



Transfer Pathways among Ontario Colleges and Universities

The Magnitude of Postsecondary Transfer Types and the Characteristics of Those Who Transfer

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Overview of the Study

Student transfer has become much more prevalent in recent years, as higher education enrollment patterns become increasingly complex. For some, obtaining a degree or diploma in today's postsecondary system is the product of multiple starts and stops, and includes attendance at multiple postsecondary institutions. More and more students are balancing multiple life obligations with their schooling (e.g., work, family), leading to an increasing number of pathways in their pursuit of degrees, diplomas, and certificates. This study uses administrative data from Statistics Canada's Postsecondary Student Information System (PSIS) (2009 to 2016) linked to T1 Family File tax data to examine the types of transfer across Ontario's colleges and universities. The PSIS data constitutes a census of all students enrolled in Ontario colleges and universities, enabling analysis of the magnitude of the following pathways: college to university, university to college, college to college, university to university, non-transfer university, non-transfer college, and swirlers. It also examines the characteristics of those who transfer within Ontario's postsecondary system.

"Aside from studies examining transfer pathways in a single institution, few existing academic or policy reports have investigated the types of students who transfer among Ontario colleges and universities, nor have we fully understood the characteristics of students who are most likely to transfer during their postsecondary journeys."

Key Findings

- The most prominent postsecondary pathway is non-transfer university students (76.17%), followed by non-transfer college students (15.86%), university to college transfers (2.15%), college to university transfers (2.03%), university to university transfers (1.73%), college to college transfers (1.52%), and swirlers (0.55%).
- Older students are more likely to take most of the transfer pathways, including university to university, college to college, college to university, and swirling, compared to younger students, while younger students were more likely to transfer from a university to a college and take the non-transfer university pathway.
- Compared to male students, female students are less likely to take many of the transfer routes (university to college, college to university, college to college, and swirling). However, female students were more likely than male students to either stay within the same university or transfer across universities.

- Lower parental income generally predicts higher odds of transferring from university to university, university to college, college to university, college to college, swirling, and not transferring from college, as well as lower odds of staying within the same university.
- Arts and humanities students show the highest probabilities of transferring from university to university, university to college, and swirling, whereas health majors show the highest probability of transferring from one college to another and for transferring from college to university. Compared to those from Southern Ontario institutions, students from Northern Ontario institutions have higher odds of transferring from university to university, are about half as likely to transfer from college to university, more likely to swirl, and less likely to transfer from college to college.

Introduction

Attending college or university has become increasingly important for securing more favourable workforce outcomes in today's knowledge-driven economy. Many stakeholders are looking for ways to enhance the participation of traditionally underrepresented groups. Policymakers and government officials are doing so with the hope of satisfying the ongoing and future skills demands of the workforce (Miner, 2010, 2012). At the same time, education officials and institution administrators are seeking cost-efficient ways to reduce attrition and dropout and boost retention, completion, and timely completion rates (Snowdon & Brady, 2018; Tricks, 2013).

Student transfer has become much more prevalent in recent years, as enrollment patterns become increasingly complex. As new populations enter the higher education system (e.g., older, first-generation, married), and as they are often balancing multiple obligations with their schooling (e.g., work, family), more and more students are taking multiple twists and turns to secure their degrees, diplomas, and certificates (Davies & Mehta, 2018; Deil-Amen, 2015). This trend underscores the need for data-driven research that maps out these less traditional pathways through higher education. Aside from studies examining transfer pathways in a single institution, few existing academic or policy reports have investigated the types of students who transfer among Ontario colleges and universities, nor have we fully understood the characteristics of students who are most likely to transfer during their postsecondary journeys.

This research fills this apparent gap in our understanding by analyzing administrative data from Statistics Canada's Postsecondary Student Information System (PSIS). The article will first examine the overall magnitude of transfers and transfer types relative to direct entry students in Ontario's postsecondary system. Next, the analysis will reveal which student characteristics are related to the various types of transfer pathways. Finally, the analysis will turn to multinomial logistic regressions to examine the relative impact of students' characteristics on postsecondary transfer types.

Transfer Types and Prevalence: Which Pathways Are Postsecondary Students Taking in Ontario?

Prior research in Canada and the United States has identified several possible types of student pathways. Since transfer students comprise a relatively small proportion of postsecondary students, the type of transfer explored in existing research has been unequivocally related to sample size (e.g., see Finnie, Dubois, & Miyairi, 2017). Several studies have examined students who begin in a college diploma program and then proceed to graduate from a university degree program (Acai & Newton, 2015; Budd & Stowers, 2015; Crisp, 2017; Decock, 2004; Dougherty & Keinzl, 2006; Gerdhardt & Ackerman, 2014; Hurlihay, 2012; Lang & Lopes, 2014; Morrin, 2011; Roksa & Calcagno, 2008; Smith et al., 2016; Trick, 2013; Wang, 2012). Other studies have looked at transfer from university degree programs to college diploma programs (Goldrick-Rab and Pfeffer, 2009; Ishanti & Flood, 2018; Jenkins & Fink, 2016; Johnson & Muse, 2012; Kalogrides & Grodsky, 2011; Smith et al., 2016). A third, albeit smaller, body of literature has examined 'lateral transfers,' or pathways within the same postsecondary section, where students transfer from one college to another college or from one university to another university (Andrews, Li, & Lovenheim, 2014; Goldrick-Rab & Pfeffer, 2009). Finally, some researchers and education officials have alluded to further complexity among student pathways and now classify some students as 'swirlers' or 'shoppers,' a situation where students experience multiple starts and stops across or within sectors (McCormick, 2003).

In this section, we examine the prevalence of five types of transfer in Ontario's postsecondary system and construct a measure to capture the following seven categories: 1) college to university transfers (CU); 2) university to college transfers (UC); 3) college to college transfers (CC); 4) university to university transfers (UU); 5) non-transfer college students (NTC); 6) non-transfer university students (NTU); and 7) swirlers (i.e., those students who changed their institutions more than once within two years).

As shown in Figure 1, not surprisingly, the largest proportions of postsecondary students did not transfer within two years of beginning their postsecondary studies: NTU (76.17%) and NTC (15.86%). Still, nearly 8% of students did transfer, and among those students, the greatest proportions transferred across postsecondary sectors—either from university to college (2.15%) or college to university (2.03%). Interestingly, lateral transfers were less common (UU, 1.73%; CC, 1.52%). Swirlers was the least common pathway among Ontario students (0.55%). Additional characteristics of the PSIS-T1FF data set are shown in Table 1.

The Characteristics of Those Who Transfer in Ontario: The Socio-demographic Antecedents of the Various Types of Postsecondary Pathways

Existing research suggests that the characteristics of students who transfer from college to university, university to college, college to college, and university to university vary considerably. In Canada, only a handful of studies empirically map out the characteristics of those who transfer, and many such studies focus on single institutions and articulation agreements (Acai & Newton, 2015; Decock, 2004; Smith et al., 2016; Stewart & Martinello, 2012) rather than draw upon a census of all college and university students in Ontario as we do here.

For instance, Acai and Newton (2015) studied Guelph-Humber college to university transfer and direct-entry students. Their results found few differences attributable to learning approaches, use of available learning resources, and academic performance, but did point to male students, older students, and aspiring teachers as being more likely to take the transfer pathway into the University of Guelph. Smith and colleagues (2016) examined the characteristics of transfer students from Seneca College to York University and from York to Seneca. Both college to university and university to college transfer students were markedly similar in terms of a number of characteristics. For instance, transfer students were more likely to be female, Canadian citizens, under 25, French- or English-speaking, have at least one parent with a postsecondary education, and majoring in social sciences, business, and the humanities. Finally, Stewart and Martinello (2012) drew upon administrative data at Brock University and found college to university transfers were more prevalent among the social sciences, and university to university transfers more common in general studies, mathematics, and the sciences. Unfortunately, their data lacked sociodemographic characteristics to look beyond program information.

One recent exception examines the 2009 entry cohort of PSIS students and focuses on the student and program characteristics of those who transfer across universities in Ontario (Finnie, Dubois & Miyairi, 2020). Ultimately, field of study was shown to be the most prominent feature related to student transfer, with the humanities standing out as the field most associated with mobility, whereas architecture, engineering, and related technologies as fields with lower rates of student mobility.

A larger body of research exists in the United States and points to additional characteristics that might also impact student transfer types and postsecondary pathways (Budd & Stowers, 2015; Dougherty & Keinzl, 2006; Goldirck-Rab & Pfeffer, 2009; Ishitani & Flood, 2018; Kalogrides & Grodsky, 2011; Wang, 2012). A number of studies examine students who transfer out of a community college and into a four-year university program. Largely, students who were enrolled full-time, younger than 18 at the start of their program, enrolled in an academic

program (vs. an occupational major), not working, without children, and coming from higher socio-economic backgrounds were all significantly more likely to transfer (Dougherty & Keinzl, 2006; Roksa & Calcagno, 2008; Wang, 2012). Existing evidence for race as a key socio-demographic determinant of transfer patterns has been mixed, with some studies finding no differences (e.g., Dougherty & Keinzl, 2006), and others finding African-American and Hispanic transfer rates to be comparatively lower (e.g., Budd & Stowers, 2015; Crisp, 2017; Wang, 2012).

Other work has looked at university to college transfer and found socio-economic background also plays a role in this form of transfer, with lower socioeconomic students more likely to transfer (Goldrick-Rab & Pfeffer, 2009; Jenkins & Fink, 2016; Kalogrides & Grodsky, 2011). Educational expectations, educational aspirations of peers in high school, and college academic performance were also shown to at times moderate the effects of parental socio-economic background (Goldrick-Rab & Pfeffer, 2009). Similarly, Ishitani & Flood (2018) found those with higher GPAs and higher admissions test scores were less likely to transfer. Females typically have been shown to have lower rates of this form of transfer (Ishitani & Flood, 2018; Johnson & Muse, 2012), while Asian and Hispanic students show mixed effects (Ishitani & Flood, 2018).

Bivariate Analysis Between Characteristics and Transfer Types

Table 2 shows the results from our bivariate analyses with key characteristics identified in the existing research above. Overall, our bivariate results suggest that transfer types are significantly related ($p < .001$) to several demographic, program, family, and location characteristics. In this section, we discuss how various groups across these characteristics are represented across the categories of our transfer type variable.

In terms of age, Figure 2 reveals that younger, traditionally-aged students (those ages 21 or under) show comparatively lower percentages across transfer categories, with the exception of university-college transfers. Specifically, smaller proportions of younger students (21 or younger), compared to older students (22 or older), are categorized as UU (1.72% vs. 1.82%), CU (1.79% vs. 3.67%), CC (1.43% vs. 2.2%), and swirlers (0.53% vs. 0.68%), although this pattern is reversed for UC (2.20% vs. 1.80%). For non-transfer students, the results are mixed, with older students showing higher percentages of non-transfer college (31.22% vs. 13.67%) and younger students more likely to take the non-transfer university pathway (78.66% vs. 58.6%).

Our results in Figure 3 also point to different patterns in transfer types by sex. Specifically, the results suggest that larger proportions of female students are either entering the university sector without transferring (NTU, 78.18% vs. 73.82%) or are transferring into and across the university sector more so than male students (CU, 2.20% vs. 1.82%; UU, 1.87% vs. 1.57%), whereas males show comparatively higher percentages of non-transfer college (NTC, 18.48% vs. 13.6%), lateral transfer across colleges (CC, 1.57% vs. 1.49%), and transfer into colleges

(UC, 2.19% vs. 2.11%). For swirlers, male and female students show similar percentages (0.54% vs. 0.55% respectively).

Prior research suggests that family socio-economic status may be an important predictor of postsecondary pathways. Indeed, the PSIS data supports this notion (see Figure 4). Students from the higher parental income categories showed increasingly higher percentages in terms of the NTU pathway (increasing from 71.25% to 85.63%). The percentages taking the CU, NTC, UC, and swirler routes decreased for higher income families, while the percentages taking the NTU pathway increased with parental income. In terms of lateral transfers across universities, the results appear to be mixed with a somewhat positive relationship with parental income.

