unit of learning no longer exceeds its cost. This could be the dynamic we are observing here. Of course, further research is needed to better understand the causal mechanisms at play. We imagine that this work will necessitate a more in-depth qualitative, as opposed to quantitative, approach.

From a policy standpoint, there are several ways to interpret these findings. One potential takeaway is that, though regional disparities exist, even in the lowest aspiring regions we see that roughly 1 in 5 college applicants aspires to a degree. As such, the province should augment college-to-university pathways in an indiscriminate fashion, to pave the way for all aspirants. A second takeaway may be that regional variations in aspirations should guide the differential allocation of resources towards college-to-university pathway development. The argument could be made that, based on objective interest levels alone, far more attention should be given to this task within the Greater Toronto Area, as opposed to the provincial north. A more detailed analysis of aspirations, cross-referenced with employer demand for degrees across program areas, could provide a useful blueprint for where priority investments could be made to create more efficient transfer pathways between college and university programming. This latter approach may prove most strategic for the province. Funding university pathways in regions where there is limited demand, though it would not harm anyone, is arguably inefficient public policy.

⁸ In robustness checks not presented, we refit our saturated models on sub-samples of applicants that had higher high marks (e.g., >80%), high parental income or education, and various other sub-groups. The reported regional differences remained statistically significant even in these far more homogenous groups.

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oncat.ca/statistical-analysis-transfer-and-student-mobility-ontario



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.

SERIES

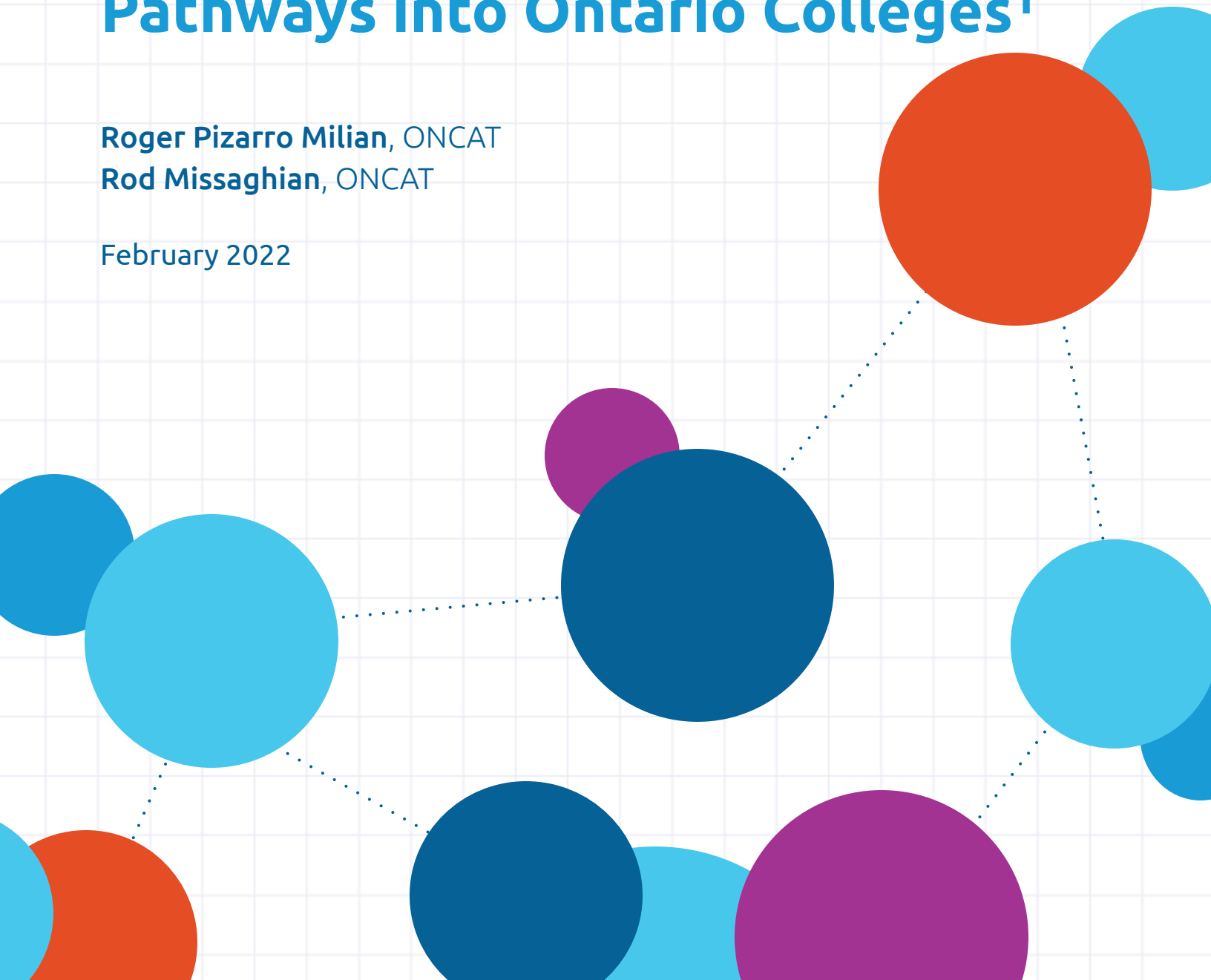
A Statistical Analysis of Transfer and Student Mobility
in Ontario: What the University/College Applicant Survey™ Tells Us

Brief 2: Does Socio-Economic Background Matter? A Look at Pathways into Ontario Colleges¹

Roger Pizarro Milian, ONCAT

Rod Missaghian, ONCAT

February 2022



Introduction

Given their traditional role as terminal or preparatory institutions (Brint & Karabel, 1989), few studies (e.g., Bahr, 2009; 2012) have sought to examine transfer flows *into* community colleges. This gap is particularly problematic in jurisdictions like Ontario, where “reverse” transfer – from university to college – occurs at comparable rates to more conventional forms of lateral or vertical transfer (Zarifa, Sano & Hillier, 2020). Through this brief, we address this gap by leveraging multiple waves (2014-2019) of the UCAS™ to examine applicant pathways into college. We focus specifically on two historically popular proxies for socio-economic status (SES) in social science research¹: parents’ educational attainment and household income. While existing studies have produced evidence that students from lower SES backgrounds are overrepresented in the college sector (Childs, Finnie & Martinello, 2017, p. 273; Drolet, 2005; Thiessen, 2009; Zarifa, Hango & Pizarro Milian, 2018), much less is known about the relationship between SES and the uptake of particular disaggregated pathways into college, including direct entry (DE), college-to-college (C2C), and university-to-college (U2C) routes. This is intelligence that could be vital to developing tailored supports for transfer students should it be discovered that – on average – they come from lower SES backgrounds.

