Under-Represented Groups in Postsecondary Education in Ontario: Evidence from the Youth in Transition Survey

Prepared by Ross Finnie, Graduate School of Public and International Affairs
and the Education Policy Research Initiative, University of Ottawa;
Stephen Childs, Education Policy Research Initiative, University of Ottawa;
Andrew Wismer, Education Policy Research Initiative, University of Ottawa
for the Higher Education Quality Council of Ontario

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Quality Council
of Ontario

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Abstract

Ensuring access to postsecondary education (PSE) for all qualified individuals is key to Ontario's future competitiveness and equally critical from an equity perspective. This paper provides an empirical analysis of access to PSE among a number of under-represented (and minority) groups in Ontario, including comparisons to other regions. Having parents that did not attend PSE is the most important factor across the country, and the effects are even greater in Ontario than in some other regions. Being from a low-income household is considerably less important than parental education, and the income effects are even smaller in Ontario than in certain other regions. Aboriginal and disabled youth are also strongly under-represented groups in PSE in Ontario, driven entirely by their lower university participation rates, offset to different degrees by higher college participation rates. Rural students are also significantly under-represented (though to a lesser degree) in university, but again go to college at somewhat higher rates. Furthermore, for these latter groups, Ontario does not compare favourably to other regions. The children of immigrants are much more likely to go to university but somewhat less likely to attend college almost everywhere. Being from a single parent family has little independent effect on access to PSE, as is also the case for being a Francophone outside of Quebec, the latter effect in some cases actually being positive. Intriguingly, although females generally have significantly higher PSE (especially university) attendance rates than males, females in under-represented groups are generally more disadvantaged than males.

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I. Introduction

Ensuring access to postsecondary education (PSE) for all qualified individuals is a key component of Ontario's future competitiveness at both the national and the international levels. Equal access is also important from an equity perspective, since the opportunity to benefit from the life-changing experiences PSE typically provides should be available to all those who have the talent to do so and who wish to make these investments.

For many young people, there is little doubt that they will attend and graduate from PSE. Recent research, for example, has shown that those from families with higher incomes – and to an even greater degree, those with higher levels of parental education – are much more likely to attend PSE (especially university) than others. However, the situation is much less clear for certain other groups of individuals, including a number that have traditionally been under-represented in PSE. Yet increasing the PSE participation of these groups, some of which are growing in absolute numbers, is essential to achieving the economic and equity goals stated above.

In particular, there is concern amongst policy-makers that those from the following groups may be disadvantaged in terms of accessing PSE:

- those from low-income families;
- those from families with no history of attending PSE (i.e., "first-generation" students);
- those living in rural areas and others who live far from college or university campuses;
- those whose mother tongue is French;
- first- and second-generation immigrants;
- those from single-parent (or other "non-traditional") families;
- those of Aboriginal or First Nations ancestry; and
- those with disabilities.

The purpose of this paper is to employ the remarkably rich Youth in Transition Survey (YITS), Cohort A to build on previous work by the authors and other researchers to undertake an extended analysis of access to PSE among these groups within the Ontario population.[1] In doing so, we will provide new evidence concerning PSE participation in Ontario that will allow policy-makers to better craft policy that is specific to the Ontario situation. Furthermore, in addressing the situation of each of these groups in a single analysis, including taking into account how these groups cross-cut each other, we provide a

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[1] Special mention goes to the MESA project, funded by the Canada Millennium Scholarship Foundation, for advancing the access research agenda in recent years, based largely on the same YITS data that we employ here. See www.mesa-project.org or Finnie, Sweetman, & Usher, 2009 and Finnie, Frenette, Mueller, & Sweetman, 2010, for their first two collections of published papers. The work here is most closely related to a series of papers produced by Ross Finnie and Richard Mueller.

perspective on access to PSE that is unique not only for Ontario, but also at the national level – and even in the international literature.

We do so by first outlining the proportion of students from each of the identified under-represented groups and their rates of access to PSE (college and university) as compared to their counterparts in the general population (i.e., those from low-income families compared to those from higher-income families and those without a tradition of PSE to those whose parents have such a background, etc.). We do this for Ontario, and we also compare the data for Ontario to those from other Canadian provinces/regions.

We then place these rates of PSE participation into a multiple regression framework. This allows us to take these various factors into account simultaneously and thus identify the "net" differences in PSE access rates for each of the under-represented groups being examined (for example, the access rates of those from low-income families taking into account parental education, rural versus urban location and so on).

We build the regression analysis further by then adding a range of additional explanatory variables available in the YITS-A, such as high school grades, high school engagement and students' international "PISA" test scores. This permits us to see how the access gaps are related to these factors and what proportions of the gaps remain once these factors are taken into account. Results are broken down by gender, and comparisons are made with other provinces/regions of Canada.

In this way, we paint a simple but rich empirical portrait of these "under-represented groups" in Ontario (some of which, in fact, turn out to be *over*-represented) and make comparisons to other provinces/regions. The results are interesting and sometimes surprising. For example, some access gaps almost disappear when the other group characteristics are taken into account, while others barely change. Similarly, some of the differences in access rates are strongly related to the additional explanatory variables (grades and so on), while others are not. Finally, some of the differences between Ontario and other provinces/regions are startling, while in other cases, the relative PSE participation rates of under-represented groups are very similar across jurisdictions. Taken together, these results have important implications for provincial and federal policy-makers as they seek to increase overall PSE participation and completion rates.

The paper is organized as follows: the following section (Section II) contains a review of the pertinent literature; Section III discusses the methodology employed; Section IV provides a description of the data; Section V presents the results of the descriptive and multivariate analysis; and the final section concludes with a summary of the major findings and explores some of the policy implications.

II. Literature

II.1 The General Literature on Access to Postsecondary Education

This analysis of under-represented groups in PSE takes place in the context of a general trend in the analysis of PSE participation in which economists have been moving beyond the narrow analysis of financial issues (tuition fees, student financial aid, family income, etc.) towards the analysis of other important factors. In particular, the availability of longitudinal surveys with detailed background information on respondents – including the YITS-A data set that provides the basis for this study – has allowed researchers to examine PSE participation based on family background factors, high school experiences and other early influences in a way that was not previously possible.

One important conclusion of this research is that ". . . access to and persistence through PSE are the result of a complex set of processes typically starting early in a person's life. Understanding these processes requires a model, an empirical approach, and data that capture these" (Finnie, Sweetman, & Usher, 2009). From this perspective, belonging to one of the under-represented groups studied here may be associated with a particular set of background influences and processes (e.g., the values attached to PSE and/or preparation for PSE from an early age), along with any other factors (including financial ones) that operate at the point that PSE decisions are ultimately made (e.g., when the individual finishes high school).

This section provides a brief discussion of the relevant literature on postsecondary access, particularly as it pertains to the under-represented groups studied in this paper.[2] In general, an extensive literature exists regarding several of the groups (particularly students from low-income families and first-generation PSE students), whereas other groups have been much less closely examined, particularly in the Canadian context.

II.2 Under-Represented Groups in PSE

II.2.1 Low-Income Students

Economists have written most extensively on the representation in PSE of students from low-income households. This focus has been grounded in large part in the economist's standard model of participation in higher education in which schooling decisions are seen to be the result of comparisons of the future returns of PSE in the form of higher earnings and other schooling-related benefits to the up-front costs of the schooling, including not only direct costs such as tuition, other student fees, books and so on, but also the opportunity costs associated with attending PSE, rather than getting a job right out of high school.

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[2] For a general overview of the literature on access to PSE, particularly in the Canadian context, see Mueller (2008, 2009).

It follows from this model that one potential barrier to accessing PSE could be its affordability, which could, in turn, be related to family income. That is, those who would like to go to PSE because the benefits of doing so are greater than the costs might be prevented from pursuing PSE because they simply do not have the financial means to do so. The student financial aid system is, of course, intended to help those students who need it, but it might not meet the needs of all individuals. Hence, patterns of PSE participation with respect to family income have traditionally been interpreted within this financial framework and taken as evidence of how well the PSE system and the associated system of student financial aid has dealt with potential barriers related to the "liquidity constraint" some young people may face when they consider how they will pay for their studies. A companion literature focuses on those financial factors themselves: tuition levels, student financial aid and so on.

The other reason for this extensive literature on the relationship between access and family income and the related focus on financial factors is the more practical one: they are often available to be measured. We search, sometimes, where the light is best – regardless of whether the well-lit spots are the most appropriate ones for addressing the questions at hand.

In any event, the accumulated evidence of the Canadian literature on tuition levels, financial aid and family income suggests that the demand for PSE in Canada is relatively price inelastic (Junor & Usher, 2004), although tuition increases may have a larger impact on individuals from low-income families. Coelli (2005, 2009) uses the variation in tuition fees across provinces through the 1990s to identify these effects, while Neill (2009) uses the political party in power in each province as an instrument to correct for the endogeneity of tuition fees in estimates of the demand for PSE. Johnson (2009) finds similar, but weaker, effects for the post-2000 period. Christophides, Cirello, & Hoy (2001) and Corak, Lipps, & Zhao (2003) include parental income in their models of PSE participation and find that it is important for university attendance but not college, while tuition is again found to have generally little overall effect but to perhaps have more impact on individuals from low-income families. Drolet (2005) similarly finds that the PSE attendance gap between high- and low-income families is narrowed when colleges and universities are both considered but that students from low-income families are less likely to attend either – especially university.

Frenette (2005) uses the deregulation of professional program tuition in Ontario as a natural experiment and discovers that it is students from middle-class families, not those from lower-income families, who saw their participation in these particular programs decline the most. In a later paper (Frenette, 2007, 2009), the same author uses the YITS-A data that we employ in this study to find that very little of the university participation gap between students from families in the first and fourth income quartiles can be explained by credit constraints. Rather, it is differences in standardized test scores and high school marks that explain the major portion of the gap.