For program characteristics, Figure 5 shows larger proportions of students who started their postsecondary educational career as full-time in the CU (2.06% vs. 1.41%) and NTU (76.47% vs. 69.79%) pathways compared to their part-time counterparts. Conversely, smaller proportions of full-time students made lateral moves across universities or colleges (UU, 1.61% vs. 4.23%; CC 1.52% vs. 1.57%), transfers from university to college (2.00% vs. 5.33%), and multiple transfers (swirlers, 0.52% vs. 1.15%). Interestingly, full-time students also showed lower percentages of non-transfer college pathways (15.83% vs. 16.52%).

For field of study, several findings of interest also emerge (see Figure 6). First, students whose field of study is health-related had the highest percentages taking college to university (3.75%), college to college (2.58%), and non-transfer college (20.11%) pathways but the lowest proportions transferring across universities UU (0.96%), from university to college (1.21%), and non-transfer university (70.84%). Students in the arts and humanities were most likely to transfer from university to university and from a university to a college. Students whose field of study is in the natural sciences showed the lowest percentage across swirlers (0.43%).

Two family-related variables (i.e., family composition and family size) are also important in understanding transfer types. In Figure 7, we find that smaller portions of students with lone-parent family are categorized as UU (1.70% vs. 1.74%) and NTU (70.32% vs. 76.96%) than their counterparts from two-parent families, although this pattern is reversed for UC (2.39% vs. 2.11%), CU (2.59% vs. 1.95%), CC (2.04 vs. 1.45%), NTC (20.28% vs. 15.26%), and swirlers (0.67% vs. 0.53%). Moreover, in Figure 8, students from larger families (4 or more) are more likely to take the UU (1.76% vs. 1.67%), UC (2.19% vs. 2.04%), and NTU (77.85% vs. 72.24%) pathways than those with smaller family size (three or fewer).

Finally, in terms of regional differences, prior research suggests that students in the northern areas of Canada may have different educational trajectories than their southern counterparts (see Hango et al., 2019; Zarifa, Hango, & Pizarro Milian, 2018a). Figure 9 compares the proportions of students from Northern and Southern Ontario institutions across our transfer type categories. Overall, larger portions of students from northern institutions are transferring laterally across universities (2.31% vs. 1.71%), and are more likely to take the non-transfer university pathway (78.40% vs. 76.06%). They also show higher percentages of swirlers

swirlers (0.74% vs. 0.54%) than their southern counterparts. Conversely, smaller proportions of northern students are transferring across universities and colleges in either direction (UC, 2.10% vs. 2.15%); CU, 1.84% vs. 2.04%), transferring from college to college (1.42% vs. 1.53%), and not transferring from a college program (13.19% vs. 15.98%).

Multinomial Logistic Regression Analysis of Transfer Types

Our bivariate analyses discussed above are useful in estimating the gross impact of student characteristics on transfer type variables. However, to further estimate the net impact of each of the characteristics simultaneously, we turn to our multivariate analysis, consisting of multinomial logistic regressions as well as predicted probabilities and 95% confidence intervals. The results for the multinomial logistic regressions are shown in Table 3 and the predicted probabilities derived from those models are shown in Table 4 and graphed in Figures 10 to 17. Largely consistent with bivariate analysis, our multivariate analysis shows that demographic, program, family, and regional characteristics are significantly associated with transfer types.

In terms of age, older students show higher odds of taking many of the transfer pathways (e.g., UU, OR=1.14, $p<0.001$, CU, OR=2.61, $p<0.001$, CC, OR=1.94, $p<0.001$, and swirlers, OR=1.46, $p<0.001$) as well as the non-transfer college route (OR=2.92, $p<0.001$) compared to taking the non-transfer university route. However, older students showed lower odds of transferring from university to college (UC, OR=0.84, $p<0.001$). When comparing the predicted probabilities in Figure 10, we can see that younger students have a higher probability of transferring from university to college whereas older students have a higher probability of transferring from college to university. As well, younger students show comparatively higher probabilities of either not transferring from university or doing so to another university, whereas older students show higher probabilities of staying at the same college or transferring from college to college.

For sex, female students are less likely than male students to take many of the transfer routes (UC, OR=0.87, $p<0.01$; CU, OR=0.93, $p<0.001$, CC, OR=0.78, $p<0.001$; NTC, OR=0.67, $p<0.001$), and swirlers, OR=0.85, $p<0.001$) than take the non-transfer university pathway. One exception is that they were more likely to transfer across universities than male students (UU (OR=1.11, $p<0.001$)). Figure 11 sheds additional light on these differences by plotting the predicted probabilities. Overall, female students show higher probabilities of staying within the university sector for their postsecondary education as well as higher probabilities of transferring into the university sector from a college program compared to males.

For parental income, our findings mirror those of our bivariate results above, as higher parental income generally predicts lower odds of taking the UU, UC, CU, CC, NTC, and swirler pathways in comparison to the non-transfer university route. However, students from middle (OR=1.08, $p<0.01$) and lower parental income (OR=1.11, $p<0.001$) categories are more likely to transfer from university to college compared to those from the lowest income category. Interestingly, the predicted probabilities in Figure 12 show evidence that perhaps the positive and negative

relationships between parental income and the university and college non-transfer pathways appear to be non-linear, where probabilities of taking the non-transfer university path increase exponentially with family income, and the probabilities of taking the non-transfer college route decline exponentially with family income.

Program characteristics are also significantly associated with transfer types ($p < .001$). Compared to full-time students, part-time students are more likely to transfer across universities ($OR = 2.62$), from university to college ($OR = 2.99$), and be categorized as a swirler ($OR = 1.92$) than take the non-transfer university pathway. Additionally, part-time students are less likely to transfer from college to university ($OR = 0.40$), across colleges ($OR = 0.73$), and stay at the same college ($OR = 0.64$, $p < 0.001$). Moreover, in Figure 13, we can see that the relative differences in probabilities across groups are largest for the UU and UC transfer categories. In other words, part-time university students show higher probabilities of switching to another university or to a college compared to full-time students. At the same time, part-time students are nearly twice as likely to become swirlers than full-time students ($OR = 1.01$ vs. 0.52).



“Our focus on north and south comparisons is also the first of its kind and offers new evidence for conversations about the creation and exploration of new credit transfer pathways, initiatives, and support networks among Ontario’s northern institutions.”

For field of study, compared to those who major in arts/humanities, students who major in health are less likely take the UU ($OR = 0.43$, $p < 0.001$), UC ($OR = 0.43$, $p < 0.001$), and swirling pathways ($OR = 0.81$, $p < 0.001$) but are more likely to take the CU ($OR = 2.43$, $p < 0.001$), CC ($OR = 1.83$, $p < 0.001$), and NTC ($OR = 1.52$, $p < 0.001$) routes over the non-transfer university route. Moreover, students who major in natural sciences are less likely to transfer from university to university ($OR = 0.65$, $p < 0.001$), university to college ($OR = 0.56$, $p < 0.001$), college to university ($OR = 0.38$, $p < 0.001$), across colleges ($OR = 0.65$, $p < 0.001$), stay at the same college ($OR = 0.97$, $p < 0.01$), and swirl ($OR = 0.59$, $p < 0.001$) than take the non-transfer university route in comparison to students who major in arts/humanities. A similar pattern emerged for students who major in social sciences. Specifically, compared to arts/humanities students, they are all less likely to be representing in UU ($OR = 0.71$, $p < 0.001$), UC ($OR = 0.73$, $p < 0.001$), CC ($OR = 0.72$, $p < 0.001$), NTC ($OR = 0.88$, $p < 0.001$), and swirling ($OR = 0.71$, $p < 0.001$) pathways than the NTU pathway but more likely to take the CU pathway ($OR = 1.14$, $p < 0.001$). Figure 14 provides an illustration of how the relative probabilities vary across fields and transfer types. In terms of non-transfer students, health majors show the lowest probability of taking the non-transfer university route while social science students show the lowest probability of taking the non-transfer college pathway. Arts and humanities students show the highest probability of transferring from university to university and university to college. They also show the highest probability of swirling. Health students show the highest probability of transferring

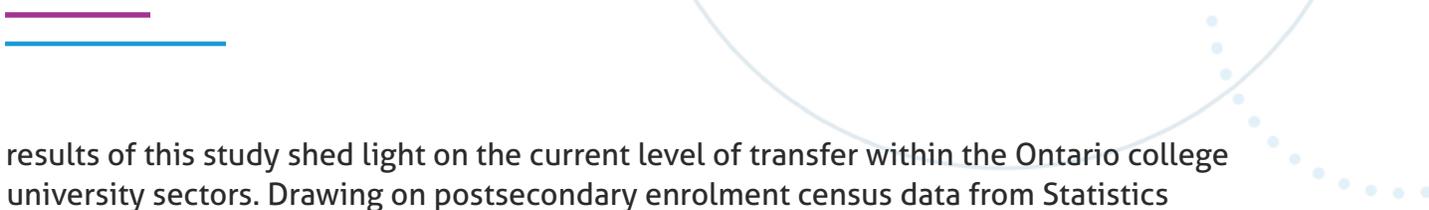
college to another and transferring from college to university. Natural science and social science students show similarly high probabilities of taking the non-transfer university route, whereas health majors show the highest probability of staying at the same college.

For family characteristics, we find that, compared to their two-parent family counterparts, students from a lone-parent family are more likely to take all other routes (UU, OR=1.07, $p<0.05$, UC, OR=1.23, $p<0.001$, CU, OR=1.14, $p<0.001$, CC, OR=1.25, $p<0.001$, NTC, OR=1.13, $p=0.001$, and swirlers, OR=1.27, $p<0.001$) than take the non-transfer university route. Further, Figure 15 shows that the relative difference across family composition is most apparent for the non-transfer route, where students from two-parent families show significantly higher probabilities.

Moreover, compared to those from small families, students from larger families are more likely to transfer across universities (OR=1.09, $p<0.001$) or from university to college (OR=1.14, $p<0.001$) than NTU but less likely to transfer from college to university (OR=0.94, $p<0.01$), across colleges (OR=0.94, $p<0.05$), or stay at the same college (OR=0.90, $p<0.001$). In addition, Figure 16 shows that students from smaller families show comparatively higher probabilities of taking the non-transfer university pathway compared to students from larger families.

Finally, in terms of institution location, several interesting findings emerge from our analyses. Our results suggest that students at Northern Ontario institutions have higher odds of transferring across universities compared to those attending Southern Ontario institutions (OR=1.21, $p<0.001$). At the same time, students at northern institutions are significantly less likely to transfer from a college to university (CU, OR=0.48, $p<0.001$), transfer across colleges (OR=0.56, $p<0.001$), and stay at the same college (OR=0.55, $p<0.001$) than they are to take the non-transfer university pathway. Figure 17 shows that students from northern institutions have significantly higher probabilities of taking the non-transfer university pathway and significantly lower probabilities of taking the non-transfer college pathway compared to those at southern institutions. Interestingly, students at northern institutions are about half as likely to transfer from college to university as their counterparts at southern institutions. Students at southern institutions are about 1.5 times more likely than those at northern institutions to transfer from college to college. In terms of swirlers, students at northern institutions show comparatively higher probabilities of taking this complex pathway.

Conclusions and Policy Implications



The results of this study shed light on the current level of transfer within the Ontario college and university sectors. Drawing on postsecondary enrolment census data from Statistics Canada's PSIS linked to family tax data, we assess both the overall magnitude of transfer within the province and identify several student characteristics that significantly impact the likelihood of transferring.

Overall, in terms of the magnitude and type of pathway, the most prominent postsecondary pathways are those that do not involve transfer, as about 76% of students stayed at the same university and about 16% of students stayed at the same college within two years of commencing their postsecondary studies. Interestingly, among those who did transfer, movement from one sector to another was more common than movement within sectors. Specifically, university to college transfer was most prevalent (2.15%), followed by college to university transfer (2.03%), university to university transfer (1.73%), and college to college transfer (1.52%). Swirlers (0.55%) comprised the least common pathway.

Our results also point to several key characteristics that influence students' chances of taking a particular pathway. First, age has a significant impact on transfer activities. Older, non-traditional age students (22 and above) are more likely to take most of the transfer pathways, including university to university, college to college, college to university, and swirling, compared to younger students. At the same time, younger students are more likely to transfer from a university to a college and take the non-transfer university pathway. This finding resonates with existing studies that find non-traditional age students encounter more difficulties completing their programs, take more complex pathways to acquire their credentials, and often take longer to do so (Deil-Amen 2015; Zarifa et al. 2018b).