Pathways into Ontario Colleges

Transfer student flows into Ontario colleges have attracted limited attention in comparison to the more voluminous literature focusing on college-to-university student flows (e.g., McCloy et al., 2017). One recent report by Colleges Ontario (2020) used data from the 2017-2018 Student Satisfaction Survey to estimate that nearly half (47%) of college students enrolled that year had some previous PSE experience. This figure is consistent with estimates (45%) produced through a project drawing on applicant and KPI survey data from four Ontario colleges presented via a recently published ONCAT report (Algonquin College, 2019). Meanwhile, earlier research by Durham College (2014), which drew on OCAS applicant data for 22 colleges, estimated that 30% of first year students in Ontario colleges had some previous PSE experience.

The abovementioned work exhibits several limitations. First, it has not contrasted the SES profiles of students traveling direct entry and transfer pathways into the college sector.

¹**Disclaimer:** The authors acknowledge the financial support provided by the Ontario Council on Articulation and Transfer (ONCAT), funded by the Ontario Ministry of Colleges and Universities, to develop this publication. The authors also wish to thank the Academica Group for providing them with access to the UCAS™. The views and interpretations expressed in this publication are those of the authors and do not necessarily reflect those of the Academica Group, Government of Ontario, or any other affiliated entity.

²For early uses of these metrics, see Blau & Duncan (1967), and Becker & Tomes (1979).

Disaggregating transfer pathways into the college sector – and isolating those that originate from a college or university – is an important exercise given the differential “filtering” and self-selection that occurs across these postsecondary pathways. On the institutional side, colleges and universities will apply contrasting admissions criteria to applicants. In Ontario, the former tends to apply higher grade “cut offs” to prospective applicants. On the individual side, students will also select programs and schools that they perceive as being a better “fit” given self-evaluations of competency, occupational goals, and parental advice. In both cases, self-selection and filtering processes prompt differentiation in the characteristics of students that will apply to transfer into college from different areas of the system. This conclusion is supported by recent research documenting the characteristics of various transfer types (e.g., Davies & Pizarro Milian, 2020; Walters et al., 2021; Zarifa et al., 2020). A second limitation of existing Ontario research on transfer student flows into colleges is that it employs primarily descriptive, as opposed to multivariate, methods.

Through this brief, we draw on the large sample size and rich demographic data of the UCAS™ to address this gap in the existing literature on pathways into Ontario colleges. We ask:

- 1) Are parental education or household income associated with the pathways students take into college?
- 2) Is there a statistically significant relationship between these SES proxies and applicant pathways, net of other applicant characteristics?

Data + Methods

Our analysis focuses on approximately 31,000 applicants to Ontario colleges in the UCAS™ dataset during the 2014-2019 period. The UCAS™ only started collecting household income in 2014, so this restriction drives us to exclude respondents from earlier years. Our analytical sample is made up of those individuals aged 40 or younger at the time of application, and who do not contain missing data across any of the predictor or outcome variables of interest.

To produce a disaggregated applicant pathways category, we utilize a variable identifying the type of institution an individual was enrolled in during the last calendar year (relative to when they were surveyed), including (1) high school, (2) college/polytechnic, or (3) university. Such variables allow us to compare direct entry students with a group of applicants seeking an immediate switch in educational tracks, and thus, those most likely (but not guaranteed) to be seeking transfer credit at the receiving institution.

We exclude all applicants with completed degrees from our analysis, as this group could be “contaminated” with those seeking entry to post-graduate college certificates. The latter would typically not be receiving transfer credit or traveling articulated pathways. However, it is important to note that our findings were robust to their inclusion/exclusion in the analytic sample.³

We analyze our data using multinomial logistic regression modelling. First, we estimate models with only parental education or household income included (along with a control for the year of application). Then, we run full/saturated models including all relevant control variables. To render our multivariate findings more interpretable, we estimate/graph predicted probabilities.

Findings

Our initial models show that children of parents with different levels of educational attainment differ only marginally with respect to their estimated probability of traveling the various available pathways into college (see Figure 1). Indeed, all groups have a roughly 77-79% chance of being direct entry, 17-20% chance of being college-to-college, and 3-4% chance of being university-to-college applicants.

Larger differences are observed with respects to pathway uptake across household income categories. Indeed, the predicted probability of being direct entry appears to increase from .72 to .81 as we move from the lowest to highest income category. When we shift our attention to the college-to-college pathway, we see that those in the lowest income group have a .23 probability of traveling this pathway. This probability gradually drops to .14 by the time we reach the highest income category. Meanwhile, there is only a marginal increase (.01) in the probability of traveling the university-to-college pathway from the lowest to highest income categories. It would thus appear that the bivariate relationship between household income and pathways into college is marginally stronger than for parental education. It is worth noting that, even in these initial models lacking extensive controls, our estimates are very precise, with our confidence intervals being barely noticeable in most cases.

³Including this group of roughly 2,000 respondents obviously reduces the percentage of individuals in our sample coming through direct entry pathways. However, the statistical relationship between our SES metrics and pathways was not affected.