Day (2009) looks at the effects of student financial aid (again using the YITS-A), but emphasizes the limitations of most such studies, including her own, in terms of separating any such effects from unobserved student characteristics and other factors that potentially affect access, persistence through to graduation, and other outcomes.

Like many others before them, Finnie and Mueller (2008, 2009a) find that family income is a strong predictor of participation in PSE – university in particular – but that this effect largely goes away when parental education is included. This is an important result because it suggests that what was previously interpreted within the framework of financial constraints and so on (i.e., the "family income effects" discussed earlier) were perhaps misplaced and that the major factors are actually more "cultural" than "economic."

These findings present a fundamental challenge to our thinking about "barriers" to PSE. It is perhaps not so much that those from low-income families are not *able* to go to PSE but that those from low-income families also tend to be from families whose parents do not have PSE, and that it is the transmission of values in favour of PSE, the preparation for PSE and other such factors associated with parental education – and not family income – that actually matter most.

The policy implications of these results are potentially far-reaching: instead of putting additional resources into addressing financial constraints (e.g., keeping tuition levels down, providing more generous and accessible loans and grants and so on) in order to level the PSE access playing field, we should perhaps be turning more of our attention to improving student motivation and performance at (or before) the high school level, providing better information to students and their families about the costs and benefits of education from an early age and carrying out other interventions targeted at the early-rooted and family-based factors that seem to be the most important determinants of access. Another recent study by Childs, Finnie and Mueller (2010) demonstrates this further.

Consistent with this evolution of thinking in Canada, Carneiro and Heckman (2002) review the U.S. literature on the evidence supporting the paramount importance of long-term factors – such as family background – over short-term factors such as credit constraints. They note that since many of these background factors are correlated with family income in the short-term period when PSE decisions are made, it is often erroneously stated that this indicator of short-term credit constraint is what prohibits low-income individuals from attending PSE.

More recently, Heckman and various co-authors, including Cunha and Heckman (2007), Heckman (2000), Heckman, J.J., and Masterov and Heckman (2007) have continued to shift the emphasis to non-financial factors as a newer generation of empirical work has indicated that financial resources are but one of many important determinants of PSE participation. Similarly, Murray (2002) notes that successful parents tend to have successful children (in terms of income). The implication of this research is that PSE participation is largely determined long before the actual point of entry into a college or university and that relaxing short-term credit constraints will have only a minimal effect on participation. This line of research thus further supports the contention that it is long-term factors such as family background more than short-term factors such as financial constraints that are of greatest importance in determining access to PSE.

That said, other research is not as sanguine about the unimportance of financial constraints. Lefebvre and Merrigan (2010), for example, note that while family income, on average, does not appear to be a key determinant of PSE attendance in Canada, the relationship is non-linear, so that those from families at the lower tail of the income distribution show higher increases in participation rates as income increases compared to those from families with

higher incomes. Acemoglu and Pischke (2001) come to a similar conclusion using data from the U.K. Carmichael and Finnie (2009) offer a theoretical model and supporting empirical evidence that may help explain why income may continue to matter even beyond the issue of liquidity constraints. And even in the Finnie-Mueller work, income still matters, especially for females, and their more recent work suggests that income effects vary greatly across Canadian provinces and may still be substantial in some jurisdictions, even if less so in others.[3] It is thus not so much a matter of now being able to *ignore* income effects as one of also paying (new) attention to other "cultural" factors as well, with the latter perhaps being the most important factors of all.

Cameron and Heckman (1998, 2001), Keane and Wolpin (2001) and Cunha, Heckman, Lochner and Masterov (2006), to name but a few, also support this general set of conclusions regarding the importance of early background factors, with income possibly still mattering to at least some degree. Keane (2002), for example, while commenting on the income divide in college attendance in the U.S., notes that this inequality "appears to be driven by unequal human-capital accumulation prior to the college-going age." The policy implication of these studies is that trying to relax short-term financial constraints in order to increase enrolment in PSE will be largely ineffective.

II.2.2 Other Under-Represented Groups

As implied by the above discussion on income and related effects, the ability of students with no family history of PSE, or *first-generation PSE students*, to access PSE has become a growing concern among researchers and policy-makers. One important consensus that has emerged in the Canadian literature (Butlin, 1999; Drolet, 2005; Finnie, Lascelles & Sweetman, 2005; Finnie & Mueller, 2008, 2009a; and Frenette, 2007, 2008, among others) is that parental education is a much better predictor of PSE participation than is parental income. In short, "culture" trumps money, where "culture" is a shorthand term for the myriad and multifaceted family-based influences – apart from those related to income and money – that affect a young person's attitude to, and preparation for, PSE (Finnie, Sweetman & Usher, 2009).

Since many of these factors are correlated with family income during the short-term period when PSE decisions are made, it is often erroneously stated that income, and the associated issue of short-term financial constraints (i.e., affordability), is what prohibits low-income individuals from attending PSE. The implication of this work is powerful: policy should be directed more toward students earlier in life if the long-term goal is to increase PSE participation.

Previous studies (see HRSDC [2004] for a bibliography on the subject) also find that *rural students* tend to have lower PSE participation rates than their urban counterparts. This is generally thought to be due to the increased difficulty of accessing PSE experienced by rural students, including the related costs. One reason for this, discussed in Frenette (2004,

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[3] CMEC (Council of Ministers of Education, Canada) and HRSDC (Human Resources and Skills Development Canada (2010, February 10). *Measuring competencies and their impacts on outcomes in later life.* Paper presented at workshop sponsored by CMEC and HRSDC, Montreal (in press).

2006), is the increased distance that rural students have to travel to attend PSE institutions. That said, it is difficult to separate "ruralness" from these distance factors, and to at least some degree, distance may be capturing other factors not directly related to distance per se (e.g., "neighbourhood" cultural effects).

Looker (2010) finds differences in the participation of rural students across regions in Canada, especially for university, but finds that to a large degree, these gaps are explained by other factors with which rural residence is correlated, although some residual effects do remain (e.g., there is a smaller urban-rural divide in university attendance in Quebec). In addition, much of the literature on access to PSE discussed in this section includes controls for rural students and generally finds that they are less likely to attend PSE.

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A number of studies (Aydemir, Chen, & Corak, 2008; Aydemir & Sweetman, 2008; Bonikowska, 2007) find that the educational attainment of ***first- and second-generation children of immigrants*** (i.e., those who themselves came to Canada with their immigrant parents or those born in Canada to immigrant parents) is higher than that of non-immigrant Canadians. Using the detailed information on the origin of students and their parents available in the YITS-A, Finnie and Mueller (2009a, 2010) find that PSE participation rates are higher for immigrants, especially at the university level, but there is great variation in these patterns by source region, with the children of Chinese immigrants having by far the highest access rates, while those from Latin America and the Caribbean actually have lower rates than the non-immigrant Canadian population, the only significant immigrant group to be in this situation.[4] Measurable factors such as parental education, high school grades and parental expectations for their children's schooling (added in stages to the multinomial logit regression model the authors use) help explain a substantial portion of at least some of these gaps, but differences remain, especially for some groups, even after all such factors are taken into account: in terms of PSE, "They just go."

The educational and labour market outcomes of ***Aboriginal Canadians*** have been the subject of several studies, although the data challenges tend to be significant (who exactly is covered, sample sizes and so on). Kuhn and Sweetman (2002), for example, as well as George and Kuhn (1994), attempt to explain the wage gap between Aboriginals and others using a decomposition technique. Mendelson (2006) offers a general discussion of Aboriginal students in Canada, while Frenette (2010a) uses a similar technique to explain the differences in educational attainment between off-reserve Aboriginals and non-Aboriginals. He finds that most of the gap can be "explained" by the variables included in the YITS-A data set that he uses, although some of the measures that he includes in his analysis are themselves potentially endogenous to schooling decisions (e.g., grades).[5] This leaves the

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[4] Other differences may exist for smaller subgroups within the groups considered by Finnie-Mueller.

[5] Drewes (2010) argues that if one is uninterested in pursuing PSE, the importance of grades and good behaviour during high school becomes less important. See also Finnie, Sweetman, & Usher (2009) on this point.

possibility that at least some of the underlying factors, possibly rooted in the family or Aboriginal culture more generally, or other barriers are related to both these sets of outcomes, including grades, and PSE access conditional on grades. Family income has no direct effect but may operate through family environment factors. Walters, White, and Maxim (2004) use data from the 1995 National Graduates Survey to estimate differences in the returns to education between Aboriginals and non-Aboriginals and find that the returns to PSE are higher for Aboriginal students, thus negating this as a potential explanation of their lower PSE participation rates. In the same vein, Frenette (2010a) finds similar rates of return to PSE for Aboriginals and non-Aboriginals.

The remaining groups discussed in this paper have very few studies devoted specifically to their access to PSE, especially in the Canadian context. First, regarding *French speakers outside Quebec*, as part of a more general analysis of PSE aspirations, HRSDC (2004) uses data from the YITS to show the differences between educational aspirations for minority language groups in Quebec and for minority language groups in the rest of Canada. Numerous other studies, including earlier work by Butlin (1999), include controls for language and typically find systematic differences not only in access rates, but also in the underlying factors that generally affect access rates to PSE (family income, parental education, parents' aspirations, etc.). That said, most such studies include one set of indicators for province (or region) and another set for language and thus confound French language effects with province effects, since French speakers both inside and outside Quebec are treated as a single group. Finnie and Mueller (2008, 2009a) account for these differences and find that Francophones outside Quebec have higher college attendance rates and no statistically significant differences in university participation.

Similarly, there are no Canadian studies of which we are aware that focus on access rates of students from *single-parent families,* although numerous studies do include some indicator of this status. As an example, Finnie and Mueller (2008, 2009a) find no effect once family income and parental education are included in the model. Sen and Clemente (2010) discuss the impact of family size on access to PSE, but their focus is on the number of siblings in the student's family, not the number of parents or guardians.