In step with prior work in the United States (Ishitani & Flood, 2018; Johnson & Muse, 2012), the sex of the student also has an effect on postsecondary pathways, even once taking into consideration all other characteristics in our models. Compared to male students, female students are less likely than their male counterparts to take many of the transfer routes (university to college, college to university, college to college, and swirling). In addition, our findings revealed that female students are more likely than males to either stay within the same university or transfer across universities.

Family tax data linked to students' postsecondary information allowed us to examine the extent to which parental socio-economic status (SES) might impact student pathways. Indeed, parental SES does matter. Lower parental income generally predicts higher odds of transferring from university to university, university to college, college to university, college to college, swirling, and not transferring from college, as well as lower odds of staying within the same university. Unfortunately, our measure of parental SES is limited in two ways. First, the PSIS data lacks measures of parental occupation, parental education, and parental aspirations for their children's education to more fully grasp how parental SES or cultural capital might impact student pathways (Goldrick-Rab and Pfeffer, 2009; Kalogrides & Grodsky, 2011). Second, the PSIS data also lack measures to capture student performance or abilities, which have been shown to predict lower transfer rates in other contexts and moderate the effects of parental socio-economic background (Goldrick-Rab and Pfeffer, 2009; Ishitani & Flood, 2018).

In terms of field of study, we also uncover several key differences. Mobility was highest among arts and humanities majors as well as health majors. For instance, arts and humanities students show the highest probabilities of transferring from university to university, university to college, and swirling, whereas health majors show the highest probability of transferring from one college to another and for transferring from college to university.

Finally, our study is the first to consider how regions within Ontario might also impact student pathways. While previous studies have shown students from the northern areas of Canada experience difficulties accessing postsecondary education and majoring in the lucrative STEM fields (Hango et al. 2019; Zarifa et al. 2018a), no existing research has examined the impact that location of study might have on transfer pathways. Compared to those from Southern Ontario institutions, students from Northern Ontario institutions have higher odds of transferring from university to university, are about half as likely to transfer from college to university, more likely to swirl, and less likely to transfer from college to college. While this research does point to significant differences across the two locales, it remains unclear which students within each location may be more likely to transfer. As such, future work will investigate the characteristics of students within each of these regions as well as explore the nature and extent of north-south transfer.

Taken together, our results have three key implications for policymakers and education administrators. First, our study provides a snapshot of system-level transfer in Ontario and compares the relative magnitude of transfer both within and across university and college sectors. This information is particularly important for governments and policymakers seeking to assess overall transfer-type levels and evaluate and establish appropriate supports. Second, by identifying some of the key characteristics of those who access the various transfer pathways, we have set the stage for policymakers and administrators who are seeking data-

driven evidence to establish new articulated pathways. Information on the types of students who take each pathway is particularly important for building the appropriate supports to ensure both program and student success. For instance, we find that students with different ages, sexes, parental incomes, registration statuses, and fields of study are taking significantly different postsecondary pathways. These findings provide an empirical foundation for policy development that can be geared towards certain students who may be taking certain transfer pathways. Finally, our focus on north and south comparisons is also the first of its kind and offers new evidence for conversations about the creation and exploration of new credit transfer pathways, initiatives, and support networks among Ontario's northern institutions.

Appendix: Data Sources, Sample, Variables, and Analytical Approach

Data Sources

This study uses the Postsecondary Student Information System (PSIS) (for further details, see Statistics Canada, 2018). PSIS is administrative data collected on all public and not-for-profit postsecondary institutions funded by a provincial Ministry of Education. The data is particularly beneficial in that it provides a census of enrolments and graduates in all Canadian colleges and universities, collected annually since the 2005/2006 academic year, and yields approximately a 95% response rate. At the time of this writing, the 2016/2017 academic year is the most recent academic year available for analysis.

Another strength of the PSIS is that it includes variables about the educational institutions, student demographics, and information about the program in which the student is enrolled. They are optimal for use in this study to investigate the characteristics of students who pursue various PSE pathways in Ontario. Additionally, we use the PSIS-T1FF linkage (tax years 2004 to 2015) to draw upon additional sociodemographic variables of relevance to answering the second research question (e.g., parental income, family composition, family size).

Finally, the PSIS administrative data overcomes a number of limitations to using other nationally representative survey data to examine PSE pathways in Northern Ontario. First, small sample sizes prevent use of Statistics Canada's Youth in Transition Survey (YITS) to parse out the Ontario case. Wave attrition further complicates analyses with YITS, and data on more recent cohorts are no longer collected. Most importantly, neither the YITS nor another nationally representative survey, the National Graduates Survey (NGS), contains institutional identifiers to create "Northern" and "Southern" groupings.

Subsample and Restrictions

This study restricts our sample in important ways. For example, we limit our sample to undergraduate students from Ontario postsecondary institutions. Specifically, this study excludes students who are enrolled in professional, graduate, and postgraduate programs (see Finnie et al., 2017). In addition, there are two different ways of selecting students in the PSIS, namely the 'enrollment cohorts' and the 'graduate cohorts.' In this study, we rely on the enrollment cohorts in our analysis and track students' school and type of postsecondary education mobility over two years.

Admittedly, it would be ideal to track students' transfer types from their initial enrollment in postsecondary education until their graduation. To do so, we would need to draw our sample from the graduate cohorts that allow us to select those students who had attended a college or university program prior to graduating from a college or university program as well as those who did not attend a prior program but graduated with a college diploma or university degree. However, there are three limitations to this approach. First, our preliminary analyses revealed that the number of students included in the graduate cohorts is considerably smaller than those in the enrollment cohorts. Moreover, the PSIS has imputed aggregate information on many Ontario colleges. Unfortunately, respondents from these institutions are not available for longitudinal linkage due to a lack of record identification. Finally, coupled with these two limitations, considering our interest in students from postsecondary institutions in Northern Ontario, our sample sizes would be too small to perform the analyses presented here.

To overcome these limitations, this study uses the enrolment cohorts to understand students' transfer types.¹ Specifically, we select those students who were enrolled in a college or university program during the time of data collection and subsequently followed their institution and sector pathways for two years.² Ultimately, we capture the probability that students change their institution and/or institution type within their first two years of college or university.

This approach has several advantages. First, tracking students for two years after their initial enrolment is suitable for documenting their transfer types because transfers often happen during a relatively early stage of one's postsecondary educational career (see Johnson & Muse, 2012).

Second, this approach allows us to keep a large-enough sample size to track students' transfer, especially among those students who had started their postsecondary education from two-year colleges. We adopt this approach and track six different cohorts of students (2009–11, 2010–12, 2011–13, 2012–14, 2013–15, and 2014–16) to understand their transfer types. For example, for 2009, we first compare differences between 2009 and 2010 institution IDs and institution types. We then compare 2010 to 2011 institution IDs and institution types. Third, we combine observed differences across both comparisons and then combine into the pathway variable below. Finally, we pool all cohorts of students together, which yields an analytical sample of 432,280 students.

1. An alternative approach was first explored by extracting and linking across the graduation cohorts in PSIS. Those who graduated in a particular year (e.g., 2016) were linked to their PSIS records in the previous four years (2012 to 2016). This approach provided a glimpse into graduates' last four years of postsecondary participation but revealed far less student mobility. As such, we opted to proceed with our current approach since a significant level of transfer occurs within their first few years of postsecondary education.

2. Additional analyses (not shown here) tracked students over four years of time and pool four cohorts of students (2009 to 2013; 2010 to 2014; 2011 to 2015; 2012 to 2016), but sample sizes diminished too much over time (due to graduation from college, attrition, drop out, or stop out). Unfortunately, once students leave or graduate from their institution, they are not captured in subsequent waves of PSIS.

Dependent Variable – Transfer Type

The transfer-type variable that we create in this study includes the following seven pathways: (1) college to university transfers, (2) university to college transfers, (3) college to college transfers, (4) university to university transfers, (5) non-transfer college students, (6) non-transfer university students, and (7) swirlers (i.e., those students who changed their institutions more than once within two years).

Independent Variables – Student Characteristics

To address the second research question, directed by previous research, we include demographic, program, family, and regional characteristics in our analysis. First, demographic characteristics include age (0=younger, 21 or under); (1=older, 22 or older), sex (0=male students; 1=female students), and the quintiles of gross parental income (0=lowest; 1=lower; 2=middle; 3=higher; 4=highest). Second, we include two program characteristics: major field of study (0=arts/humanities; 1=health; 2=natural sciences; 3=social sciences; 4=other), and registration status (0=full-time; 1=part-time).³ Third, we add family characteristics such as the number of people in the family (0=smaller, 3 or fewer; 1=larger, 4 or more) and family type (0=two-parent; 1=lone-parent).

Finally, we include an additional variable to capture the location of the postsecondary institution (0=Southern Ontario; 1=Northern Ontario). As part of the limitations of the PSIS, we are not able to include students from imputed institutions. Considering that each year contains a different set of imputed institutions, we account for academic year of initial enrolment (0=2009; 1=2010; 2=2011/2012; 3=2013; 4=2014).⁴ In addition, there are several other demographic variables, such as international student status and immigration status; however, we do not include these variables due to their small sample sizes. Moreover, due to data quality issues, and under the advisement of Statistics Canada, we were also unable to make use of the following variables available in the PSIS files: total transfer credits; Aboriginal or visible minority status; mother tongue; program duration; program duration units; co-op program indicator; credits needed to graduate; program credit units; cumulative credits for program; second specialization; and end date in program. The PSIS data also lack measures of GPA or student grades to account for academic performance as well as measures of parental aspirations or parent education to account for cultural capital effects. At the same time, we are unable to account for high school education and behavioural metrics (see Davies and Pizarro Milian, 2020).

3. Our field of study measure combines both 2-digit and 4-digit CIP (Classification of Instructional Program) codes (additional details available upon request).

4. The number of swirlers was too small for 2011 to permit Statistics Canada's disclosure of our bivariate results, so we combined 2011 and 2012 categories together to examine the year of enrolment and transfer types.

Analytical Approach

To address the first research question, we use univariate analysis to obtain the overall magnitude of postsecondary transfer types (across institutions and regions) among colleges and universities in Ontario. Next, to discover the characteristics of those who transfer via the various types of postsecondary pathways, we first use cross-tabulations and chi-square tests of the independent variables by our dependent variable of transfer pathway types (i.e., college to university, university to college, college to college, university to university, non-transfer college graduate, non-transfer university graduate, and swirlers). Considering our dependent variable has seven categories, we utilize pooled multinomial logistic regression models (Long, 1997; Long and Freese, 2014) to map out the effects of the various independent variables on transfer pathways. Multinomial logistic regression models serve to provide two important facets of information on the data: (1) to identify which predictors are significantly related to the dependent variable; and (2) to indicate how strong each predictor is relative to others (Denham, 2010). Thus, these models will enable us to map out the key characteristics of those who transfer, taking into consideration the effects of all other characteristics simultaneously. To add further insights into the results, we also graph the predicted probabilities and 95% confidence intervals around those estimates.