Figure 1. Predicted Probability of Pathway Uptake by Parental Education

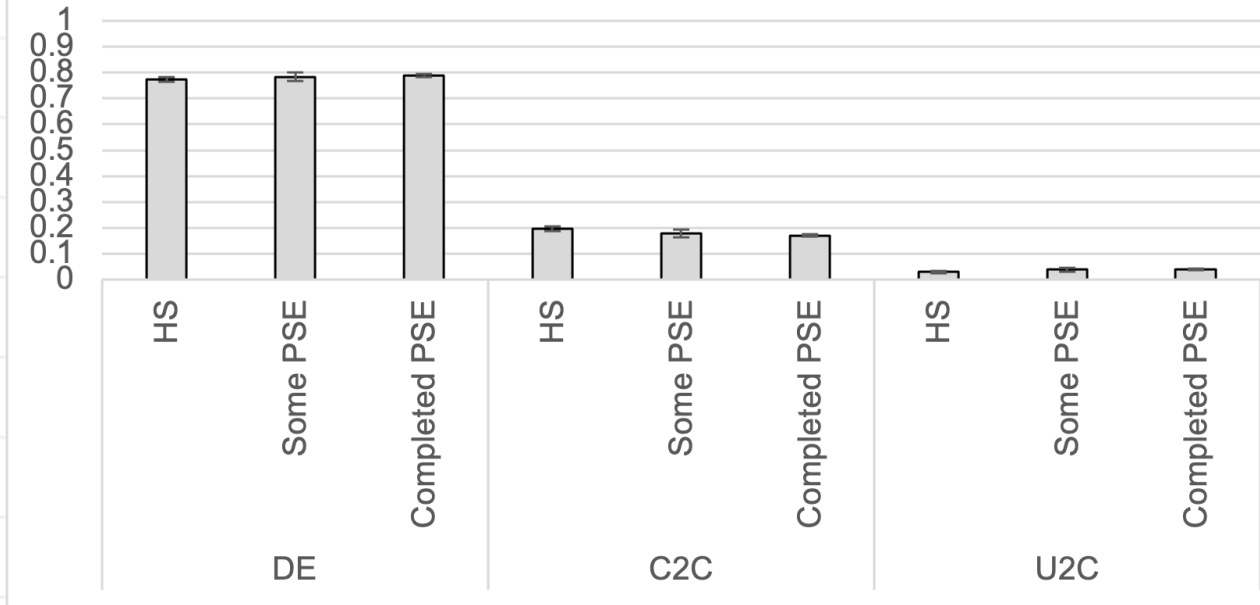
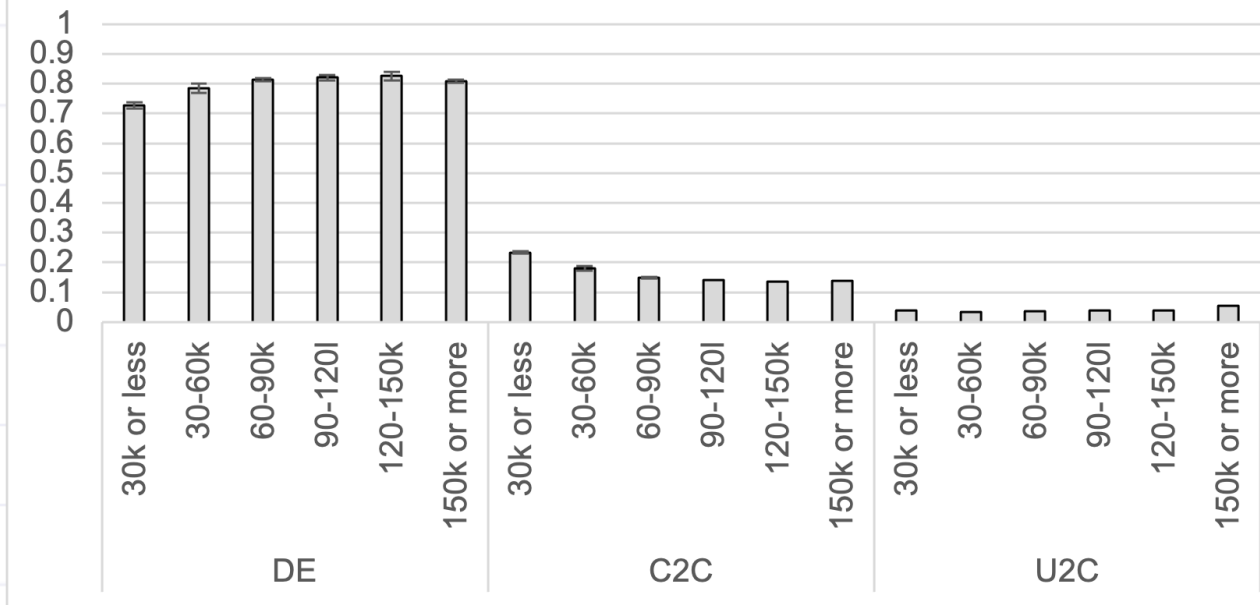
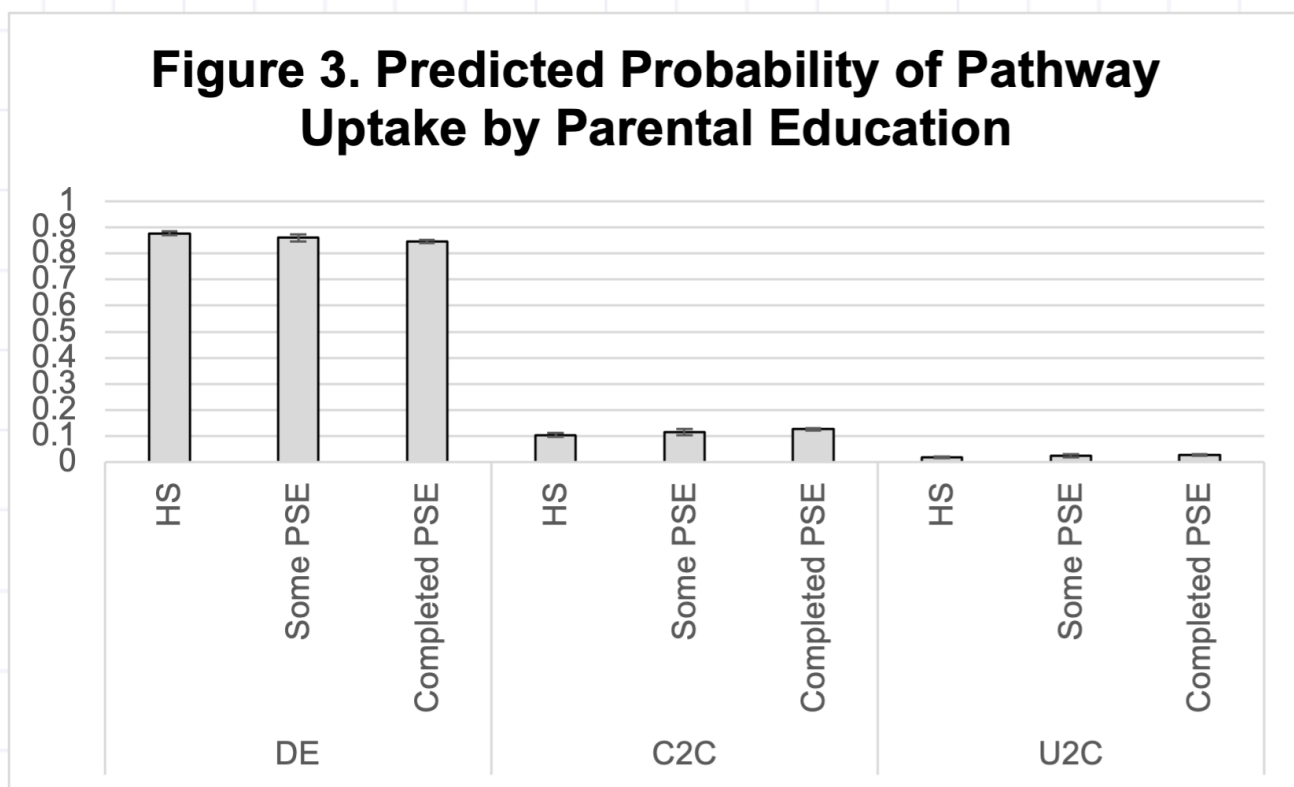


Figure 2. Predicted Probability of Pathway Uptake by Household Income



Once we simultaneously introduce parental education and household income into our models, along with other available controls⁴, we see a reversal of some of the patterns observed above. The probability of direct entry is found to drop from .88 among applicants with a HS-educated parent to .84 for those with parents that had completed PSE. Meanwhile, there is a .3 rise in the probability of college-to-college pathway uptake as we move from the lowest (.10) to highest (.13) parental education groupings. Only a minor .01 difference exists in the probability of university-to-college application pathway across parental education groupings.