Homes (2005) provides a descriptive picture of the PSE participation of Canadian *students with a disability,* using data from the 2001 Participation and Activity Limitation Survey (PALS). Shaw, Madaus and Banerjee (2009) simply discuss potential strategies to improve access to PSE for disabled students at the policy level. In a somewhat related piece, Hollenbeck and Kimmel (2008) estimate earnings functions and returns to education using U.S. data. Despite higher returns relative to individuals without disabilities, earnings for disabled graduates of PSE programs are lower overall, as the higher returns do not fully cover the gap.

II.3 Summary of the Literature

The earlier literature on access to PSE was focused largely on the apparent difficulty individuals from low-income households had in attending PSE, as well as related financial factors connected with the affordability of PSE (tuition fees, student financial aid, etc.), and the past few decades of government policy seem to reflect this orientation for the most part. With the advent of large longitudinal studies of youth with extensive background information,

however, the last decade or so has seen a number of important advances in our understanding of access to PSE. In particular, it has been revealed that while low-income students are indeed underrepresented in PSE, other factors are crucial to understanding each student's PSE decision. These factors are complex, largely rooted in the family, appear to start early and have been shown to be significantly related to parental education much more than family income (Finnie, Sweetman, & Usher, 2009). Indeed, the income-PSE participation relationship itself is now seen in a very different context, since income is strongly correlated with these other factors, and while income still appears to matter, other "cultural" factors involving attitudes to PSE, preparation and other such factors appear to be the dominant ones. The richness of the YITS-A data set will allow us to undertake our analysis of under-represented groups in Ontario in this context.

III. Methodology

This research uses a previously developed regression framework for estimating access to PSE and differences in access across identifiable groups (Finnie &Mueller 2008, among other papers). In this approach, access is taken to be a function of membership in the various groups of interest and other explanatory variables, which, when taken into account, can help identify how the observed overall group differences are related to these other factors.

The model may be expressed as follows:

$$Y = X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + \mu$$

where Y is the access measure of interest (participation in college or university), the X_1 are vectors of covariates that influence Y, the β_1 are the coefficients associated with each set of X and μ is the classical stochastic error term.

X_1 comprises the indicators of membership in the groups of interest, those addressed in this analysis in the present case: low income, no family history of PSE, rural and so on. The simplest models include just this one set of variables, entered one at a time – i.e., one separate regression for each variable – and in each case, capture the overall differences in access rates between members of these under-represented groups and others. We then include all group indicators together in order to identify the separate effects of each group when they are all considered jointly. To the degree that the various factors are related (e.g., low-income students are also more likely to have parents without PSE, to live in rural areas and so on), we would expect the "estimated separately" and "estimated jointly" effects to differ, perhaps substantially.

We then include regressors that represent other kinds of influences available in the YITS-A that have been gaining increasing attention as perhaps constituting some of the more important determinants of access to PSE – or at least factors that are *related to* PSE access, even if causality is not strictly determined. X_2 includes one element of these: high school grades. X_3 includes another set: measures of high school "engagement" and "inclusion," such

as how connected the student felt to their high school, the student's self-appraisal of confidence and competence and parental behaviours regarding monitoring and disciplining their children, etc. An international (PISA) reading score is also included in this group.

These additional influences do not necessarily have an "econometrically correct" ordering (i.e., representing strictly exogenous influences) in terms of their inclusion. For example, students who have decided they want to get into PSE may work to get higher high school grades in order to be able to do so and to do better when they get there. Hence, grades do not really *explain* participation in PSE so much as they may represent a jointly determined outcome. What is most important to the current analysis, however, is that: (1) these variables are all determined before the entry into PSE, since they have been measured during the earlier pre-PSE cycles of the YITS-A, (2) they are empirically related to access to PSE and (3) they might, in turn, be related to membership in the groups under consideration. In particular, it will be interesting to see how the group differences change when these additional variables are added, thus telling us whether the differences are *related to* grades, engagement and so on or whether they exist *even after taking such factors into account*. This exercise will provide us with a better understanding of the group differences, even if only from a descriptive perspective.

Our model uses a multinomial logit set-up to differentiate between access to college and university. This allows the regressors in our models to have different effects on college and university participation while allowing these processes to be related.

IV. The Data

IV.1 The Youth in Transition Survey

This paper uses data from Cohort A of the Youth in Transition Survey (or YITS-A) to analyze the PSE participation of under-represented groups in Ontario. The YITS-A is ideal for this application, since it follows young people born in 1984 (age 15 in December 1999 as per the sample selection criteria) through their later high school years and beyond. The longitudinal aspect of the survey allows us to examine the impact of belonging to each of the under-represented groups (as defined at age 15) on subsequent PSE outcomes and to do so while taking other important factors affecting PSE access into account.

In March and April of 2000 (Cycle 1), the YITS-A began with the completion of a written survey by a representative sample of Canadian high school students who were 15 years old as of December 31, 1999. Interviews were also conducted with the parents of these students and with officials of the high schools they attended. In addition, the YITS-A also contains the youths' "PISA" reading scores (PISA, the Programme for International Student Assessment, is an international standardized test in which Canada participated).[6]

The students themselves (although not their parents or school administrators) were surveyed again in 2002, 2004, 2006 and 2008 (Cycles 2, 3, 4 and 5). We chose to use the

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[6] See Motte, Qiu, Zhang, & Bussiere (2009) for a general description of the YITS.

respondents' PSE status in the 2006 (Cycle 4) survey as the optimal compromise between the ability to identify participation in PSE (participation increases with age) and sample size (decreasing over time).[7] In this wave of the survey, the young people were 21 years of age, a point at which they had made their initial choices about entering PSE. Whether the individual has accessed PSE at this point forms the basis of our analysis.[8]

The dependant variable in our study represents whether or not the individual enrolled in college or university at any point over the first four cycles of the survey, regardless of whether or not they continued in their studies. This is the standard definition of access to PSE used in the literature; continuing on to graduation and other aspects of "persistence" are normally thought of as being a separate process. We differentiate access to college and university, counting only the latter (university) if the individual attended both.

All results shown in the analysis that follows (except for the absolute sample sizes shown in Table 1b) were generated using the weights constructed by Statistics Canada for the YITS-A, which are designed so that the samples (and any analysis based on them) should reflect the underlying population of youth born in 1984 (who would therefore be age 15 and living in Canada in December 1999).

IV.2 Under-Represented Groups in PSE

This subsection presents the definitions of the various under-represented groups discussed in this paper and describes how the categories were constructed using variables from the YITS-A. We also present the proportions of these groups (Table 1a), along with their absolute numbers (Table 1b) in our sample for Ontario and in our samples for Atlantic Canada, Quebec and Western Canada, as well as in all Canadian regions outside Ontario pooled together. It is important to remember that these distributions reflect the characteristics of the individuals (and their families) included in the YITS-A cohort, thus representing a sample of students aged 15 years old in 1999 (i.e., born in 1984 and living in Canada in 1999), rather than the general population as a whole.

Partly in consideration of sample size issues, the strategy in this paper is to define membership in the under-represented groups fairly broadly – especially in the case of the smaller groups such as Aboriginals. That said, we also aimed at keeping the groups sufficiently homogeneous and representative of the relevant characteristics.

The absolute (unweighted) sample sizes are shown in Table 1b. The smallest group in Ontario is Aboriginals, with just 59 observations. This is a small number, but not necessarily too small to identify a single parameter such as the difference in access rates for the members of this group as compared to others (i.e., non-Aboriginals) – which is the kind of

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[7] It should be noted that an analysis carried out by the MESA Project indicates that the attrition from the YITS-A does not appear to be a problem, at least for the analysis of access to PSE, since the original sample weights appear to do a good job of compensating for the attrition.
[8] Tests indicate that although access rates do increase over time, the structure of access with respect to background variables does not change in any important ways.

parameter we estimate for the most part in this work. We will come back to discussions of sample sizes as appropriate below.

Table 1a
Group distributions (%) by region

	Ontario	Atlantic Canada	Quebec	Western Canada	All Provinces Excluding Ontario
Family income					
Income below $50,000	26.4	47	40.2	32.5	37.3
Income greater than $50,000	73.6	53	59.8	67.5	62.7
Total	100	100	100	100	100
Parental education					
No PSE	28.9	28.4	37.8	26.7	31
At least some PSE	71.1	71.6	62.2	73.3	69
Total	100	100	100	100	100
Rural/Urban					
Rural	16.2	46.5	21	26.4	27.2
Urban	83.8	53.5	79	73.6	72.8
Total	100	100	100	100	100
French minority					
French minority	4.2	10.2	n/a	1.1	1.9
Non-French minority	95.8	89.8	n/a	98.9	98.1
Total	100	100	n/a	100	100
Family type					
Single parent	17.2	15.9	20.1	15.4	17.2
Two-parent family	82.8	84.1	79.9	84.6	82.8
Total	100	100	100	100	100
Immigrant status					
First generation immigrant	12	0.9	4.1	8.9	6.1
Second generation immigrant	26.1	5.8	9.7	20.2	14.4
Non-immigrant	61.9	93.3	86.2	70.9	79.5
Total	100	100	100	100	100
Aboriginal status					
Aboriginal	2.3	3.1	1.6	4.3	3.1
Non-Aboriginal	97.7	96.9	98.4	95.7	96.9
Total	100	100	100	100	100
Disability status					
Disability	11.4	15	9.5	16.5	13.7
No disability	88.6	85	90.5	83.5	86.3
Total	100	100	100	100	100