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Figures and Tables

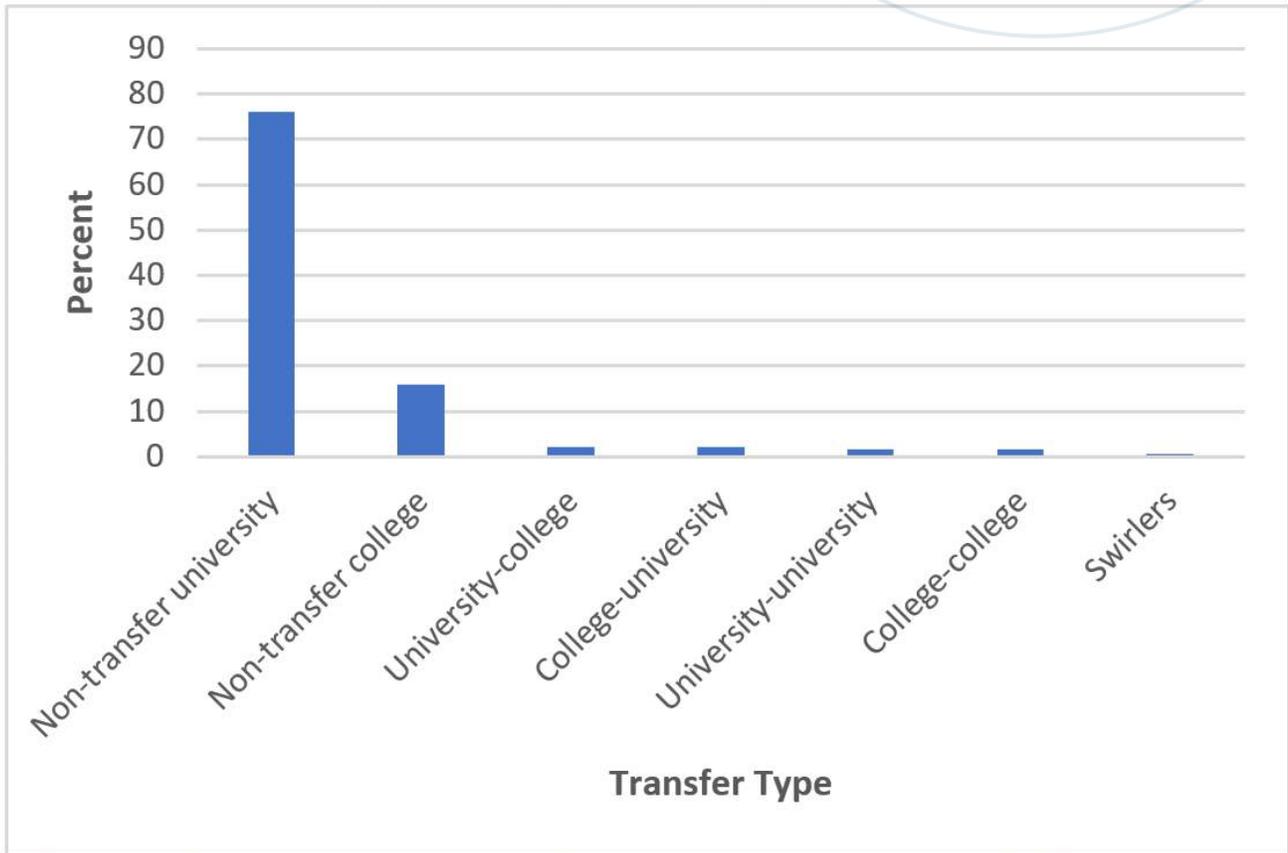


Figure 1. Pathways among Ontario Postsecondary Students, PSIS-TIFF, 2009 to 2016

	Percentage
Transfer type	
University to University (UU)	1.73
University to College (UC)	2.15
College to University (CU)	2.03
College to College (CC)	1.52
Non-Transfer University (NTU)	76.17
Non-Transfer College (NTC)	15.86
Swirlers	0.55
Age	
Younger (21 or younger)	87.57
Older (22 or older)	12.44
Sex	
Men	46.22
Women	53.78
Parental income	
Lowest	19.58
Lower	20.09
Middle	20.11
Higher	20.11
Highest	20.11
Registration status	
Full-time	95.48
Part-time	4.52
Field of study	
Arts/humanities	19.16
Health	12.06
Natural sciences	26.34
Social sciences	38.38
Other	4.06
Family composition	
Couple	88.05
Lone	11.95
Family size	
Smaller (3 or fewer)	29.94
Larger (4 or more)	70.06
Region of institution	
South	95.51
North	4.49
Year of enrolment	
2009	16.02
2010	16.85
2011/2012	33.50
2013	17.15
2014	16.48
Total	423,280

Table 1. Sample characteristics, PSIS-T1FF, 2009 to 2016

	UU	UC	CU	CC	NTU	NTC	Swirlers
Age							***
Younger (21 or younger)	1.72	2.20	1.79	1.43	78.66	13.67	0.53
Older (22 or older)	1.82	1.80	3.67	2.20	58.60	31.22	0.68
Sex							***
Men	1.57	2.19	1.82	1.57	73.82	18.48	0.55
Women	1.87	2.11	2.20	1.49	78.18	13.60	0.54
Parental income							***
Lowest	1.73	2.06	2.49	1.79	71.25	20.09	0.60
Lower	1.68	2.28	2.35	1.82	71.77	19.53	0.55
Middle	1.74	2.27	2.06	1.72	74.07	17.61	0.54
Higher	1.71	2.29	1.93	1.43	77.98	14.12	0.54
Highest	1.81	1.83	1.32	0.88	85.63	8.05	0.48
Registration status							***
Full-time	1.61	2.00	2.06	1.52	76.47	15.83	0.52
Part-time	4.23	5.33	1.41	1.57	69.79	16.52	1.15
Field of study							***
Arts/humanities	2.43	3.11	1.65	1.53	76.60	14.00	0.68
Health	0.96	1.21	3.76	2.58	70.84	20.11	0.53
Natural sciences	1.48	1.78	0.65	1.10	78.90	15.67	0.43
Social sciences	1.74	2.30	2.03	1.18	78.55	13.68	0.52
Other	2.32	1.34	7.55	4.30	49.74	33.70	1.05
Family composition							***
Couple	1.74	2.11	1.95	1.45	76.96	15.26	0.53
Lone	1.70	2.39	2.59	2.04	70.32	20.28	0.67
Family size							***
Smaller (3 or fewer)	1.67	2.04	2.37	1.75	72.24	19.35	0.58
Larger (4 or more)	1.76	2.19	1.88	1.43	77.85	14.36	0.53
Region of institution							***
South	1.71	2.15	2.04	1.53	76.06	15.98	0.54
North	2.31	2.10	1.84	1.42	78.40	13.19	0.74
Year of enrolment							***
2009	2.09	2.28	2.49	1.72	72.92	18.00	0.49
2010	2.02	2.06	2.57	1.67	74.39	16.81	0.49
2011/2012	2.00	2.09	2.10	1.29	76.69	15.40	0.42
2013	1.32	2.47	1.65	1.39	77.84	14.45	0.88
2014	0.98	1.88	1.28	1.79	78.35	15.17	0.56

*p<0.05, **p<0.01, ***p<0.001

Table 2. Bivariate analysis of the dependent and independent variables, PSIS-T1FF, 2009 to 2016

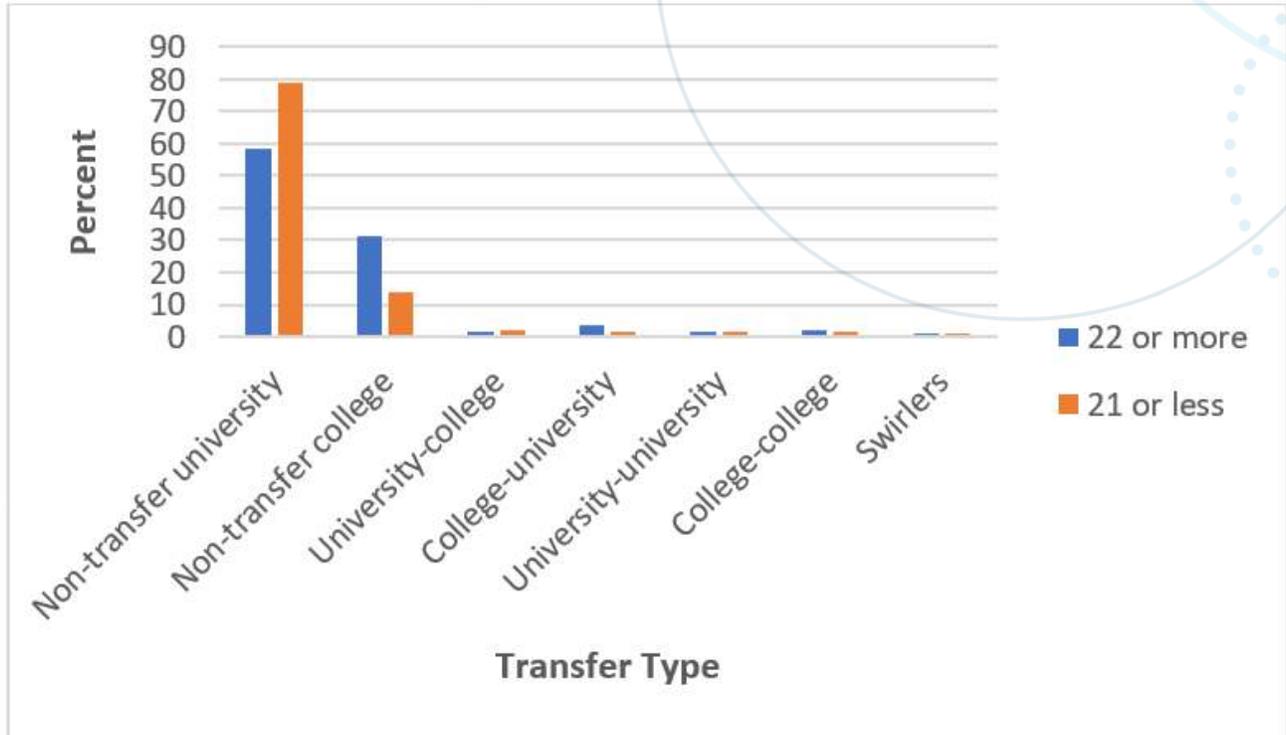


Figure 2. The Relationship between Age and Transfer Pathways, PSIS-T1FF, 2009 to 2016

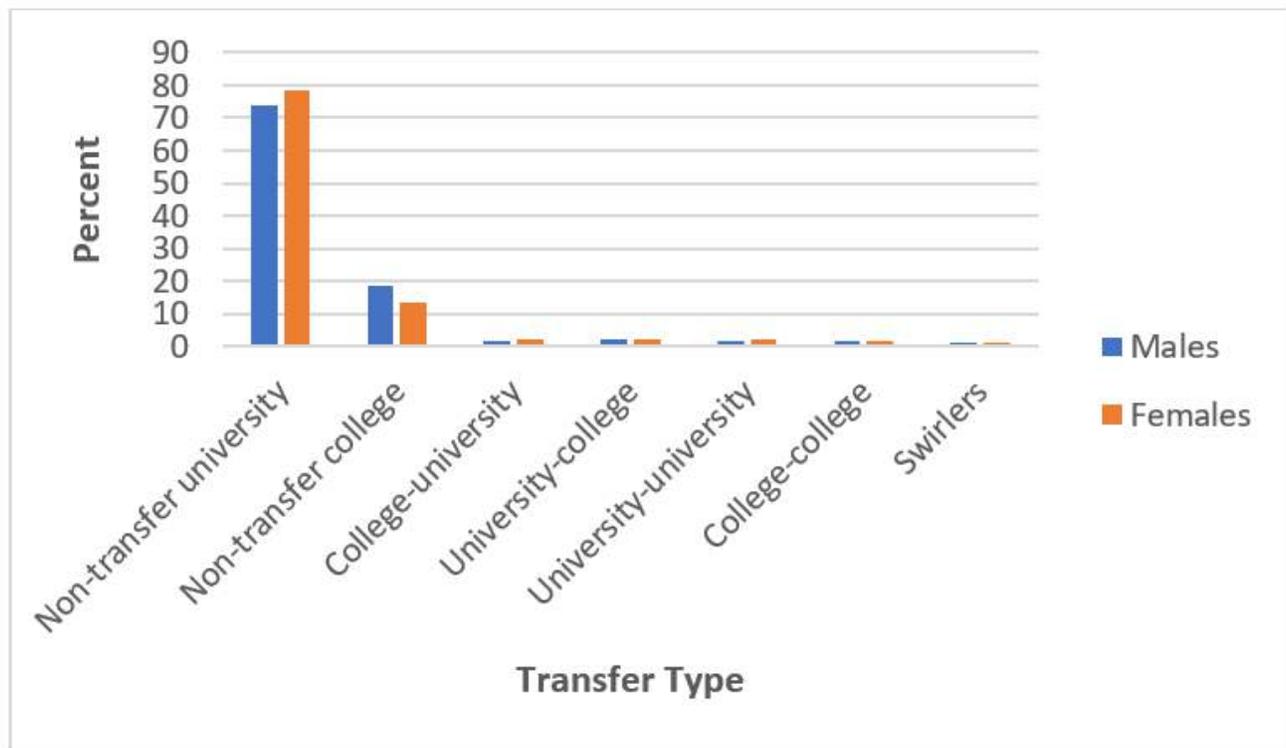


Figure 3. The Relationship between Sex and Transfer Pathways, PSIS-T1FF, 2009 to 2016