Adjusted estimates for the relationship between household income and pathway uptake are also reversed (see Figure 4). We see that the difference in direct entry probability drops from .86 in the lowest to .82 in the highest income group. Variation in the probability of college-to-college pathway uptake is compressed to .03 between the highest and lowest groups, with more affluent applicants being more likely to apply via this pathway. Variation in the probability of university-to-college (.02) pathways is generally unchanged by the introduction of controls⁵.

⁴Controls include the geographical region of residence, age, gender, ethno-racial group, disability, marital status, dependents, average in Grade 12, type of secondary school attended, whether they also applied to university, and the primary field of study applied to.

⁵A final set of robustness checks were conducted to test for independence of observations. We re-ran the saturated models for single application years to assess whether observed trends would remain consistent to the full model. We observed little change from full model when looking at specific years, although some years slightly modified results given their smaller sample sizes.

Discussion

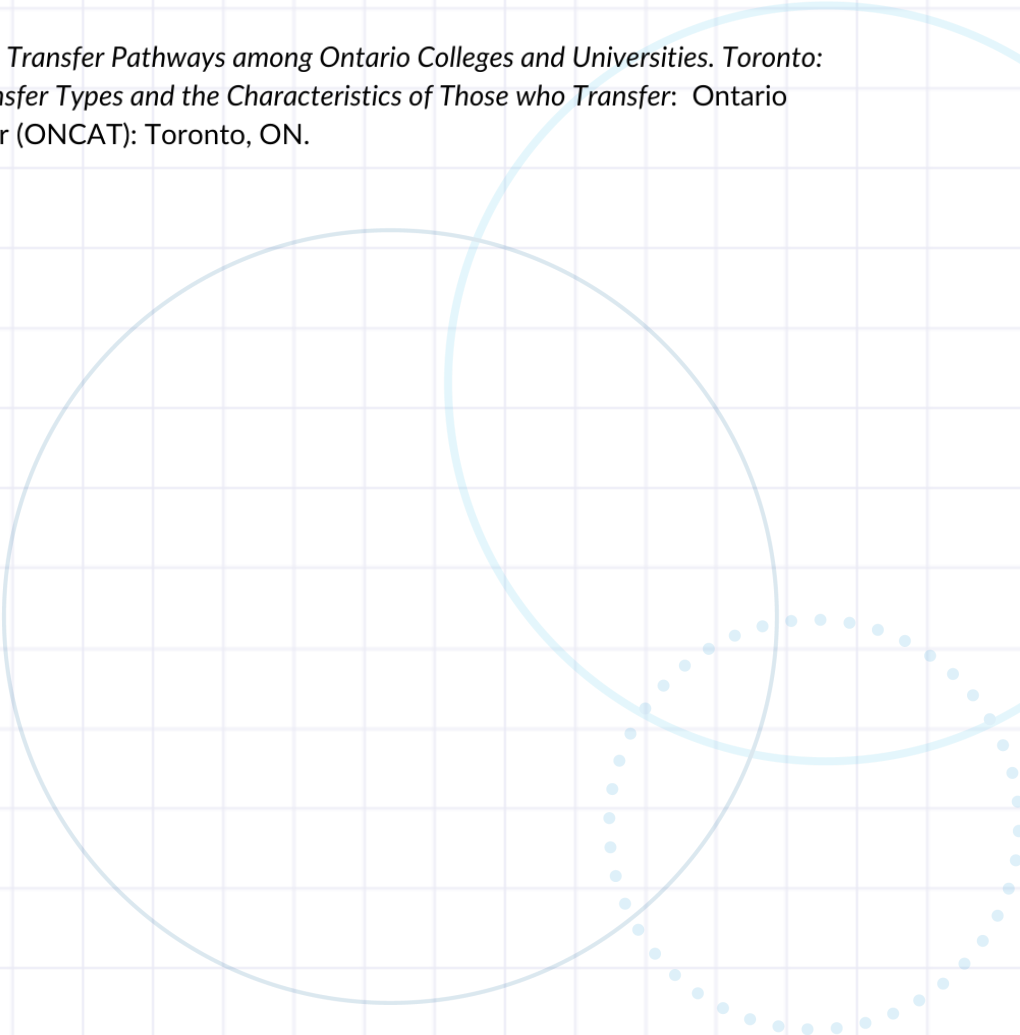
Our analyses of UCAS™ data focus on the statistical relationship between two common proxies of socio-economic status (SES) and applicant pathways. Our initial models show that the probability of direct entry increased (and transfer generally decreased) with parental education and household income, with the latter demonstrating a more pronounced relationship with applicant pathways. However, once we introduced further controls into our models, these observed patterns were generally reversed, and the strength of the relationship between both SES metrics and applicant pathways was markedly weakened. Indeed, all other things being equal – knowing an applicant’s SES background is not a very useful piece of information when trying to predict what pathway they are taking into the college sector. These findings contrast those of Canadian studies which have found that SES is more strongly associated with overall PSE participation, selection of college or university, and graduation (Childs, Finnie, & Mueller, 2018; Robson, Maier, Anisef & Brown, 2019; Walters et al., 2021).

It is important to contextualize these findings. First, recall that we are only looking at the pathways taken by applicants, as opposed to their eventual outcomes. While there may be no SES-related disparities in application patterns, higher-SES applicants may get accepted at greater rates than their counterparts due to differences in their academic performance or preparation. This could be more common when it comes to competitive college programs, where there are far fewer seats than applicants. Future research, drawing on linkages between enrolment and applicant data, would be useful towards identifying these disparities. In addition, work focusing on early academic performance once enrolled (e.g., first term GPA), as well as persistence rates, seems warranted. Our data unfortunately do not speak to these dynamics.

What are the practical implications of our findings? For policymakers wishing to improve our transfer system, if we had found SES-based disparities, options like additional assistance in the form of scholarships, grants or other forms of financial aid targeted at prospective transfers from low-SES groups would have been considered. However, we found no sizable problems of this sort at the application stage. Even in the absence of large disparities, we may still wish to consider SES-conscious strategies to facilitate transfer, with a view towards avoiding potential downstream issues experienced by students from lower SES backgrounds. For example, we can continue to improve the visibility of information pertaining to articulation agreements and transfer credit opportunities. What colleges – and programs within them – will give students the largest amount of transfer credit? Having access to this knowledge *prior* to application could be particularly useful to lower-SES students that may struggle to navigate bureaucratic processes to obtain this information. It could also eventually expedite their timely completion of credentials and labor market entry.

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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.