Table 1b
Absolute (Unweighted) Numbers of Observations by Group, by Region

	Ontario	Atlantic Canada	Quebec	Western Canada	All Provinces Excluding Ontario
Family Income					
Income Greater than $50,000	1,772	2,903	1,574	3,883	8,360
Income Below $50,000	613	2,616	919	1,896	5,431
Total	2,385	5,519	2,493	5,779	13,791
Disability Status					
No Disability	2,169	4,751	2,291	5,038	12,080
Disability	244	785	234	826	1,845
Total	2,413	5,536	2,525	5,864	13,925
Aboriginal Status					
Non-Aboriginal	2,354	5,382	2,492	5,601	13,475
Aboriginal	59	155	34	263	452
Total	2,413	5,537	2,526	5,864	13,927
Parental Education					
At Least Some PSE	1,710	3,954	1,666	4,277	9,897
No PSE	700	1,574	858	1,577	4,009
Total	2,410	5,528	2,524	5,854	13,906
Rural/Urban					
Urban	1,936	2,562	2,041	3,816	8,419
Rural	477	2,975	485	2,048	5,508
Total	2,413	5,537	2,526	5,864	13,927
Family Type					
Two Parent Family	2,066	4,820	2,091	5,109	12,020
Non-Traditional Family	347	717	435	755	1,907
Total	2,413	5,537	2,526	5,864	13,927
Immigrant Status					
Non-Immigrant	1,629	5,215	2,059	4,485	11,759
First Generation Immigrant	224	48	98	390	536
Second Generation Immigrant	560	274	369	989	1,632
Total	2,413	5,537	2,526	5,864	13,927
French Minority Outside Quebec					
Non-French Minority	1,984	4,907	…	5,675	13,108
French Minority	429	630	…	189	819
Total	2,413	5,537	…	5,864	13,927
Gender					
Male	1,172	2,601	1,281	2,945	6,827
Female	1,241	2,936	1,245	2,919	7,100
Total	2,413	5,537	2,526	5,864	13,927

… not applicable

For the purposes of defining *students from low-income households,* we turn to the parent survey. The interviewed parent was asked to provide a comprehensive total of pre-tax income for both parents (or guardians) of the student. We define low-income households to be those with a total household income (parents only) of less than

$50,000.[9] This is an arbitrary cut-off, but for Ontario, this amount represents just over the lowest quartile of the parents' income distribution (26.4 per cent) in the YITS-A (Table 1a) – that is, just over one-quarter of Ontario participants had "family" incomes below this income cut-off. (We use the term "family incomes," rather than "parents' income," henceforth, for convenience.) In comparison to the other regions, Ontario has the lowest proportion of 15-year-olds from low-income families by this definition. The highest proportion is in Atlantic Canada, with 47 per cent.[10]

First-generation PSE students are defined as those high school students whose parents did not attend any form of PSE. This captures 28.9 per cent of the Ontario sample. Using this measure of parental education, we do not find large differences across the regions except in Quebec, where 37.8 per cent of the sample comes from a family with no PSE.

Rural students are classified according to the community in which they were living when they attended high school at age 15. Urban high schools fall within the Metropolitan Influence Zone of an urban centre, which is defined by the proportion of households that have an individual who commutes to the urban core. Ontario is the most urbanized province by this definition, with only just over 16 per cent of the YITS-A cohort attending a rural high school. Again, Atlantic Canada is the outlier, with a much higher rate: 46.5 per cent.

To identify the respondents whose **mother tongue is French**, we again turn to the parental questionnaire. Those individuals who learned French as their first language and still understand it are considered members of this group. This is a small population: just over 4 per cent of the Ontario cohort's mother tongue is French – a higher percentage than in the Western provinces but lower than in the Atlantic region. Nevertheless, this represents 347 students in the survey.

What we refer to as students from **single-parent families** includes all those from anything but a two-parent family. The parental questionnaire includes detailed questions about the number of parents and guardians the student had at the age of 15. We consider step-parents and other guardians as "parents" when determining the number of parents in the household. Students from single-parent (or other) families, which will be referred to as "single-parent families" hereafter, make up just over 17 per cent of the Ontario cohort. Across the regions, family types are fairly uniform, though Atlantic Canada and the Western provinces have somewhat smaller proportions of individuals from single-parent families than do Ontario and Quebec.

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[9] The small number of students with parental incomes below $5,000 have been dropped from this analysis due to suspicion of respondent error. In particular, most of these cases reported zero for all income categories (which allow for the reporting of government transfers directed at low-income families), while the behaviour of these youth with respect to access to PSE is not at all like that of other low-income families. This group represented about 1.3 per cent of the sample.
[10] In order to keep the measure simple and easy to interpret, incomes are adjusted neither for family size nor for the cost of living. Adjusting for these factors could change the results – but probably not greatly.

To determine *first- and second-generation immigrants*, we once more use the parental questionnaire. Parents were asked which country they and the student were born in. We consider any student born outside of Canada to be a *first-generation immigrant* and any student born within Canada but with at least one parent born outside of Canada to be a *second-generation immigrant*. Because all first-generation students must have been enrolled in a Canadian high school at age 15 in order to be included in the YITS, the first-generation group represents what some have called the "1.5 generation," since they immigrated along with their parents at an early enough age that they completed their high school education in Canada rather than abroad. In comparison to the other regions, Ontario has by far the highest proportion of immigrants, comprising just over 38 per cent of the cohort.

In the YITS, *Aboriginal* youth are identified by their parents' response to the question "Is this person [the student] Aboriginal, that is, North American Indian, Métis, or Inuit?" It should be noted that the YITS did not survey youth living on-reserve, so our sample and analysis excludes that group. A relatively small proportion of our sample – 2.3 per cent in Ontario (and just 59 actual observations) – consists of Aboriginal youth. This is lower than in the other regions except for Quebec and means the numbers reported below have to be viewed with particular caution. Nevertheless, some interesting findings emerge.

Partly to gain sample size, but also to be inclusive, we adopt a fairly broad definition of *students with a disability* for the purposes of this paper. This definition includes physical, sensory and cognitive disabilities based on information provided in the parental questionnaire. The disability variable captures those individuals whose parents report them having difficulties in those areas, as well as those whose parents report them having a condition that reduces the amount or kind of activities they perform at home, at school or anywhere else. According to this definition, just over 11 per cent of Ontario survey respondents have a disability. This is slightly lower than the percentage for all the other regions except Quebec, where the level was 9.5 per cent.

IV.3 Additional Explanatory Variables[11]

In addition to membership in the under-represented groups of interest that are described above, we also include in our analysis measures of experiences, behaviour and performance in high school from the rich data available in the YITS-A.

The measure of *high school grades* is included in our analysis to capture the student's performance in the educational system prior to attending PSE. The YITS asked students to specify their overall average grade using a series of percentage categories. From this information we constructed a pseudo-continuous variable using the midpoints of these

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[11] See Finnie and Mueller (2008) for further details about the variables discussed in this subsection.

categories (tests indicated that it performed just as well for our purposes as a set of detailed variables).[12]

Based on the answers to a battery of questions relating to engagement, self-image, social support and parental behaviour, Statistics Canada constructed various sets of "***scale variables.***" Three measures come under the heading of "high school engagement." The first of these, "academic identification," refers to getting along with teachers, having an interest in the subject matter and related behaviours and attitudes. "Academic participation" is an aggregate of working diligently both inside and outside of school, including hours spent on homework, meeting assignment deadlines, not skipping classes, etc. Finally, "social engagement" is a gauge of social involvement at school such as having friends, a feeling of belonging to the social aspects of school and so on.

The next set of variables represents "self-perception" and again contains three specific measures. "Self-esteem" is largely self-explanatory. "Self-efficacy" reflects the student's responses to questions related to their competence and confidence in performing school work. Finally, "self-mastery" is an appraisal of the individual's sense of broader control over their life.

The third category of scale measure consists of a single variable, "social support," which measures the availability of assistance from friends and family.

Finally, "parental behaviour" consists of three separate measures. "Monitoring behaviour" reflects the parents' awareness of what their child is doing and with whom they are friends. Second, "nurturance behaviour" is measured by a set of variables aimed at measuring the degree to which parents are "supportive of their youth's education, are involved in their youth's school, and have a firm but responsive parenting style" (from the YITS codebook). The same goes for the third measure, "inconsistent discipline," which addresses how parents address their child's inappropriate behaviour.

These scale variables are constructed to have a mean of zero and a standard deviation of 1 across all the students surveyed in the PISA 2000 survey (which included Canada, along with 42 other countries).

The ***PISA reading score*** is the score obtained on the standardized international reading test that was administered to all those included in the YITS-A. It is normalized to have a mean of 500 and a standard deviation of 100. We use the reading test because it was administered to all YITS-A participants, while both the math and the science components of the assessment were administered only to some.

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[12] In previous work (Finnie & Mueller, 2008), we have found that the overall grade is a better predictor of access to PSE than grades in specific subjects (math, science, main language).

IV.4 Sample Selection

Non-Canadian citizens and those with unknown immigration status were dropped from the sample. In addition, we deleted those individuals for whom data were missing, as well as those who, at 21 years of age, were continuing in high school as of the Cycle 4 survey – since we obviously did not observe any immediate potential transition into PSE for this latter group. In large part due to the completeness of the YITS data, our selection procedures resulted in relatively few individuals being dropped. The final sample contains 1,158 males and 1,224 females in Ontario. At times, however, this number is reduced slightly due to missing values for some of the variables included in the different models.

V. Results

V.1 PSE Access Rates by Group and Region

In this subsection, the PSE access rates of the groups of interest are provided, along with those of the relevant comparison groups. As described in the previous section, we define access to a given type of PSE (college or university) as having been enrolled in that type of PSE program by the end of Cycle 4, when those in the YITS-A cohort are 21 years of age. These access rates are presented in Table 2. We go over these results fairly quickly, and only as an introduction, since the regression results we present below start with a set of models that essentially present the same patterns while showing which differences are statistically significant and which are not.