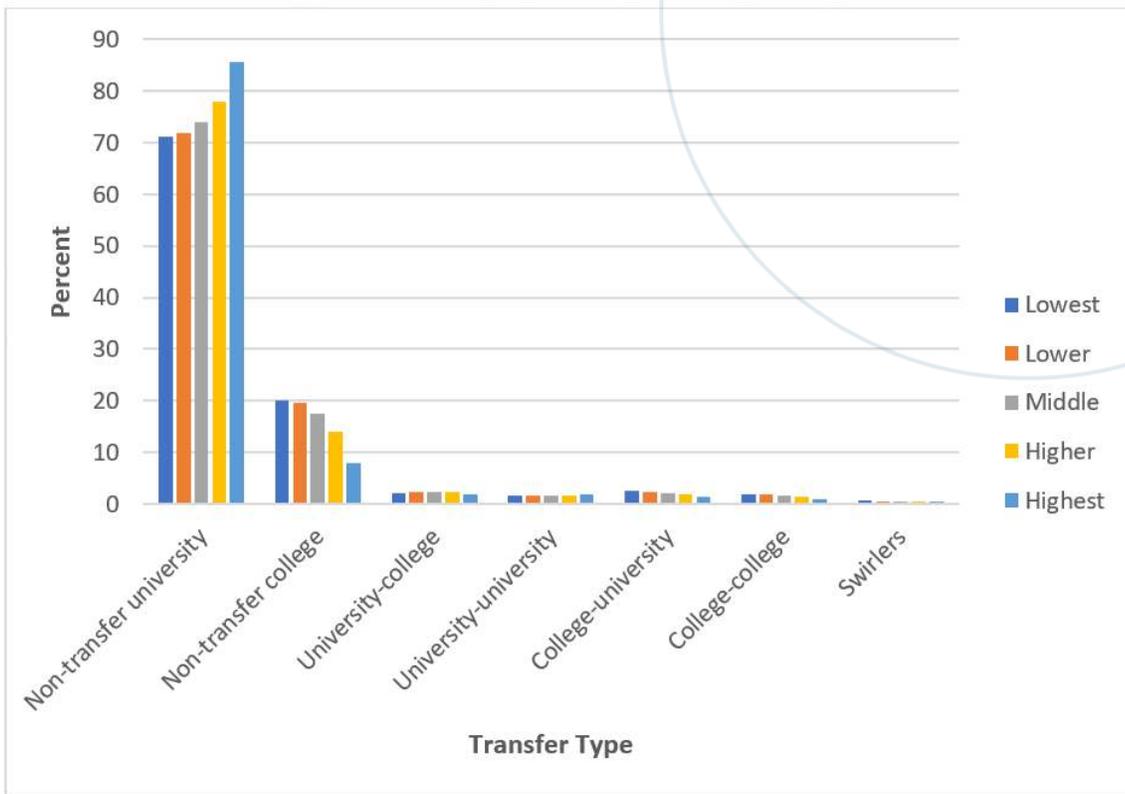


Figure 4. The Relationship between Parental Income and Transfer Pathways, PSIS-T1FF, 2009 to 2016

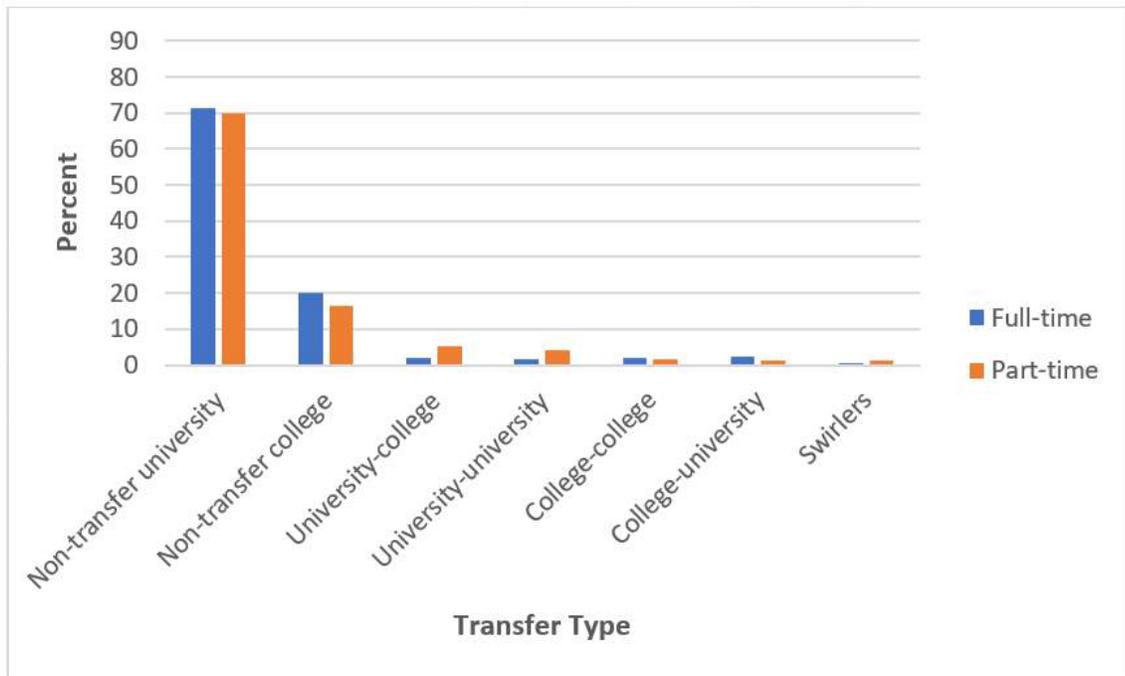


Figure 5. The Relationship between Registration Status and Transfer Pathways, PSIS-T1FF, 2009 to 2016

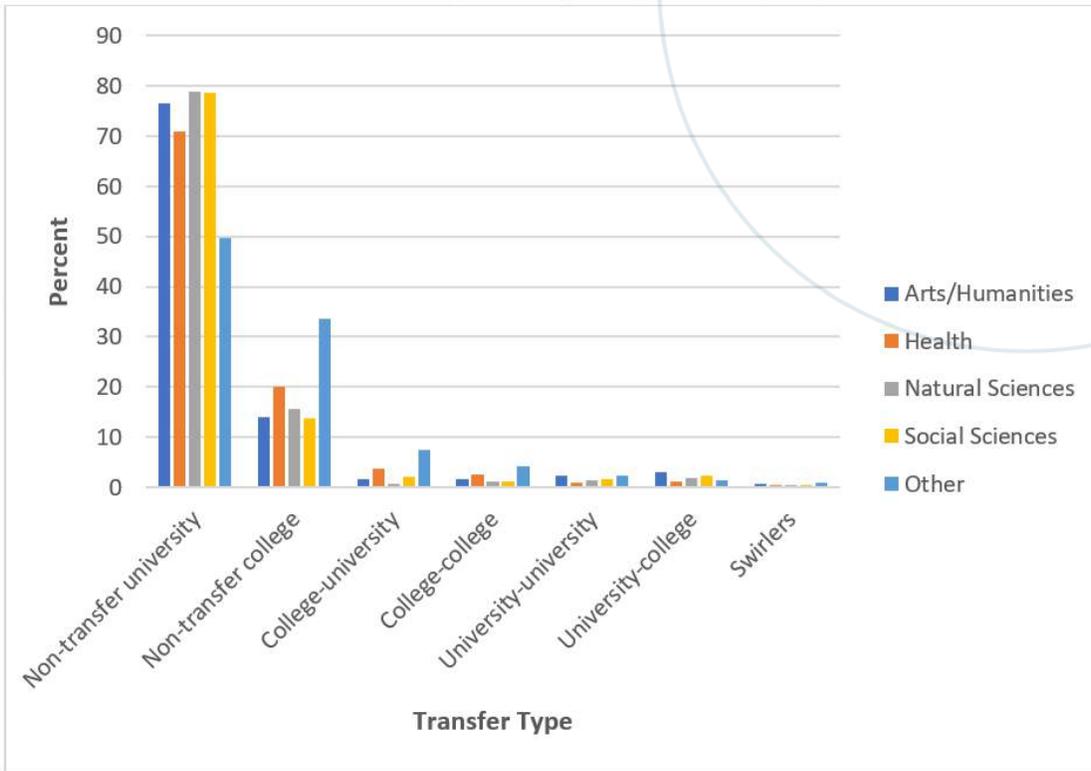


Figure 6. The Relationship between Field of Study and Transfer Pathways, PSIS-T1FF 2009 to 2016

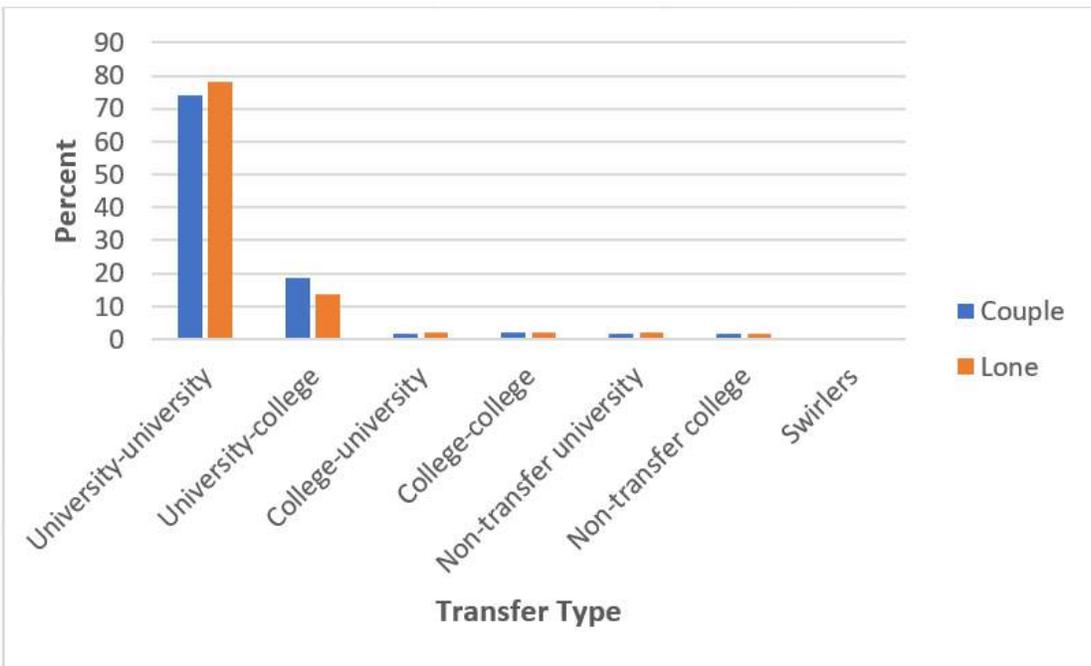


Figure 7. The Relationship between Family Composition and Transfer Pathways, PSIS-T1FF 2009 to 2016