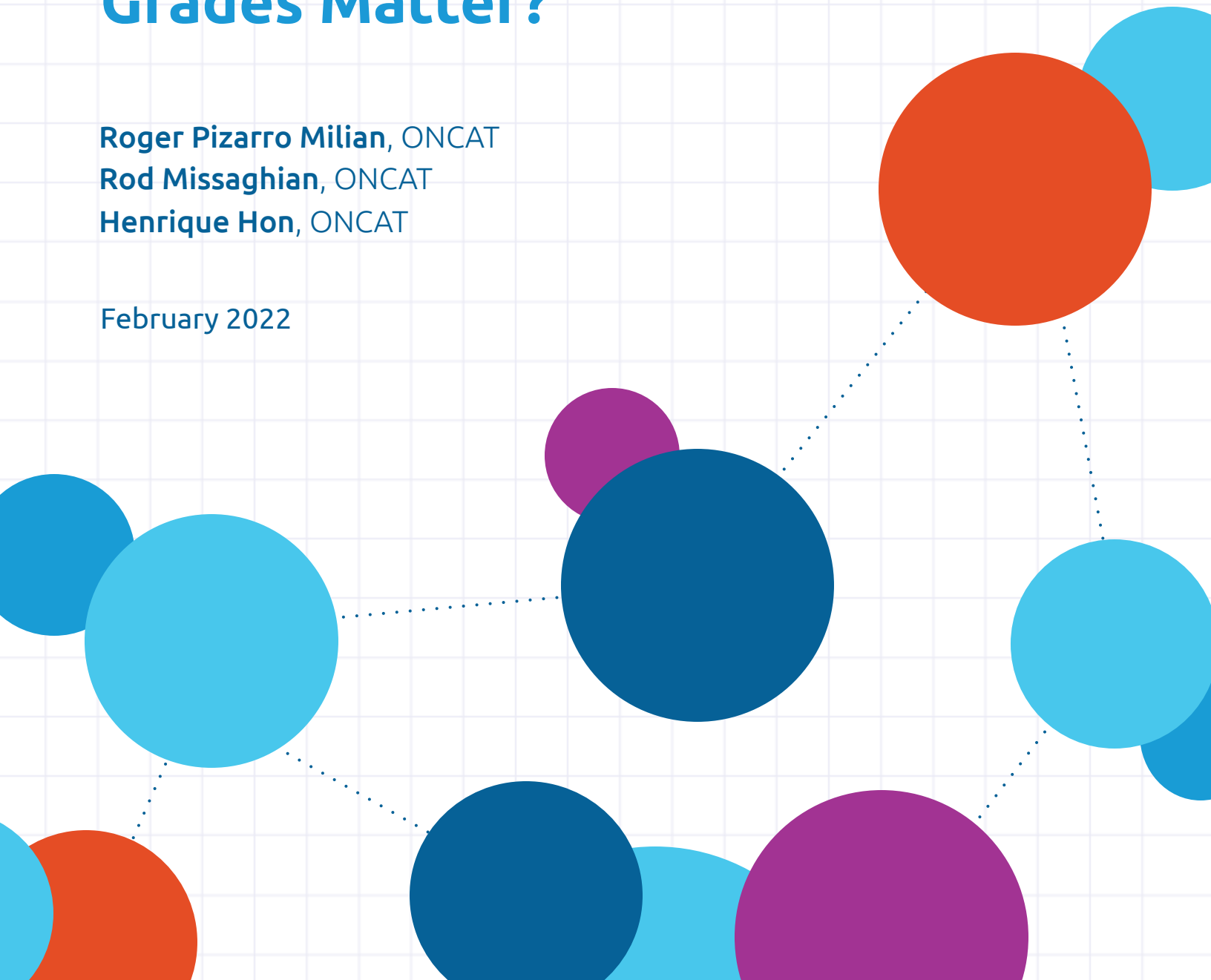
Brief 3: Applicant Pathways into University: Do High School Grades Matter?