For most of the groups of interest within Ontario, we observe substantially lower university participation rates than for other Ontarians but – interestingly – higher college participation rates. We can thus say that, generally speaking, being a member of one of these under-represented groups results – at least statistically speaking – in substantially lower university participation, with some individuals substituting college for university and others opting for no PSE at all. This pattern is by no means uniform across the country, perhaps reflecting the associated differences in PSE systems, with Ontario characterized by, among other things, its relatively large college sector.

Table 2
Rates of access to college and university for groups of interest by region

	Ontario		Atlantic Canada		Quebec		Western Canada		All Provinces Excluding Ontario	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
All	36.4	45.5	24.6	51.1	40	30.3	26.1	42.8	31	39.3
Family income										
Income below $50,000	39.3	35.2	29.2	36.1	41.3	19.7	26.5	36.4	32.8	29.8
Income greater than $50,000	35.2	49.5	20.5	64.4	39.2	37.3	26	45.8	30	45
Parental education										
No PSE	43.5	25.7	30.1	30.1	38.5	16.7	27.5	28.6	32.7	23.5
At least some PSE	33.5	53.7	22.4	59.5	40.9	38.5	25.7	47.9	30.2	46.5
Rural/Urban										
Rural	44.6	28.6	30.4	42.5	40	23.2	28.7	33.1	32.3	32.5
Urban	34.9	48.8	19.6	58.5	40	32.1	25.2	46.3	30.5	41.9
French minority										
French minority	43	39.5	26.3	48.4	n/a	n/a	21	50	24.8	48.9
Non-French minority	36.1	45.8	24.4	51.4	n/a	n/a	26.2	42.8	31.1	39.2
Family type										
Single parent	41.1	36.4	24.4	39.7	41.9	24.9	24.8	34.3	32.1	31
Two-parent family	35.5	47.4	24.6	53.2	39.5	31.6	26.4	44.4	30.8	41.1
Immigrant status										
First generation immigrant	30.1	58.4	12.6	82.6	44.5	29.1	24.1	63.4	28.9	55.3
Second generation immigrant	31.2	54.7	12.7	70.5	38.1	46.5	26.7	51.2	28.8	51.1
Non-immigrant	39.9	39.2	25.5	49.6	40	28.5	26.2	37.9	31.6	36
Aboriginal status										
Aboriginal	38.7	17.8	19.5	40.7	35.3	25.6	20.9	22.4	23.3	25.5
Non-Aboriginal	36.4	46.2	24.8	51.4	40.1	30.3	26.4	43.7	31.3	39.8
Disability status										
Disability	46.2	22.1	26.4	37.9	41.6	16.5	28.5	27.4	31.5	26.2
No disability	35.2	48.5	24.2	53.4	39.8	31.7	25.7	45.9	30.9	41.5

The Ontario youth in our sample who come from low-income households (those that have a combined parental annual income of less than $50,000) have an overall rate of PSE attendance that is 10 percentage points lower than the remainder of the Ontario sample, while their university participation rate is 14 percentage points lower (35.2 per cent for low-income students versus 49.2 per cent for others). A similar pattern holds for the other regions, with some variation. In particular, in Atlantic Canada, where university participation rates are generally high, there is an even greater difference between lower-income students' and higher-income students' university access rates (36.1 per cent versus 64.4 per cent versus). Quebec, meanwhile, has a much lower overall university participation rate and an even wider gap in relative participation between low-income students and other students (19.7 per cent versus 37.3 per cent).

In Ontario, students with no family background of PSE attendance have an overall PSE participation rate that is 18 percentage points lower than that of students with at least one parent who attended PSE. More dramatically, the university participation rate of first-generation PSE students is less than half that of non-first generation PSE students, at 25.7 per cent and 53.7 per cent, respectively. This is offset to some degree by higher college participation rates (43.5 versus 33.5 per cent). From another perspective, many fewer first-generation youths attend PSE of any sort, and of those who do, the great majority choose college rather than university, which is the opposite of the comparison group. The university gap is about the same in Atlantic Canada and Quebec in absolute terms, while it is smaller in the West. At the same time, Ontario's 10-percentage-point difference in the other direction (i.e., higher rates) for college enrolment is the largest in the country.

Rural Ontarians are also underrepresented in PSE, with an overall PSE participation rate that is 10 percentage points lower than that of students from urban areas. Furthermore, and following the same pattern as for the other groups seen so far, their university access rate is a full 20 percentage points lower than that of students from urban areas (28.6 per cent versus 48.8 per cent), with their higher college rates offsetting this difference to some degree (44.6 per cent versus34.9 per cent for their urban counterparts). Furthermore, these differences are larger in Ontario than in any of the other regions. Atlantic Canada has the smallest gaps, and in Quebec there is no difference between the college access rates for rural and urban students, this presumably due at least in part to the CEGEP system there.

While those respondents whose first language is French have a slightly higher overall PSE participation rate than others in Ontario, their university attendance rate is around 6 percentage points lower, which is just a little more than offset by their higher college rates. In Atlantic Canada, the Francophone university participation rate is just a few percentage points lower than that of the remainder of the population, while their college participation rate is a couple of points higher. In Western Canada, Francophones have a higher university participation rate and a lower college participation rate than non-Francophones.

Within Ontario, students from single-parent families access PSE at an overall rate that is 5 percentage points lower than that of students from two-parent families. Once again, the college attendance rate is slightly higher for this group, but the university participation rate is 11 percentage points lower. The same pattern, with smaller differences, is observed in Quebec. In Atlantic Canada, students from single-parent families have a similar college attendance rate to that of students from two-parent families, but the difference in the university attendance rate is over 13 percentage points. In the West, the difference between the university access rates is similar to that in Ontario, while the college participation rate for students from single-parent households is approximately 2 percentage points lower than the rate for students from two-parent families.

First- and second-generation immigrants in Ontario have higher PSE participation rates than non-immigrants, so they are not actually an "under-represented group" – at least as far as PSE is concerned. This is driven by their university participation rates, which are 19 percentage points higher for first-generation immigrants and 15 percentage points higher for second-generation immigrants as compared to non-immigrant youth; college participation rates for first- and second-generation immigrants are lower. Higher university and lower college access rates are also observed for first- and second-generation immigrants in all other regions, except for first-generation immigrants in Quebec, where their university access rates are about the same, and their college rates are only a bit higher than those of non-immigrants.

Youth of Aboriginal ancestry are dramatically underrepresented in university in Ontario, with an overall participation rate 28 percentage points lower than that of non-Aboriginal respondents (46.2 per cent versus 17.8 per cent). College participation rates are similar for Aboriginal and non-Aboriginal youth, so all the difference in the overall rate of PSE access is due to the very large difference in their university participation rates. This particular pattern is not repeated in the other regions and provinces, where Aboriginal youth have lower participation rates for both university and college, partly because the university gap is not nearly as large as it is in Ontario.

Ontarians whose parents identified them as having a cognitive or physical disability have an overall PSE participation rate 15 percentage points lower than the participation rate of those without a disability. The difference in university participation is 26 percentage points in favour of those without a disability. The difference in college participation is 11 percentage points in favour of those with a disability, thus partially offsetting the university gap.

V.2 The Main Regression Model Results for Ontario

This section extends the descriptive analysis presented above by first placing those same simple two-way comparisons in a very simple regression framework and then seeing what happens when interactions across the groups is taken into consideration. For example, many of those in one of the under-represented groups tend to be in one (or more) of the other groups as well: what are the differences once those other factors are taken into account? The results presented below are for male and female Ontarians pooled together. Because the PSE attendance rates (both specific and overall) for males

and females are quite different, an indicator variable for females is included in the model. These models assume that the relationship between membership in the various under-represented groups and PSE access is similar for male and female students. This assumption is relaxed in subsection V.3.

V.2.1 Model Construction and Interpretation

Table 3 presents the results from a number of different multinomial logit models. The first set of columns, labelled "separately," represents the results from a set of regressions which look at the differences associated with being in each of the different groups of interest treated separately (one for those from low-income families, one for those from no-parental PSE families, etc.[13]). Each of these models includes only the variable indicating membership in the group of interest and the female indicator variable. These results correspond very closely to the descriptive PSE access rates presented in Table 2, as they should, since we are just putting those overall differences into a very simple regression framework. The college and university effects, estimated jointly in the multinomial logit set-up used, are shown separately.

The next set of columns, labelled "jointly," represents the results from one single model that includes the indicator variables for each of the groups of interest treated simultaneously. Comparison of the two sets of results – "separately" and "jointly" – for each of the indicator variables reflects the correlation between the different groups and what these correlations mean for the estimated effects associated with each individual group. Please note that when we discuss average marginal effects (often shortened to "effects") in the analysis below, we are referring to statistical correlations and are not making any claims of a causal effect between membership in one group of interest and attending PSE.

The third and fourth sets of columns summarize the differences between the two sets of models just described. The first represents the absolute change in the average marginal effects between the separate and joint models. The last columns indicate what proportion of the original "effect" in the separate models remains when the other influences are considered. The higher the proportion, the more the effect is robust to adding in additional effects. The remaining relative effect measure is the most meaningful when the coefficient in the separate model is relatively large and statistically significant. We should not read too much into the relatively large remaining effects for the college estimation when the university effect appears to be almost completely explained by the other characteristics. This is largely due to the construction of the model, as discussed below.

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[13] A single model includes both the first and second generation immigrant indicators.