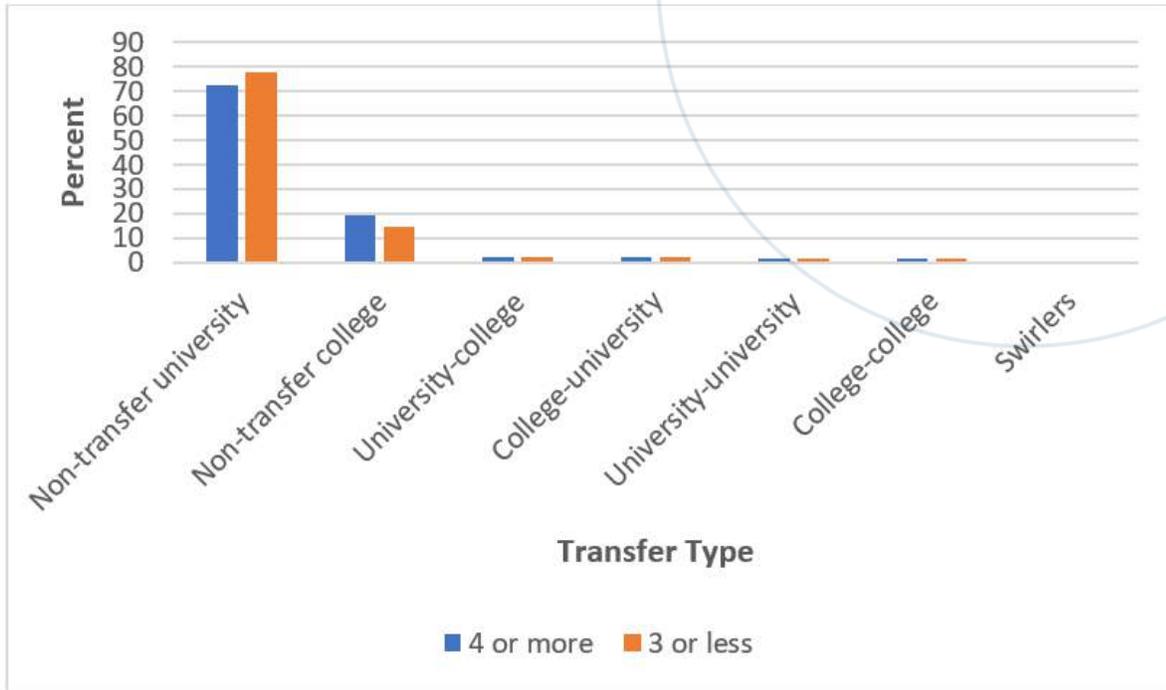


Figure 8. The Relationship between Family Size and Transfer Pathways, PSIS-T1FF, 2009 to 2016

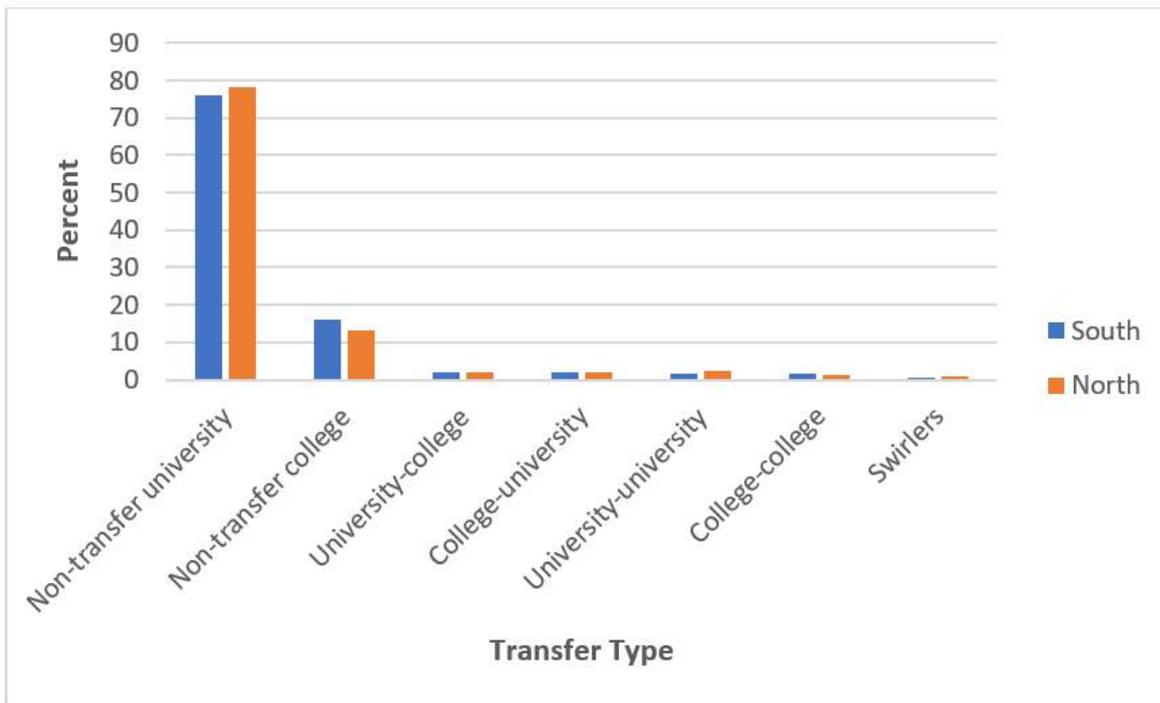


Figure 9. The Relationship between Region of Institution and Transfer Pathways, PSIS-T1FF 2009 to 2016

	UU	UC	CU	CC	NTC	Swirlers
Age						
Younger (21 or younger)	-	-	-	-	-	-
Older (22 or older)	1.14***	0.84***	2.61***	1.94***	2.92***	1.46***
Sex						
Men	-	-	-	-	-	-
Women	1.11***	0.87***	0.93***	0.78***	0.67***	0.85***
Parental income						
Lowest	-	-	-	-	-	-
Lower	0.97	1.11***	0.96	1.03	1.02	0.93
Middle	0.98	1.08**	0.84***	0.97	0.93***	0.89*
Higher	0.94	1.06	0.78***	0.79***	0.74***	0.86**
Highest	0.94*	0.76***	0.51***	0.46***	0.39***	0.70***
Registration status						
Full-time	-	-	-	-	-	-
Part-time	2.62***	2.99***	0.40***	0.73***	0.64***	1.92***
Field of study						
Arts/humanities	-	-	-	-	-	-
Health	0.43***	0.43***	2.43***	1.83***	1.52***	0.81***
Natural sciences	0.65***	0.56***	0.38***	0.65***	0.97**	0.59***
Social sciences	0.71***	0.73***	1.14***	0.72***	0.88***	0.71***
Other	1.37***	0.64***	7.83***	4.48***	3.84***	2.16***
Family composition						
Couple	-	-	-	-	-	-
Lone	1.07*	1.23***	1.14***	1.25***	1.13***	1.27***
Family size						
Smaller (3 or fewer)	-	-	-	-	-	-
Larger (4 or more)	1.09***	1.14***	0.94**	0.94*	0.90***	1.06
Region of institution						
South	-	-	-	-	-	-
North	1.21***	1.01	0.48***	0.56***	0.55***	1.06
Year of enrolment						
2009	-	-	-	-	-	-
2010	0.97	0.91**	1.04	0.97	0.95***	1.02
2011/2012	0.96	0.92***	0.84***	0.74***	0.86***	0.85**
2013	0.63***	1.08**	0.66***	0.80***	0.82***	1.80***
2014	0.46***	0.83***	0.51***	1.02	0.85***	1.14*

*p<0.05, **p<0.01, ***p<0.001

Table 3. Multinomial logistic regression analysis of transfer types, PSIS-T1FF, 2009-2016

	UU			UC			CU			CC			NTU			NTC			Swirlers			
	Margins	95% CI		Margins	95% CI		Margins	95% CI		Margins	95% CI		Margins	95% CI		Margins	95% CI		Margins	95% CI		
Age																						
Younger (21 or younger)	1.76	1.72	1.80	2.26	2.21	2.31	1.82	1.77	1.86	1.45	1.41	1.49	78.37	78.24	78.50	13.81	13.70	13.92	0.54	0.51	0.56	
Older (22 or older)	1.56	1.45	1.67	1.48	1.38	1.58	3.44	3.29	3.60	2.06	1.93	2.18	61.06	60.64	61.49	29.79	29.39	30.20	0.60	0.53	0.67	
Sex																						
Men	1.57	1.51	1.63	2.24	2.17	2.30	2.00	1.94	2.07	1.66	1.60	1.72	73.43	73.24	73.62	18.53	18.36	18.70	0.57	0.54	0.61	
Women	1.87	1.81	1.93	2.07	2.01	2.13	2.04	1.99	2.10	1.42	1.37	1.47	78.50	78.34	78.67	13.57	13.43	13.71	0.52	0.49	0.55	
Parental income																						
Lowest	1.72	1.63	1.81	2.07	1.97	2.17	2.36	2.26	2.47	1.72	1.63	1.81	72.93	72.63	73.23	18.60	18.34	18.86	0.60	0.54	0.65	
Lower	1.66	1.58	1.75	2.29	2.18	2.39	2.25	2.15	2.34	1.77	1.68	1.85	72.57	72.28	72.87	18.91	18.66	19.17	0.55	0.50	0.60	
Middle	1.71	1.62	1.80	2.27	2.17	2.37	2.02	1.93	2.12	1.70	1.61	1.79	74.07	73.78	74.35	17.69	17.43	17.94	0.54	0.49	0.59	
Higher	1.71	1.62	1.80	2.31	2.20	2.41	1.99	1.89	2.08	1.47	1.38	1.55	77.24	76.96	77.52	14.74	14.50	14.98	0.55	0.50	0.60	
Highest	1.88	1.79	1.97	1.83	1.73	1.92	1.48	1.40	1.57	0.95	0.88	1.02	84.55	84.30	84.80	8.81	8.62	9.01	0.50	0.45	0.54	
Registration status																						
Full-time	1.61	1.57	1.65	1.98	1.94	2.03	2.11	2.06	2.15	1.54	1.50	1.58	76.06	75.93	76.19	16.18	16.07	16.29	0.52	0.50	0.54	
Part-time	4.21	3.91	4.52	5.90	5.53	6.28	0.89	0.79	1.00	1.17	1.04	1.31	76.09	75.50	76.69	10.71	10.34	11.08	1.01	0.87	1.15	
Field of study																						
Arts/humanities	2.33	2.23	2.44	3.05	2.94	3.17	1.67	1.58	1.76	1.58	1.49	1.66	75.86	75.57	76.16	14.81	14.56	15.05	0.69	0.64	0.75	
Health	0.94	0.85	1.02	1.24	1.14	1.34	3.69	3.53	3.86	2.63	2.49	2.77	70.59	70.20	70.99	20.38	20.04	20.73	0.52	0.46	0.58	
Natural sciences	1.58	1.50	1.66	1.78	1.70	1.86	0.66	0.61	0.71	1.08	1.02	1.14	79.34	79.11	79.58	15.12	14.91	15.33	0.43	0.39	0.47	
Social sciences	1.73	1.66	1.79	2.31	2.24	2.39	1.99	1.93	2.06	1.18	1.13	1.23	78.67	78.47	78.86	13.61	13.45	13.77	0.51	0.48	0.55	
Other	2.08	1.87	2.29	1.26	1.10	1.43	7.95	7.53	8.37	4.33	4.02	4.65	49.53	48.78	50.27	33.89	33.19	34.59	0.96	0.81	1.10	
Family composition																						
Couple	1.73	1.68	1.77	2.10	2.06	2.15	2.00	1.96	2.05	1.48	1.45	1.52	76.48	76.35	76.62	15.67	15.56	15.79	0.53	0.51	0.55	
Lone	1.79	1.66	1.92	2.50	2.34	2.66	2.18	2.06	2.31	1.78	1.66	1.90	74.07	73.67	74.46	17.02	16.70	17.35	0.65	0.57	0.73	
Size of family																						
Smaller (3 or fewer)	1.61	1.54	1.69	1.95	1.87	2.03	2.09	2.01	2.17	1.56	1.49	1.63	75.47	75.23	75.71	16.80	16.59	17.01	0.52	0.48	0.56	
Larger (4 or more)	1.79	1.74	1.84	2.24	2.18	2.30	2.00	1.95	2.05	1.51	1.46	1.55	76.52	76.36	76.67	15.39	15.25	15.52	0.56	0.53	0.59	
Region of institution																						
South	1.70	1.66	1.74	2.14	2.09	2.18	2.09	2.04	2.13	1.56	1.52	1.59	75.81	75.68	75.93	16.17	16.06	16.28	0.54	0.52	0.56	
North	2.25	2.03	2.46	2.34	2.11	2.57	1.15	1.02	1.27	0.99	0.87	1.11	82.47	81.97	82.98	10.17	9.79	10.56	0.63	0.52	0.74	
Year of enrolment																						
2009	2.03	1.93	2.14	2.21	2.10	2.32	2.40	2.28	2.51	1.68	1.58	1.77	74.06	73.74	74.37	17.16	16.89	17.43	0.47	0.42	0.52	
2010	2.00	1.90	2.10	2.04	1.94	2.14	2.52	2.41	2.63	1.65	1.55	1.74	74.74	74.44	75.05	16.56	16.30	16.82	0.49	0.44	0.54	
2011/2012	2.01	1.94	2.09	2.10	2.03	2.18	2.12	2.04	2.19	1.29	1.23	1.35	76.56	76.34	76.77	15.50	15.32	15.68	0.42	0.39	0.45	
2013	1.33	1.25	1.41	2.49	2.38	2.61	1.69	1.59	1.78	1.43	1.34	1.51	77.31	77.01	77.61	14.86	14.60	15.11	0.90	0.83	0.97	
2014	1.00	0.92	1.07	1.93	1.82	2.03	1.30	1.22	1.38	1.82	1.72	1.92	77.81	77.51	78.12	15.57	15.30	15.83	0.57	0.52	0.63	