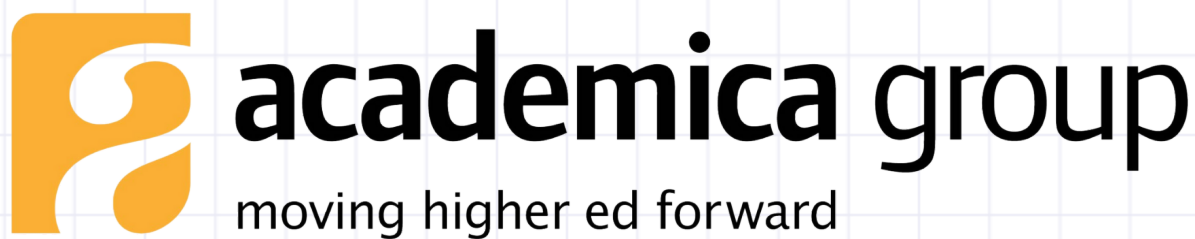
Roger Pizarro Milian, ONCAT

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February 2022

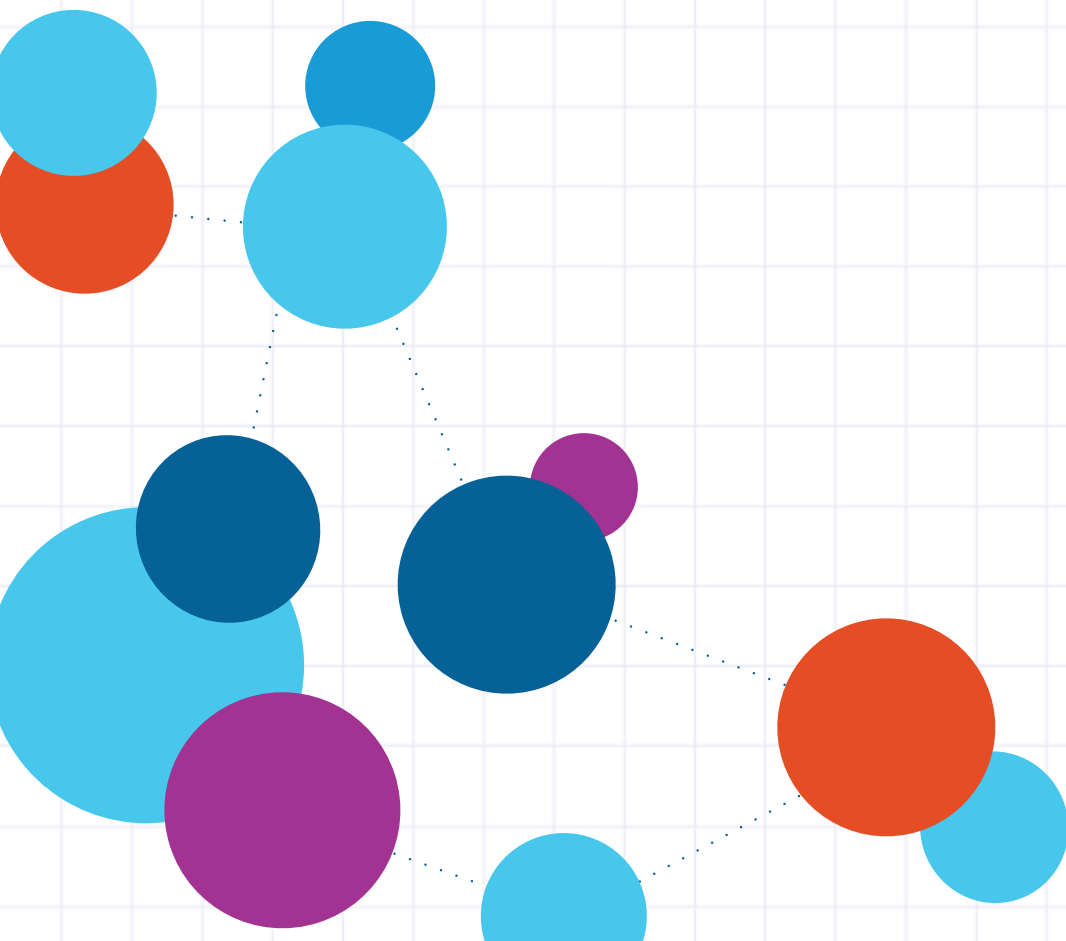




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The authors wish to thank the Academica Group for providing them with access to the UCAS™



Foreword

Rod Missaghian, ONCAT

Postsecondary transfer research in Ontario – despite making significant strides in recent decades – continues to suffer from a lack of data sources that systematically capture patterns in student mobility. For this reason, ONCAT has been diligently working to find innovative data sources, potential new data-linkages, and other opportunities that allow us to extend our understanding of transfer and student mobility in Ontario.

In the spring of 2020, Academica Group graciously provided ONCAT with access to one of the richest and largest educational datasets in Canadian postsecondary education (PSE): The University/College Applicant Survey™ (UCAS). This proprietary data source provides impressive coverage of hundreds of data fields capturing postsecondary applicants' demographic characteristics, educational background and aspirations, usage of various information sources, decision-making, and other relevant topics. The UCAS™ has been conducted annually by Academica since the mid-2000s and has been fine-tuned over the years in consultation with PSE stakeholders to capture emerging topics of interest. During this period, the UCAS™ has been completed by hundreds of thousands of applicants to 100+ Canadian colleges, polytechnics, and universities. To date, the UCAS™ remains one of the most trusted data sources for institutional decision-makers across Canada.

ONCAT is now releasing a series of briefs and papers that outline the initial statistical analysis of transfer and student mobility in Ontario based on this UCAS™ dataset. The analysis presented in this series was developed by the ONCAT research team in partnership with researchers from across the sector and a cross-sector panel of external reviewers. This work builds on previous ONCAT-funded research (Henderson & McCloy, 2017) that also used UCAS™ data. This series contains an introductory paper followed by three briefs:

- **Situating the UCAS™ Dataset within the Ontario PSE Data Landscape**
- **Brief 1: Regional Disparities in Transfer Intent Among Ontario College Applicants: Insights from Academica's University/College Applicant Survey™**
- **Brief 2: Does Socio-Economic Background Matter? A Look at Pathways into Ontario Colleges**
- **Brief 3: Applicant Pathways into University: Do High School Grades Matter?**

It is our hope that this statistical research will advance transfer research and instigate useful discussions at multiple levels within policy and administrative circles.

Introduction¹

Canadian research has consistently found that university graduates outperform college counterparts across a range of labor market metrics (e.g., Dhuey, Seward & Walters, 2021; Ferrer and Riddell 2002; Finnie, Dubois & Miyairi, 2020; Boothby & Drewes, 2006; St-Denis, Boujija & Sartor 2021).² It is thus perhaps not surprising that access to university is highly coveted in Canada and internationally (Davies & Pizarro Milian, 2016). This has led many Canadian social scientists to empirically examine the factors associated with university access (e.g., Finnie, Wismer & Mueller, 2015; Frenette, 2007; 2017; Robson, Anisef, Brown & George, 2018). However, research exploring the uptake of disaggregated transfer pathways into universities within Ontario is limited, in large part due to the absence of longitudinal data sources capturing K-12 to postsecondary transitions (Robson, 2021). In the absence of robust longitudinal data sources, Ontario research analyzing pathways into universities has been dominated by studies drawing on (i) the college Graduate Satisfaction Survey (GSS) (McCloy, Steffler & Decock, 2017; Steffler, McCloy & Decock, 2018), (ii) an assortment of custom linkages (e.g., Davies & Pizarro Milian, 2020; Robson et al., 2018; Walters, Brown, Parekh, Reynolds & Einmann, 2021), and (iii) Statistics Canada's Post-secondary Student Information System (PSIS) (e.g., Finnie et al., 2020; Zarifa, Sano & Hillier., 2020). All these sources have notable deficiencies.³

One area of ongoing debate in this literature centres on the influence of high school grades on postsecondary pathways. Analyzing an administrative linkage between the Toronto District School Board and the University of Toronto, Davies & Pizarro Milian (2020) found that TDSB graduates with lower high school grades were more likely to enter the university by way of a community college, but university transfers had similar high school performance as direct entries. Descriptive statistics presented by Walters et al. (2021) for a TDSB-PSIS linkage also showed that students traveling direct entry pathways into Ontario universities had higher marks (79%) in Grade 12 than lateral transfer (76%) or college-to-university (65%) counterparts. On the other hand, work by Steffler et al. (2018) with a custom linkage between Seneca and York found that high school grades were negatively correlated with the desire among college entrants

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²For an alternative set of findings, see Frenette (2019).

³The GSS captures only the transitions of graduates that go on to university within the six months following college graduation, missing those that transfer prior to graduation or later in the life course. The latter is a particularly notable limitation, given that credential accumulation plays out over long stretches of time (St. Denis, Boujija & Sartor, 2021). On the other hand, available custom K-12 to PSE linkages in Ontario capture only Toronto District School Board (TDSB) students and are thus not provincially representative. Meanwhile, the PSIS lacks extensive coverage of student demographics.

to eventually transfer to a university (e.g., transfer intent), but that their Seneca GPA was positively correlated with eventual transfer. The findings of these studies contrast those of earlier Canadian research with the Youth in Transition Survey (YITS), which did not identify any high school grade or reading proficiency effects on the likelihood of program switching (Childs, Finnie, & Martinello, 2017).⁴ Unfortunately, this topic is not one that has been explored through recent ONCAT-funded work (e.g., Zarifa et al., 2020) with Statistics Canada's Post-Secondary Student Information System (PSIS), given that such data currently lacks proxies of academic performance – such as grades and standardized tests scores – at either the K-12 or PSE levels in Ontario. As such, making progress on this front will require the continued use of creative “workarounds.”