Table 3
Multinomial estimates of access to college and university: Baseline model, all students (Ontario)

	Separately		Jointly		Absolute Change		Remaining Relative Effect (%)	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Gender: Female (Male)	‡	‡	-0.050**	0.171***				
			[0.022]	[0.022]				
Income below $50,000 (Others)	0.042	-0.149***	0.016	-0.072***	0.026	-0.077	38.1	48.3
	[0.028]	[0.025]	[0.031]	[0.027]				
Parents with no PSE (Others)	0.099***	-0.280***	0.080***	-0.236***	0.019	-0.044	80.8	84.3
	[0.028]	[0.021]	[0.029]	[0.021]				
HS Location: Rural (Urban)	0.096***	-0.201***	0.063*	-0.131***	0.033	-0.070	65.6	65.2
	[0.033]	[0.026]	[0.033]	[0.027]				
French minority (Others)	0.075*	-0.071*	0.035	0.004	0.04	-0.075	46.7	-5.6
	[0.039]	[0.039]	[0.036]	[0.037]				
Single parent (Two parents)	0.051	-0.115***	0.029	-0.028	0.022	-0.087	56.9	24.3
	[0.034]	[0.031]	[0.036]	[0.033]				
Immigration status (Non-immigrant)								
First generation immigrant	-0.107***	0.189***	-0.077*	0.145***	-0.03	0.044	72.0	76.7
	[0.038]	[0.040]	[0.041]	[0.039]				
Second generation immigrant	-0.085***	0.145***	-0.065**	0.101***	-0.02	0.044	76.5	69.7
	[0.026]	[0.027]	[0.027]	[0.026]				
Aboriginal (Non-Aboriginal)	0.028	-0.277***	0.004	-0.222***	0.024	-0.055	14.3	80.1
	[0.082]	[0.057]	[0.078]	[0.060]				
Disabled (Non-disabled)	0.091**	-0.239***	0.082**	-0.207***	0.009	-0.032	90.1	86.6
	[0.040]	[0.028]	[0.039]	[0.028]				
Observations	2,382		2,382					

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01 **p < 0.05 *p < 0.1. The "Separately" columns report the results of the separate models run, where each group variable was included with only a gender variable (i.e., eight separate regressions in all). The "Jointly" columns report the results with all variables included together. The "Absolute Change" columns give the differences in average marginal effects between the separate regressions and the joint regression for each variable. The "Remaining Relative Effect" represents the effect in the joint regression as compared to the effect in the separate " regressions. ‡ The gender variable was included in each separate regression; its coefficient varied depending on which variable was also included.

In addition, note that some of the groups have significant effects for both college and university attendance – these influences running in opposite directions. For example, those students whose parents have no PSE background have, *ceteris paribus*, university participation rates that are 28 percentage points lower than those of the comparison group (those with at least one parent who has attended some PSE), but this is partly offset by a 9.9 percentage point higher rate of college attendance. This makes sense: not having a parental history of PSE attendance changes not only how many individuals go on to PSE (the net decrease of 17.9 per cent represented by the two effects taken together in the example just given), but also the distribution of the kind of schooling they engage in (decreasing university-level schooling and increasing college-level participation). The multinomial logit model used here captures these effects in the econometrically appropriate manner and also in a way that is expositionally convenient.

V.2.2 The Baseline Models

While a number of studies have shown that students from low-income households are less likely to attend PSE, university in particular, recent research (e.g., Finnie and Mueller [2008]) has indicated that this effect is highly correlated with other factors, particularly parental education. We can see this in Table 3, where over 50 per cent of the university effect associated with being in the low-income group disappears when the other variables – including the parents' PSE backgrounds – are included. That said, students from low-income families are just over 7 per cent less likely to attend PSE after controlling for other factors (this is seen in the -.072 average marginal effect in the university effect in the "jointly" column).

These results should not be taken to mean that money does not matter, but rather that the role that money plays is limited in comparison to the role played by some of the other factors discussed here. Furthermore, these results are based on the PSE cost structure and student financial aid system currently in place: were these significantly different, the effects of family income would undoubtedly be very different. The students in this cohort were, for instance, able to use the Ontario Student Assistance Program (OSAP) and other financial aid programs to help fund their PSE, and tuition was, for the most part, regulated by the province.

The results in Table 3, on the other hand, emphasize the fact that first-generation PSE students are much less likely to attend PSE. Taking this factor individually, a young person who has no family history of postsecondary education is, on average, 28 percentage points less likely to attend university and over 18 percentage points less likely to attend PSE of any kind than someone whose parents themselves went to college or university. These effects remain quite strong even when membership in the other groups of interest is taken into account; for example, almost 85 per cent of the effect on university access remains when the other variables are included in the model, leaving a gap of 23.6 percentage points. These are enormous effects.

This result emphasizes the important role that parental education plays with regard to PSE access; the effect of being a first-generation PSE student is larger than the effects for any of the other under-represented groups, and this holds whether or not the other variables are included in the model. Being from a non-PSE family has a greater effect

than being from a low-income family (by far) or a rural area (again by far); the parental education effect is even greater than the effects of being disabled or Aboriginal.

Students from rural areas are underrepresented in university. A student who attended a rural high school is 20.1 percentage points less likely to attend university but 9.6 per cent more likely to attend college when this variable is considered in isolation, and 65 per cent of these differences remain when the student's other characteristics are added to the model. This suggests that while some of the gap in rural student representation in PSE is explained by other student characteristics (particularly membership in a lower-income household or not having a family history of PSE), there is also a significant unexplained portion, or "net effect."

The similarity in magnitude – but in opposite directions – of the college and university effects in the separate model indicates that students whose first language is French are, on average, approximately 7 percentage points more likely to attend college and a similar 7 points less likely to attend university. These students therefore attend some form of PSE at a rate roughly comparable to that of other Ontarians but tend to favour college over university compared to non-Francophones. The underrepresentation of Francophone Ontarians in university appears, however, to be almost fully explained by other student characteristics, as is about half their positive college effects, although all of these estimates should be treated with caution, since the estimates are generally not very precise (see the relatively low level of statistical significance and comparatively high standard errors relative to the point estimates of the estimated effects indicated in the table).

Ontarians from single-parent families (and other non–two parent family types) are 11.5 percentage points less likely to attend university than those from two-parent families when treated in isolation. The small (and statistically insignificant) marginal effect for college attendance suggests that about half of that effect may be a shift to PSE at that level. Again, though, a large proportion of these effects appears to be related to the other characteristics of the students (as captured by the other variables included in the "joint" models), and the remaining differences are small and not statistically significant. In short, family status on its own does not appear to be an important factor, but being in a single-parent family is also often associated with low income, with the parent not having a background in PSE and other factors that are themselves associated with lower participation rates.

First- and second-generation immigrants, taken as a whole, are much more likely than other Ontarians to attend PSE, driven entirely by their much higher university participation rates (college rates are actually lower). Furthermore, a substantial proportion of the university effects – 77 per cent for first-generation immigrants and 70 per cent for the second-generation – is not explained by the other student characteristics included in the model. This matches the strong immigrant effects – and the limited ability of other variables to explain these differences – observed by Finnie and Mueller (2010).

In Ontario, as in other regions of Canada, Aboriginal youth are significantly underrepresented in PSE. The average marginal effect on university attendance, taken separately, is almost 30 percentage points (there is little offsetting college effect) and

this effect remains at 22 percentage points when the students' other characteristics are taken into account. So this gap appears to go beyond these students having lower incomes, being less likely to have a history of PSE in the family, living in rural communities and so on. Given the limited sample sizes, the statistical significance of these estimates attests to the strength and uniformity of the underlying differences.[14]

Students with a physical or cognitive disability are almost 24 percentage points less likely to attend university than others and 14 percentage points less likely to attend PSE at all (they have higher college rates). Interestingly, of all the groups addressed in this study, the effect of having a disability is the most robust to the inclusion of other characteristics in the model. This presumably reflects the fact that disability tends not to be so highly correlated with family income, parental education, rural residence and so on as is often the case with the other groups.

The results of the multinomial logistic model described above provide some key insights into how these groups of Ontarians are underrepresented in PSE. By showing the average marginal effects from the separate and joint models and highlighting the differences between them, we are able to differentiate between groups whose underrepresentation in PSE can be explained by other factors and groups whose underrepresentation goes beyond these related factors.

One trend that the model results make quite clear is the apparent general shift from university to college among those belonging to under-represented groups. This may represent evidence that students who are not able to attend university – or choose not to do so – may instead be able to take advantage of a well-functioning community college system in Ontario. The "demand side" versus "supply side" of these relationships might warrant some further research.

Two of the groups considered in this model – students from low-income households and first-generation PSE students – are both sizeable in number and associated with strong effects. The results presented here suggest that the combined effects of belonging to these groups operate much more through parental education, rather than through parental income.

Students whose mother tongue is French and those from single-parent households are underrepresented in Ontario's PSE system, but these results suggest that the effects can be explained largely by other characteristics of these students: that they tend to come from lower-income households, that their parents do not have a history of PSE participation and so on. They may therefore not be subject to the same sort of specific

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[14] That is, for such differences to be estimated with the relative precision they are, as indicated by the low standard errors of the estimates and (related) high levels of statistical significance indicated in the table, the results must be strong and relatively uniform. (Standard errors and statistical significance are, simply put, the result of the uniformity of behaviour and sample size. With small samples, the behaviour of the group in question – in this case their lower PSE participation rates – must be relatively uniform for the estimates to have these statistical properties.

factors that prevent Aboriginal, disabled or rural youth from attending PSE (i.e., those groups whose effects remain strong even when other factors are considered).

V.2.3 Adding the Additional Explanatory Variables

In the preceding subsection, a multinomial logit regression framework was used to capture the relationship between membership in the under-represented groups and participation in PSE. By controlling for membership in multiple groups, we gained insight into the relationships that make members of these groups less likely to attend PSE (especially university). We now continue this analysis by adding additional correlates of PSE attendance. By observing the differences between the models with and without these correlates, we can further advance our understanding of the educational prospects of these groups and at least some of the factors with which their underrepresentation appears to be associated. The caveats about causal interpretations of these results again apply.

Table 4 continues the model presented in the previous section, with the first (or baseline) column repeating the same set of jointly estimated effects as shown in Table 3.[15] The remaining columns add in the high school performance and related variables – grades, the scale variables and the student's PISA reading score – described in the data section above.