Table 4. Predicted probabilities of transfer types, PSIS-T1FF, 2009 to 2016

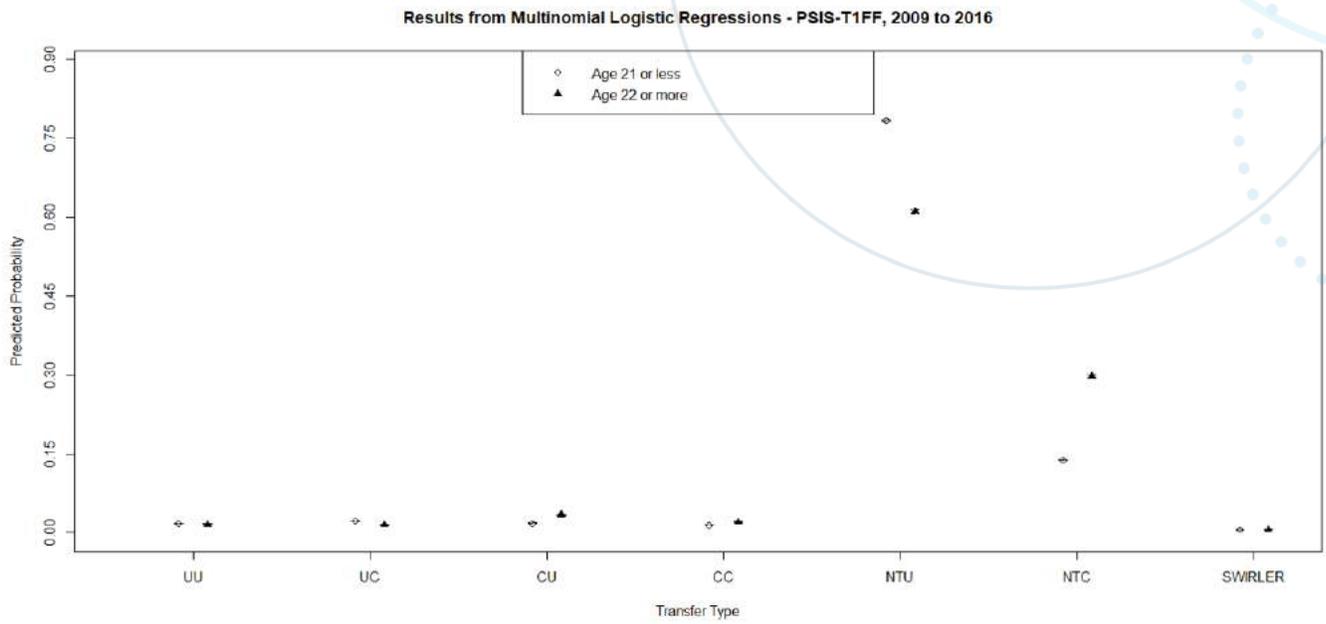


Figure 10. The Predicted Probabilities Across Age and Transfer Type, PSIS-T1FF 2009 to 2016

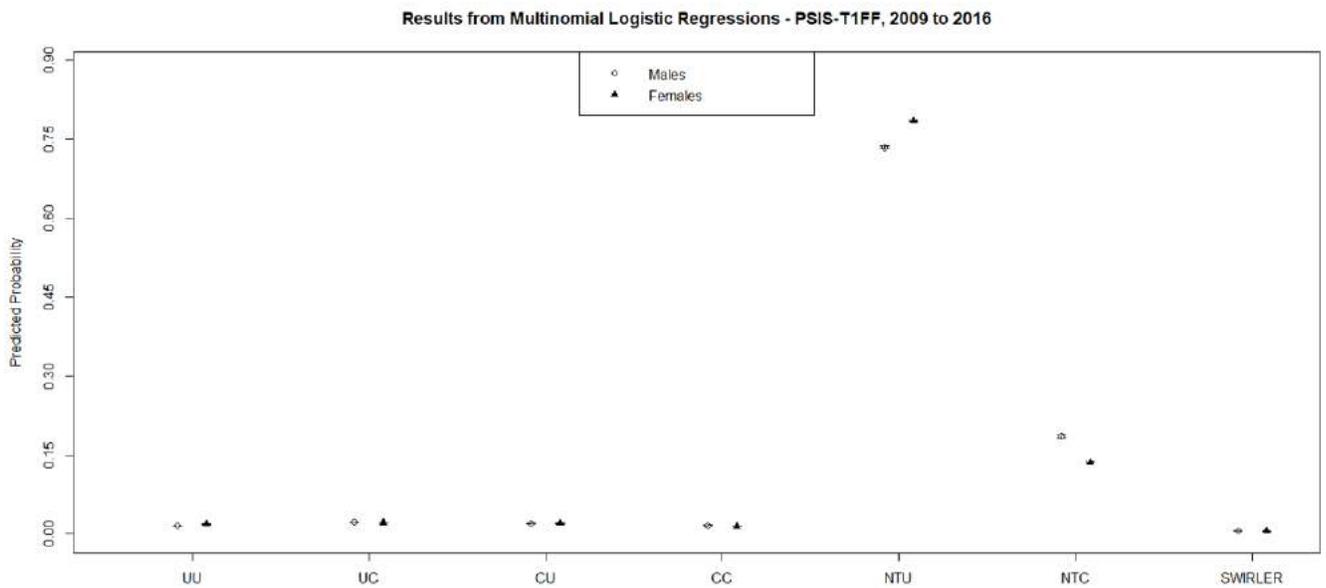


Figure 11. The Predicted Probabilities Across Sex and Transfer Type, PSIS-T1FF, 2009 to 2016

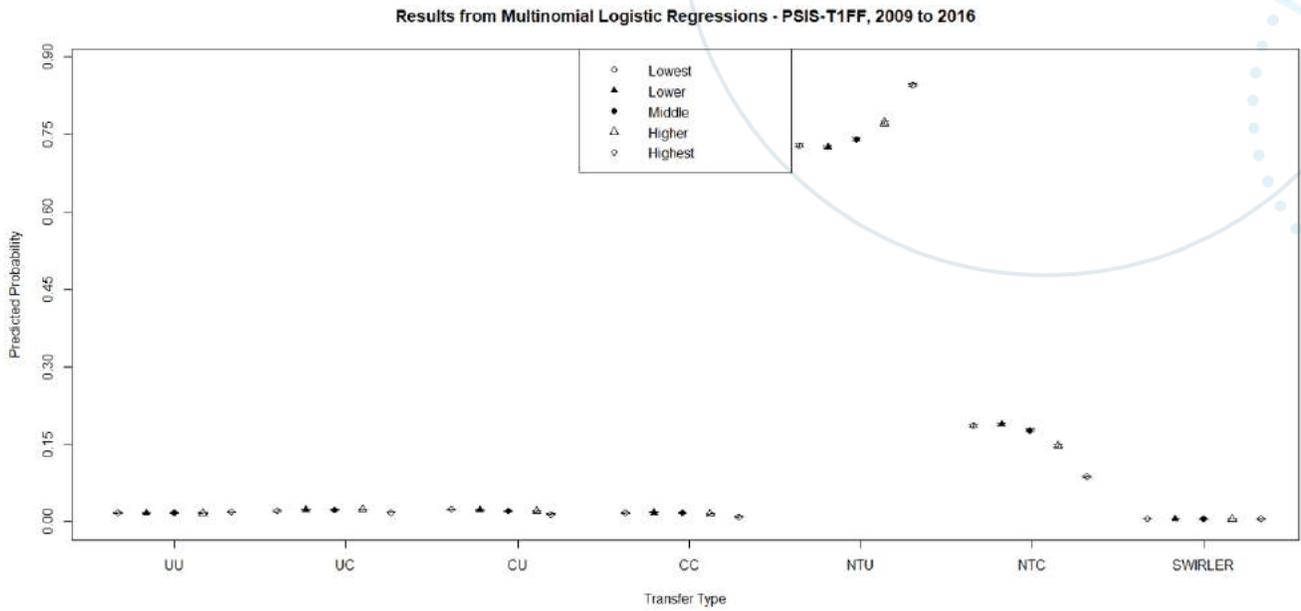


Figure 12. The Predicted Probabilities Across Parent Income and Transfer Type, PSIS-T1FF, 2009 to 2016

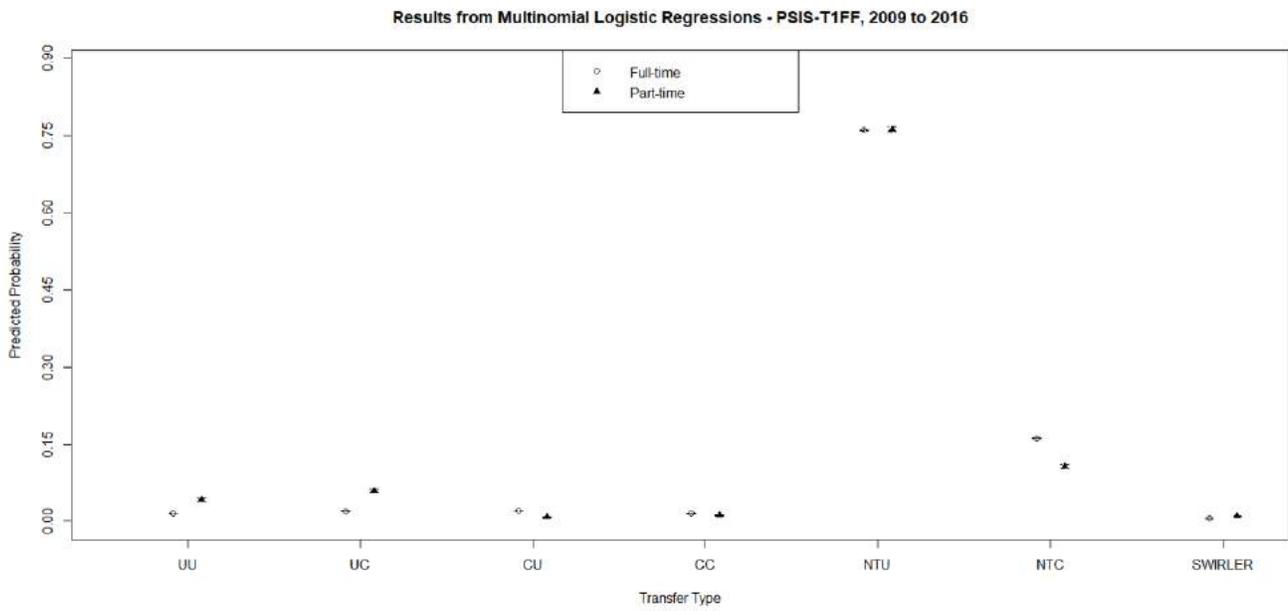


Figure 13. The Predicted Probabilities Across Registration Status and Transfer Type, PSIS-T1FF, 2009 to 2016