Through this brief, we explore the relationship between high school grades (academic achievement) and the pathways travelled by applicants into Ontario universities using Academica's University/College Applicant Survey (UCAS™). This is a dataset that contains impressive coverage of not only high school grades, but also, a host of demographic characteristics that could serve as confounding variables. Our analysis finds that the probability of traveling a college-to-university pathway decrease as H.S. grades rise. Meanwhile, the opposite is true for direct entry and university-to-university transfer, with the odds of traveling those pathways increasing as H.S. grades increase. We consider the implications of these findings for both future research and policy in Ontario.

Plan for Analysis

This brief empirically explores two main questions:

- 1) Do applicants taking various routes (direct entry, college/university transfer) into university differ with respects to their high school grades?
- 2) Does the relationship between high school grades and pathways into university survive controls for other applicant characteristics?

Two waves of analyses are performed. First, we provide a descriptive overview of H.S. grades among the roughly 46,000 UCAS respondents who resided in Ontario and applied to university during the 2013-2019 period. This first analytical sample includes only those applicants who would be aged 40 or younger by September 1st of the forthcoming academic year, and who did not contain missing data on either their age or postsecondary history (e.g., most recent institution enrolled in).

⁴We do not discuss American research at length, but it too has found that those engaging in upward transfer tend to have lower high school performance than direct entry counterparts (e.g., Dietrich & Lichtenberger, 2015; Grubbs, 2020).

Second, multinomial logistic regression was used to regress applicant pathways on H.S. grades among the sub-sample of 28,300 applicants with complete data across a broader of controls, including: age, gender, ethno-racial groupings, disability, marital status, dependents, parental education, household income, place of birth, region of residence, primary language, type of high school attended, primary program area applied to, and year applied.

To produce a disaggregated applicant pathways category, we utilize a variable identifying the type of institution that the individual was enrolled in during the last calendar year, including (1) high school, (2) college or polytechnic, and (3) university. Such variables allow us to focus on student mobility, and those applicants most likely (but not guaranteed) to be seeking transfer credit at the receiving institution. Our focal predictor is self-reported grades in the final year of high school, a continuous measure that ranges from 50 to 100% in our analytic sample.⁵

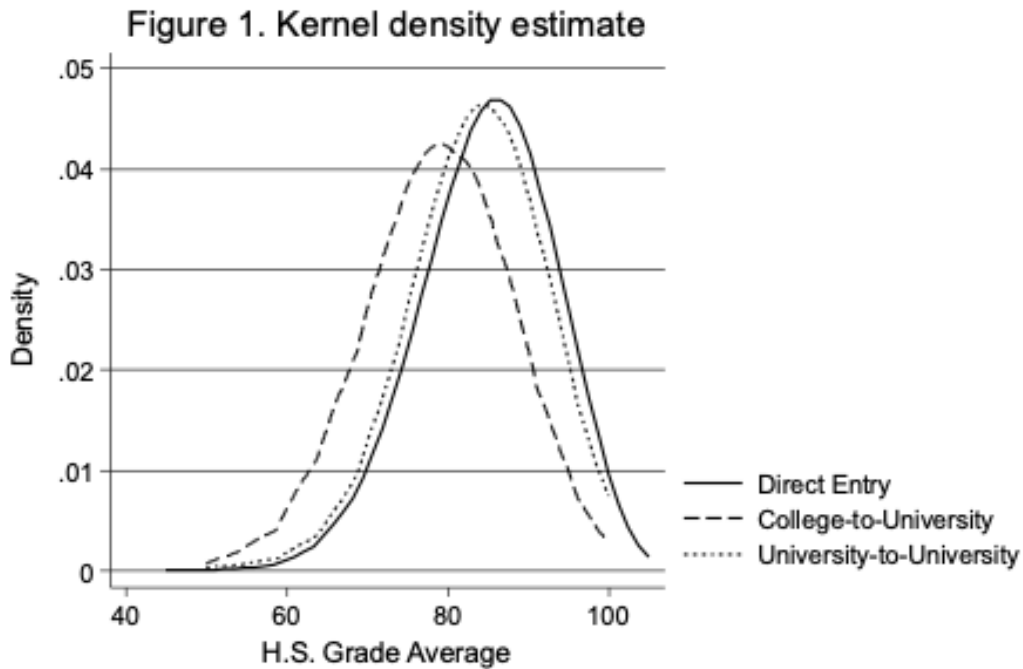
Findings

Descriptive Statistics

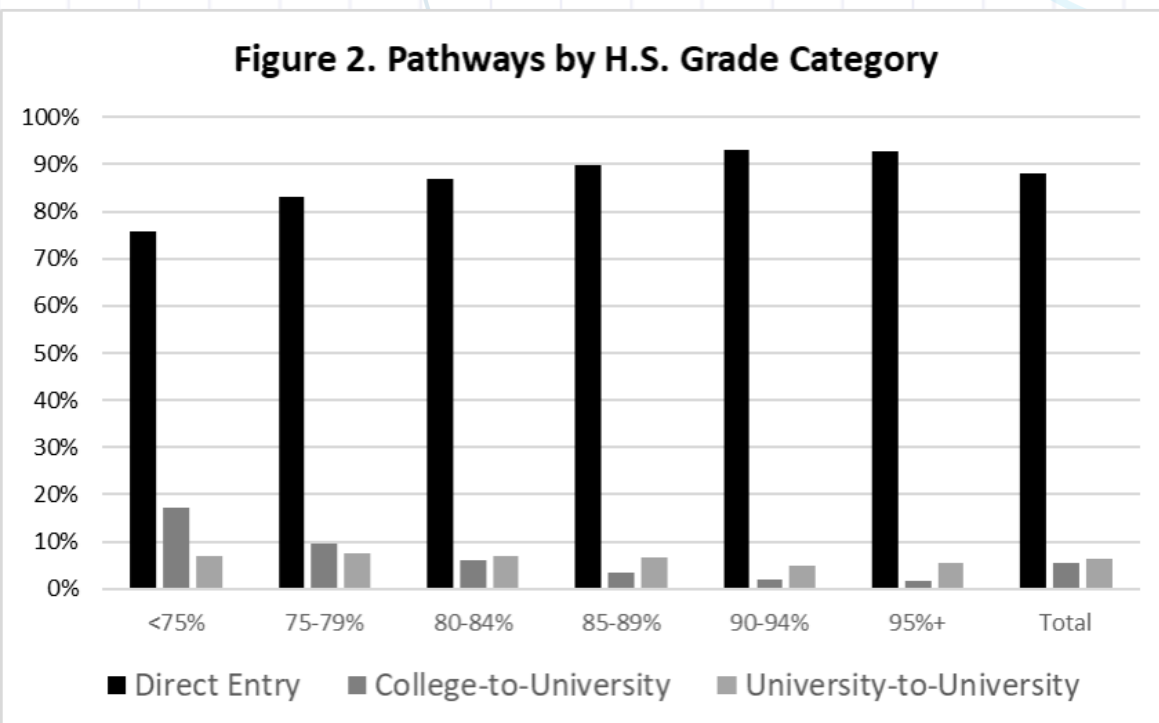
Descriptive statistics reveal mean differences in the H.S. grades of applicants traveling different pathways into universities. Those applying directly from high school tend to have the highest average (84.9%), followed by those applying from another university (83.5%), and then those applying from a college (78.7%). This general ordering of categories closely mirrors those observed by both Davies & Pizarro Milian (2020) and Walters et al. (2021) despite the vastly different sampling frames used.