The effect of high school grades can be interpreted as the change in the likelihood of attending the relevant level of PSE associated with a 1 percentage point increase in the individual's overall high school grade average. Therefore, in the model where only grades are added to the previous specification a student with a 10 per cent higher grade than another individual would be 23 percentage points more likely to attend university, 13 percentage points less likely to attend college and 10 percentage points more likely to attend any form of PSE (the total of these two effects).

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[15] Note that the estimates included in the first column of Table 4 are not exactly the same as those in the "joint" column of Table 3, even though the same variables are included. The reason is that for all regressions in Table 4, respondents' missing information on high school grades, scale variables or PISA reading scores have been dropped. However, the changes are minimal.

Table 4
Multinomial estimates of access to college and university: Adding the additional explanatory variables, all students (Ontario)

	Baseline		HS Grade		Scales and PISA		All	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Gender : female (Male)	-0.062***	0.172***	-0.013	0.076***	-0.042*	0.118***	-0.015	0.068***
	[0.023]	[0.023]	[0.022]	[0.020]	[0.023]	[0.021]	[0.024]	[0.020]
Income below $50,000 (Others)	0.013	-0.061**	-0.002	-0.036	-0.013	-0.005	-0.014	-0.005
	[0.032]	[0.028]	[0.030]	[0.025]	[0.030]	[0.025]	[0.029]	[0.023]
Parents with no PSE (Others)	0.084***	-0.235***	0.048*	-0.170***	0.033	-0.124***	0.024	-0.114***
	[0.030]	[0.023]	[0.028]	[0.023]	[0.027]	[0.022]	[0.027]	[0.021]
HS location: Rural (Urban)	0.055	-0.133***	0.026	-0.091***	0.036	-0.087***	0.023	-0.074***
	[0.034]	[0.028]	[0.033]	[0.027]	[0.031]	[0.026]	[0.031]	[0.025]
French minority (Others)	0.036	-0.002	0.025	0.010	-0.040	0.106***	-0.029	0.088***
	[0.037]	[0.038]	[0.035]	[0.031]	[0.034]	[0.033]	[0.033]	[0.030]
Single parent (Two parents)	0.028	-0.040	0.014	-0.021	0.025	-0.037	0.017	-0.025
	[0.036]	[0.034]	[0.035]	[0.030]	[0.035]	[0.029]	[0.034]	[0.027]
Immigration status (Non-immigrant)								
First generation immigrant	-0.096**	0.154***	-0.080**	0.123***	-0.101**	0.163***	-0.093**	0.145***
	[0.041]	[0.041]	[0.040]	[0.035]	[0.041]	[0.037]	[0.040]	[0.033]
Second generation immigrant	-0.071**	0.106***	-0.071***	0.099***	-0.071***	0.093***	-0.073***	0.089***
	[0.028]	[0.027]	[0.026]	[0.023]	[0.026]	[0.022]	[0.026]	[0.021]
Aboriginal (Non-Aboriginal)	0.019	-0.184***	0.008	-0.169***	0.020	-0.110	0.017	-0.120
	[0.082]	[0.071]	[0.080]	[0.062]	[0.082]	[0.082]	[0.083]	[0.073]
Disabled (Non-disabled)	0.108***	-0.219***	0.079**	-0.164***	0.084**	-0.130***	0.074**	-0.120***
	[0.041]	[0.032]	[0.039]	[0.031]	[0.038]	[0.031]	[0.037]	[0.029]
Overall grade in last year HS			-0.013***	0.023***			-0.008***	0.015***
			[0.001]	[0.001]			[0.001]	[0.001]
Overall engagement					-0.026*	0.068***	-0.017	0.052***
					[0.015]	[0.013]	[0.015]	[0.012]
Self-esteem					-0.016	0.004	-0.017	0.004
					[0.016]	[0.014]	[0.016]	[0.013]
Self-efficacy					-0.018	0.042***	-0.001	0.014
					[0.014]	[0.011]	[0.014]	[0.011]
Self-mastery					0.008	0.001	0.006	0.006
					[0.016]	[0.013]	[0.016]	[0.012]
Social support					0.022	-0.045***	0.017	-0.036***
					[0.014]	[0.012]	[0.014]	[0.011]
Monitoring behaviour					0.010	0.010	0.009	0.011
					[0.014]	[0.012]	[0.013]	[0.011]
Nurturance behaviour					-0.016	0.001	-0.016	0.000
					[0.013]	[0.011]	[0.012]	[0.010]
Inconsistent discipline					-0.008	-0.021**	-0.014	-0.010
					[0.012]	[0.010]	[0.012]	[0.009]
Reading ability					-0.001***	0.002***	-0.001***	0.002***
					[0.000]	[0.000]	[0.000]	[0.000]
Observations	2,257		2,257		2,257		2,257	

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01 **p < 0.05 *p < 0.1. The grade variable is the students' overall high school grades divided by 10. The reading ability variable used is the students' PISA reading scores divided by 100.

As described above, the various scale variables are constructed to have a mean of zero and a standard deviation of one. This means that the effects shown in Table 4 represent a student with a score of one standard deviation greater than another for each of the particular scale variables shown. The engagement scale shows the greatest overall effect among the scale variables because it includes both academic identification, which is highly correlated with PSE aspirations, and academic participation, which includes information on study habits and other behaviour that is correlated with academic success. The effect associated with the "self-efficacy" variable is also fairly strong.

The reasons for the negative effect of the social support scale are less clear but may have something to do with the interactions between the various scale variables. Or it could be that more strongly "socially connected" individuals are simply less likely to go on to university than others; perhaps they focus less on school and more on the social side of their lives. Regardless, it is an interesting result because it is often hypothesized that being socially connected is positively related to a range of outcomes, scholastic ones included. These data appear to be inconsistent with that hypothesis. The negative impact of having parents who exercise "inconsistent discipline" is also interesting, albeit the effect is not large (2.1 percentage points).

The effect of the PISA reading score is in the expected direction, as it captures both unobserved ability and academic skills (as shown by the reduction in the effect of high school grades between the second and fourth sets of columns of Table 4).

When high school grades (only) are added to the analysis (the second set of regression results shown in the table) (model 2), the *direct* effect of being from a low-income household on university attendance is reduced by almost another half, to just 3.6 per cent, and is no longer statistically significant, suggesting that one of the ways that the income effect operates is through the student obtaining lower high school grades. Including the scale variables and the PISA scores instead (the third set of results) reduces the effect to nil. That is, once high school factors are controlled for, there is no remaining income effect. This is very important from a policy perspective because the policy orientation has – as discussed earlier – been largely focused on money-related interventions (tuition controls and subsidies, student financial aid and so on), based in part on earlier findings that family income is correlated with participation in PSE. These findings suggest that, at least at the margin, such policies are likely to have little effect on increasing the university/PSE participation rates of youth from low-income families and that other, earlier interventions are required to help this group.

In contrast, when the grade and scale variables are added to the model, being a first-generation PSE student still has a strong direct effect on not attending university, although it is substantially reduced: the effect goes from 23.5 per cent in the baseline model to 11.4 per cent in the final model, where all the other high school–related variables are included. It therefore appears that while parents' education influences what happens in high school, it also has a significant impact on students when they make the transition from high school to postsecondary education *at that point*, perhaps by influencing students' choices. The (partially) compensating positive effect on college attendance essentially disappears once the extra variables are added.

When both sets of high school performance and behaviour variables are added to the model, the effect of being from a *rural* area on university accessremains strong and statistically significant, although the effect is cut nearly in half, from 13.3 per cent to 7.4 per cent. This is consistent with the idea that part of the rural effect is related to other factors with which it is correlated, including not only parental education, income and so on (as seen above), but also (now) high school experiences and other related measures. But part of the rural effect is still net of these factors, presumably due to their facing higher costs due to distance to PSE, having different preferences for higher education, other cultural effects and so on.

When the additional variables are added to the model, the average marginal effect for Francophones jumps to a positive 8.8 percentage points (statistically significant). This may, however, be an artefact of the PISA reading test. That is, once PISA scores – where Ontario Francophones perform relatively poorly – are added to the model, the Francophone effect jumps up, implying that the rate at which they go to PSE is high relative to what might be expected from those poor test scores. To understand these results better, it would be necessary to better understand why they have lower PISA scores. Perhaps it is because some Francophones – precisely because they are a minority group in Ontario and in some cases are attending English-language schools – take the test in English, rather than French, thus driving their scores downward. But here we are speculating.

For those from single-parent families, the small effects found in the jointly estimated model are reduced yet further. In short, family status, on its own, has little effect on access to PSE. Of course, we have seen that they do have a "raw" gap, but this is due to their being in low-income and lower-parental-education families and so on, rather than their family status per se.

The strong positive effects of being a first- or second-generation immigrant remain strong and are only slightly affected when grades, the scale variables and PISA scores are added to the model. For first-generation immigrants, adding the scale variables and the PISA score actually increases the magnitude of the effects. As observed with the Francophone results above, this is probably due to their systematically lower scores on the PISA tests.

These results suggest that the effects on PSE attendance of being an immigrant – unlike many of the other factors discussed here – do not work through high school performance and behaviour. This is an interesting finding: they go on to PSE in much greater numbers not because they do so well in high school, but because they are more likely to go on for a *given* set of high school outcomes.

Adding high school grades to the model only moderately reduces the significance of being an Aboriginal student on PSE attendance. This suggests that high school grades do not explain the large difference in access rates between Aboriginal youth and others. Interestingly, when PISA scores and the scale variables are included in the model, the magnitude of the university effect drops by almost 8 percentage points and loses statistical significance (the latter also being due to the limited sample sizes available). This finding is consistent with that of Frenette (2010a). Even though the Aboriginal effect

in the final model of the table is no longer statistically significant, the magnitude of the point estimate still retains over 65 per cent of the effect from the baseline model, suggesting that there may remain an important direct Aboriginal effect – or at least one not explained by the variables included in the model – although the small sample sizes mean our estimates are not very precise, and the effects may, in reality, be different from what is found here..