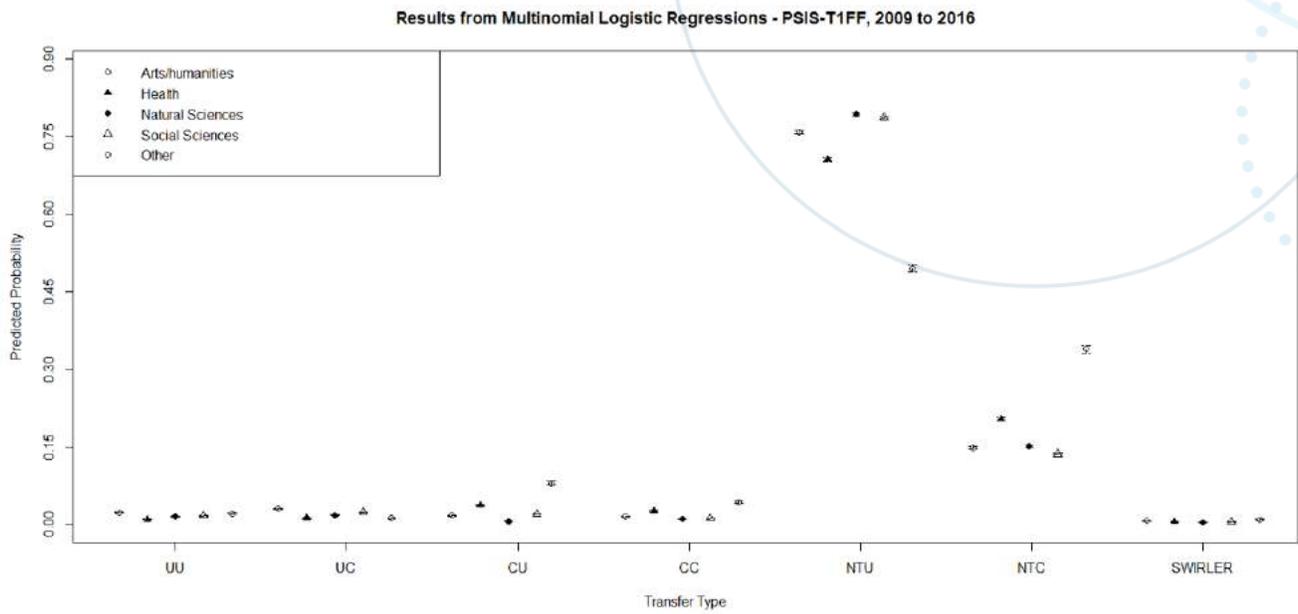


Figure 14. The Predicted Probabilities Across Field of Study and Transfer Type, PSIS-T1FF, 2009 to 2016

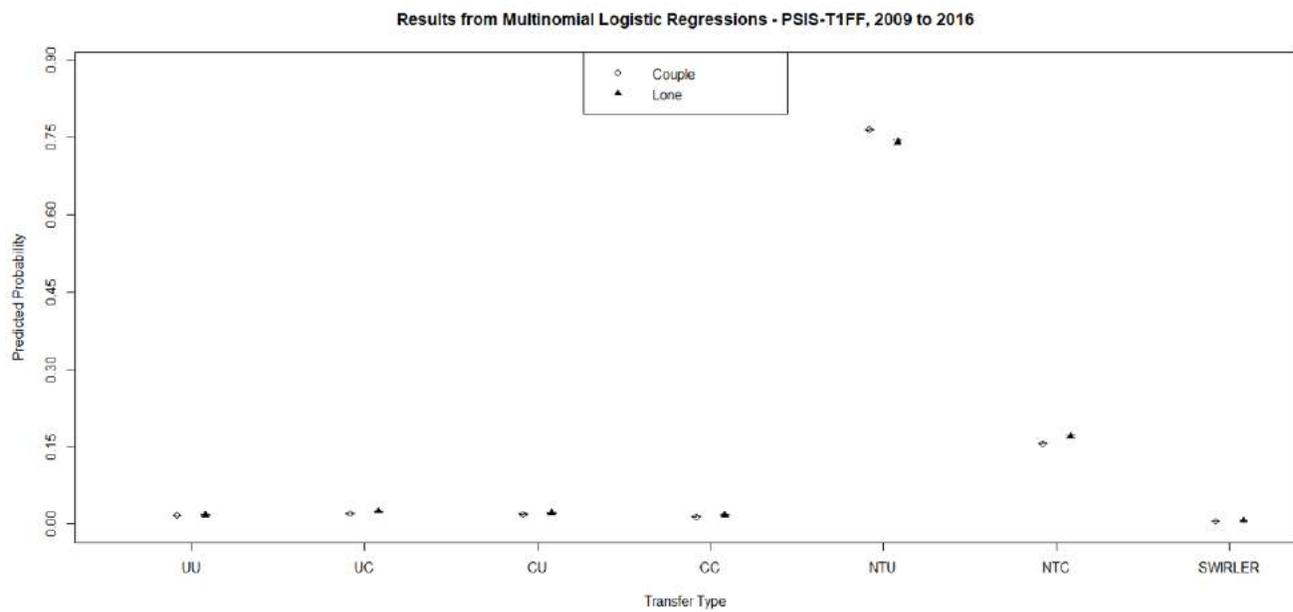


Figure 15. The Predicted Probabilities Across Family Composition and Transfer Type, PSIS-T1FF, 2009 to 2016

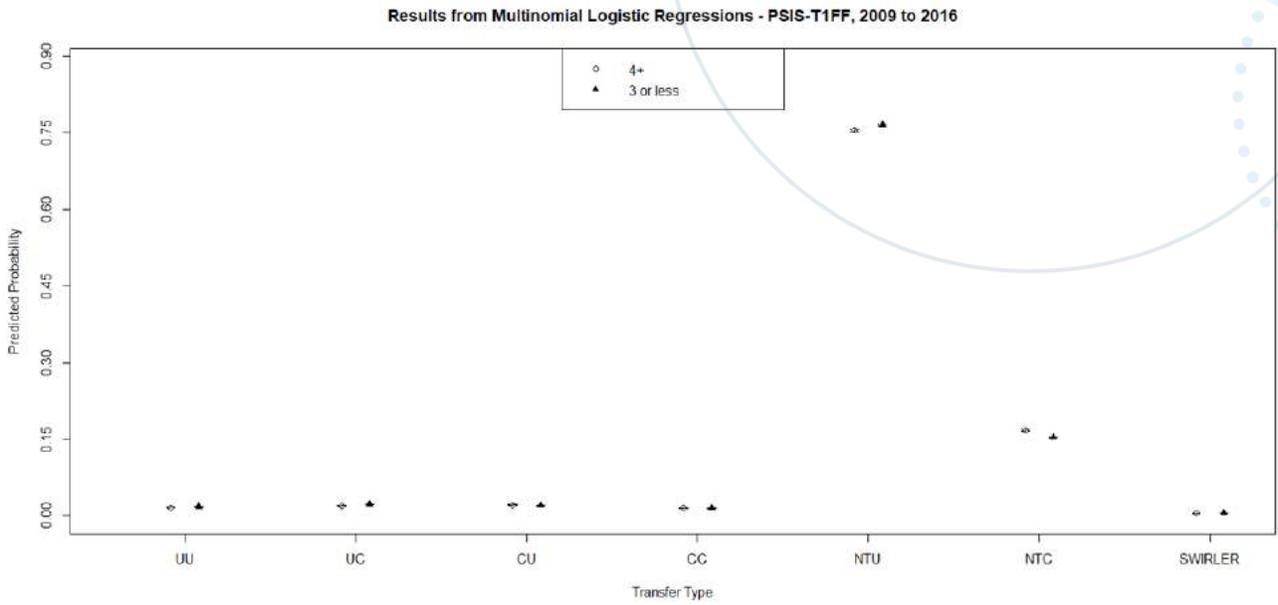


Figure 16. The Predicted Probabilities Across Family Size and Transfer Type, PSIS-T1FF, 2009 to 2016

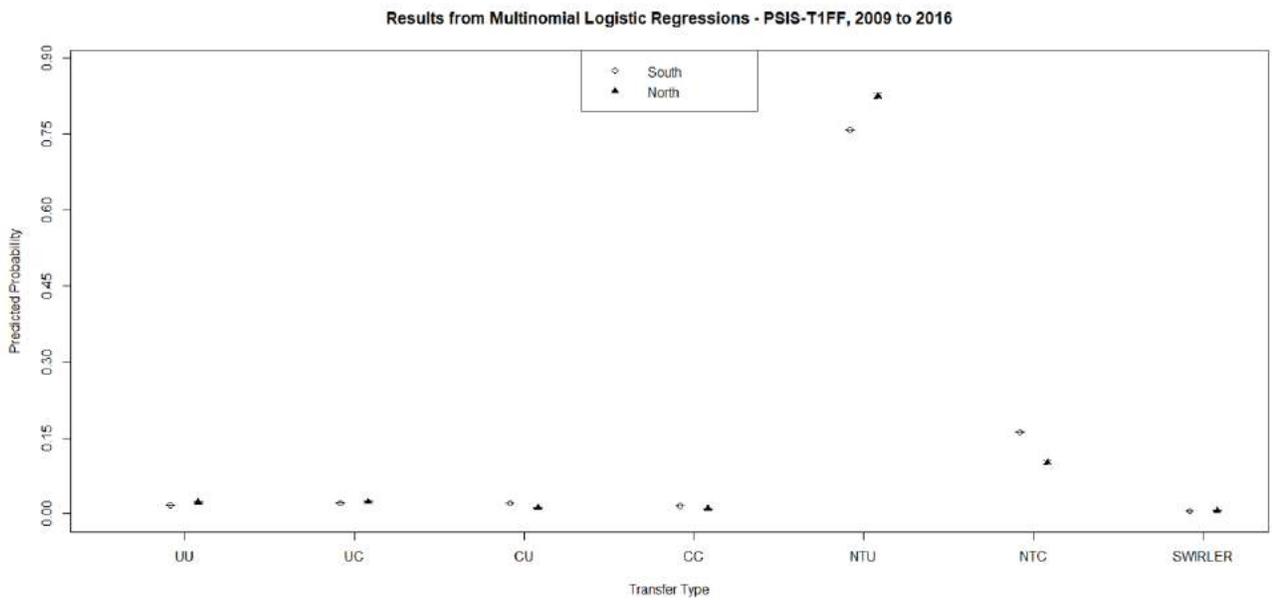
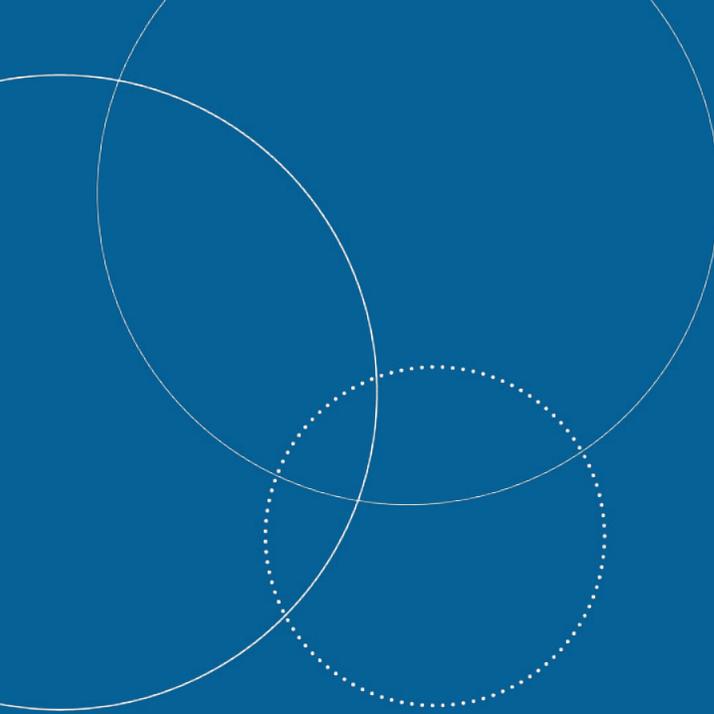


Figure 17. The Predicted Probabilities Across Region of Institution and Transfer Type, PSIS-T1FF, 2009 to 2016



oncat
Ontario Council on
Articulation and Transfer



caton
Conseil pour l'articulation
et le transfert – Ontario

oncat.ca/en/projects/transfer-pathways-among-ontario-colleges-and-universities



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.