Visualizing the grade distribution by group also reveals important differences. We see that the distributions for direct entry and university-to-university applicants are quite similar in shape, with the average simply differing by less than 2 percentage points. However, the grades of college-to-university transfers are not only lower, but the distribution is more “spread out.” It is important to emphasize that, despite the noted differences, there is considerable overlap in the grade distributions across applicant categories. Hence, there are many applicants with comparable grades within each group.

⁵We experimented with various ways of coding grades, including both the natural log and quintiles of grades. All of these rendered the same general results, serving as additional evidence that observed relationships weren't an artifact of any given coding of the predictor.

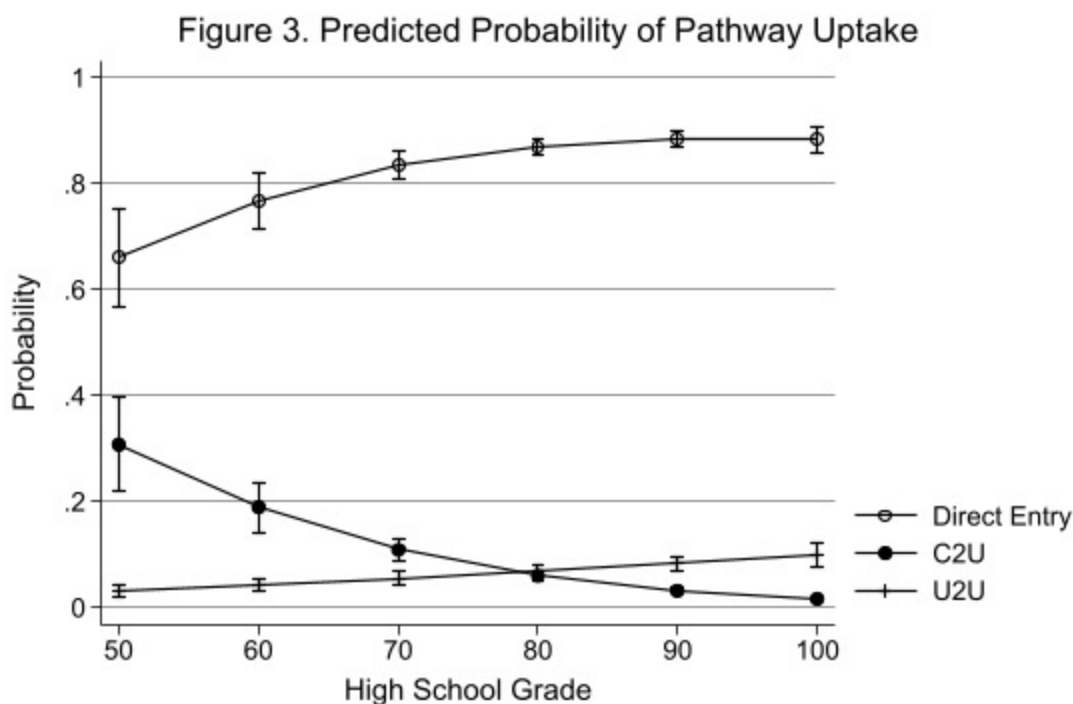


Another useful way to display the relationship between applicant pathways and H.S. grades is to plot the percentage of students applying through the various pathways across segments of the H.S. grade distribution (Figure 2). Again, we see that the percentage of direct entry students tends to increase with grades. Meanwhile, the percentage of college transfers decreases with grades. The same pattern is also true for university transfers, but the drop is less pronounced.



Regression Analyses

To assess whether the above-mentioned differences would persist after controlling other applicant characteristics, such as age and gender, we ran regression models to estimate the net relationship between reported H.S. grades and applicant pathways into university. In Figure 3, we plot the results of this modeling: the predicted probability that an applicant will travel each pathway into university across various points of the grade distribution.⁶ As with our descriptive analyses, we find that the predicted probability of applying via the C2U pathway decreases markedly as grades improve, while the likelihood of applying via direct entry or U2U pathways increases with grades.⁷



⁶These predicted probabilities assume the applicant would be aged 19 at the start of the next academic year, and sample means across all other variables in our regression model. The age specification here is important, as our pathway variable does not meaningfully vary at the lower age ranges (since those students have not yet had the opportunity to transfer).

⁷A final set of robustness checks were conducted to test for independence of observations. We re-ran the saturated models for single application years to assess whether observed trends would remain consistent to model that included all years. We observed little change from full model when looking at specific years, although some years slightly modified results given their smaller sample sizes.

Discussion

Our analyses suggest that individuals applying to Ontario universities through the various available pathways differ with respects to their H.S. grades. Direct entry and university transfer applicants tend to report higher grades than transfers originating from college. One potential interpretation of the observed trends is that those traveling the college-to-university pathway are comparatively lower-achieving students in high school. They may have been unable to gain admission to their preferred university programs directly after high school, and thus, traveled “roundabout” pathways to their university program of choice. The reason why university transfers do not differ markedly from direct entry applicants with respects to HS academic performance may be that their lateral movement to another university is perhaps motivated by factors other than academics. Perhaps it is the function of a poor social fit at their initial university, or to access a field of study not offered at their current institution. Of course, further research is required to better understand the dynamics behind these observed trends.

What are the practical implications of these findings? For starters, we need to acknowledge that college-to-university transfers may need more academic support once they arrive at university than their counterparts traveling other routes. As such, universities need to invest not only in the recruitment and admission of these students, but also, establishing protocols to ensure they receive the timely academic support and guidance that they need. In the absence of such efforts, college-to-university students may struggle academically. Our interpretations of these findings are supported by recent ONCAT-funded research (Davies & Pizarro Milian, 2020; Walters et al., 2021) drawing on various custom linkages, which finds that college-to-university transfers have lower university graduation rates than their direct entry and university transfer counterparts.

A key limitation of this analysis is that we cannot distinguish the extent to which grades in the final year of H.S. are from either university or college stream preparatory courses. As such, there are likely further qualitative differences between the grades of college-to-university and other applicants that we cannot control for. Future research, drawing on administrative data from school boards, should be able to control for the academic stream that students were on during their final year of high school. Lastly, while self-reported GPA's have been found to closely approximate actual grades (Kuncel, Credé, Thomas, Klieger, Seiler & Woo, 2005), there is always the possibility that there is some reporting bias, particularly among lower achieving students. This further emphasizes the need for further work on this topic with administrative records.

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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.