The effects of having a disability on access to PSE (negative effect on university attendance and positive effect on college attendance) remain quite strongly significant once grades, scales and PISA scores are added to the model. For university attendance, the final effect (a 12.0 percentage point disadvantage) retains almost 55 per cent of the baseline impact, while the greater part of the final college effect (a 7.4 per cent higher participation rate in the final model) also remains. These results suggest that there are both direct and indirect effects (through these high school variables) of having a disability on PSE attendance.

V.3 Male-Female Comparisons for Ontario

To this point, this paper has presented the results for male and female Ontarians pooled together in one model. In this section, results are presented for models estimated separately for females and males so the differences between the two can be shown.

V.3.1 Baseline Models
Tables 5a and 5b present the baseline multinomial results (the equivalent of Table 3) for males and females. The results are, in fact, striking and important: the magnitudes of the effects are all larger for females than for males, whether estimated separately or jointly (except for the non-significant language effects). This indicates that while females have a higher rate of PSE attendance (particularly university) overall, females from under-represented groups are more disadvantaged than their male counterparts. This general result has not previously been identified in the literature, and the policy implications are clearly important. Interestingly, the positive first- and second-generation immigrant effects are also stronger for females.

Table 5a
Multinomial estimates of access to college and university: Baseline model, females (Ontario)

	Separately		Jointly		Absolute Change		Remaining Relative Effect (%)	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Income below $50,000 (Others)	0.080**	-0.174***	0.032	-0.111***	0.048	-0.063	40.0	63.8
	[0.039]	[0.038]	[0.043]	[0.038]				
Parents with no PSE (Others)	0.151***	-0.306***	0.116***	-0.257***	0.035	-0.049	76.8	84.0
	[0.039]	[0.035]	[0.041]	[0.034]				
HS location: Rural (Urban)	0.164***	-0.234***	0.112**	-0.138***	0.052	-0.096	68.3	59.0
	[0.047]	[0.041]	[0.047]	[0.041]				
French minority (Others)	0.088	-0.095*	0.040	-0.015	0.048	-0.080	45.5	15.8
	[0.054]	[0.055]	[0.049]	[0.044]				
Single parent (Two parents)	0.111**	-0.133***	0.069	-0.034	0.042	-0.099	62.2	25.6
	[0.046]	[0.045]	[0.049]	[0.045]				
Immigration status (Non-immigrant)								
First generation immigrant	-0.150***	0.214***	-0.103*	0.162***	-0.047	0.052	68.7	75.7
	[0.050]	[0.053]	[0.056]	[0.053]				
Second generation immigrant	-0.115***	0.165***	-0.079**	0.117***	-0.036	0.048	68.7	70.9
	[0.034]	[0.037]	[0.036]	[0.036]				
Aboriginal (Non-Aboriginal)	0.084	-0.354***	0.055	-0.262***	0.029	-0.092	65.5	74.0
	[0.118]	[0.086]	[0.106]	[0.098]				
Disabled (Non-disabled)	0.155**	-0.290***	0.135**	-0.257***	0.020	-0.033	87.1	88.6
	[0.060]	[0.043]	[0.059]	[0.041]				
Observations	1,224		1,224					

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01   **p < 0.05   *p < 0.1. The "Separately" columns report the results of the separate models run where each group variable was included by itself (i.e., eight separate regressions in all). The "Jointly" columns report the results with all variables included together. The "Absolute Change" columns give the differences in average marginal effects between the separate regressions and the joint regression for each variable. The "Remaining Relative Effect" represents the effect in the joint regression as compared to the effect in the separate regressions.

Table 5b
Multinomial estimates of access to college and university: Baseline model, males (Ontario)

	Separately		Jointly		Absolute Change		Remaining Relative Effect (%)	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Income below $50,000 (Others)	0.004	-0.121***	-0.000	-0.031	0.004	-0.090	0.0	25.6
	[0.040]	[0.033]	[0.045]	[0.038]				
Parents with no PSE (Others)	0.049	-0.253***	0.045	-0.219***	0.004	-0.034	91.8	86.6
	[0.039]	[0.026]	[0.040]	[0.027]				
HS location: Rural (Urban)	0.028	-0.168***	0.011	-0.122***	0.017	-0.046	39.3	72.6
	[0.046]	[0.032]	[0.046]	[0.035]				
French minority (Others)	0.059	-0.042	0.030	0.029	0.029	-0.071	50.8	-69.0
	[0.056]	[0.056]	[0.054]	[0.061]				
Single parent (Two parents)	-0.014	-0.096**	-0.021	-0.019	0.007	-0.077	150.0	19.8
	[0.049]	[0.042]	[0.052]	[0.048]				
Immigration status (Non-immigrant)								
First generation immigrant	-0.062	0.161***	-0.045	0.123**	-0.017	0.038	72.6	76.4
	[0.058]	[0.059]	[0.061]	[0.057]				
Second generation immigrant	-0.055	0.126***	-0.052	0.085**	-0.003	0.041	94.5	67.5
	[0.039]	[0.039]	[0.040]	[0.037]				
Aboriginal (Non-Aboriginal)	-0.028	-0.212***	-0.031	-0.189***	0.003	-0.023	110.7	89.2
	[0.113]	[0.072]	[0.109]	[0.070]				
Disabled (Non-disabled)	0.032	-0.195***	0.035	-0.166***	-0.003	-0.029	109.4	85.1
	[0.053]	[0.035]	[0.052]	[0.035]				
Observations	1,158		1,158					

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01   **p < 0.05   *p < 0.1. The "Separately" columns report the results of the separate models run where each group variable was included by itself (i.e., eight separate regressions in all). The "Jointly" columns report the results with all variables included together. The "Absolute Change" columns give the differences in average marginal effects between the separate regressions and the joint regression, for each variable. The "Remaining Relative Effect" represents the effect in the joint regression as compared to the effect in the separate regressions.

The gender differences in income effects shown here are consistent with the authors' previous research (e.g., Childs, Finnie, and Mueller, 2010; Finnie and Mueller, 2008, 2009b, 2010), where the effects of family income have generally been found to be greater for females than males, this difference largely driven by the fact that females in higher-income families do relatively better than females from lower-income families than is the case for males. In the present case, while the low-income effect largely disappears for males when the groups are treated jointly (the university effect retains only 25.6 per cent of its original effect and becomes statistically insignificant), the effect for females remains strong, retaining 63.8 per cent of its separate effect in the joint model and indicating a statistically significant difference of 11.1 percentage points on university access.

This is not true for students without a family history of PSE in the sense that although the female effects are stronger in all specifications, the reductions in the effects when the other group indicators are added are similar for males and females; in both cases, the differences across the two specifications are small.

V.3.2 Adding the Additional Explanatory Variables

We now examine the impact of adding the grades, scale and PISA variables to the male and female models. If we refer to the pooled grades and scales model discussed in the last section (Table 4), we can get a sense of the different impacts that adding grades, scale variables and PISA scores will likely have on the gender-separate models.

In the baseline model (the first two columns of Table 4), we see that females are – when other factors are held constant – just over 11 percentage points more likely to attend some form of PSE, and over 17 percentage points more likely to attend university while being less likely to attend college (by 6.2 percentage points) than males. However, adding grades (the second set of results) and the scale variables and the PISA score (third set), as well as both, to the model substantially reduces the impact of being female. Females' advantage in university access, as well as their lower college rates, are thus to a significant degree explained by having higher grades and PISA scores as well as better school engagement. Still, 39 per cent of the university effect and 24 per cent of the college effect remains when the other variables are added.

Tables 6a and 6b present a similar model progression broken down by gender. The effects of the high school grade, various scale variables and the PISA reading score variables are not substantially different for males and females. Interestingly, the negative effects of social support on university participation remain in the female models – and are indeed stronger than in the pooled model – but not in the male models (i.e., the pooled model yields mixed effects, which average the male and female effects). However, the stronger effects of being a member of the under-represented groups for females (which are seen in the baseline models) are now, in some cases, reduced or even marginally reversed (e.g., the negative first-generation PSE effect is stronger for males than it is for females in the final model). Being a Francophone is also now a stronger advantage (rather than disadvantage) in terms of university participation for males than females (although the caution regarding the interpretation of this particular result offered above should be kept in mind).

The general interpretation of these results is that the overall differences in PSE participation associated with being a member of any of the under-represented groups are greater for females but that these differences are more related to the high school variables included in the second sets of models than is the case for men.

Table 6a
Multinomial estimates of access to college and university: Adding the additional explanatory variables, females (Ontario)

	Baseline		HS Grade		Scales and PISA		All	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Income below $50,000 (Others)	0.015	-0.101**	-0.020	-0.067*	-0.013	-0.043	-0.029	-0.033
	[0.043]	[0.040]	[0.043]	[0.036]	[0.040]	[0.034]	[0.041]	[0.032]
Parents with no PSE (Others)	0.120***	-0.255***	0.069*	-0.187***	0.042	-0.114***	0.030	-0.109***
	[0.042]	[0.035]	[0.041]	[0.032]	[0.038]	[0.031]	[0.038]	[0.029]
HS location: Rural (Urban)	0.102**	-0.134***	0.080*	-0.100**	0.085*	-0.100***	0.075*	-0.086**
	[0.047]	[0.043]	[0.047]	[0.039]	[0.044]	[0.038]	[0.045]	[0.036]
French minority (Others)	0.037	-0.009	0.034	-0.007	-0.018	0.079**	-0.012	0.067**
	[0.050]	[0.045]	[0.046]	[0.036]	[0.041]	[0.036]	[0.041]	[0.033]
Single parent (Two parents)	0.079	-0.050	0.062	-0.024	0.092**	-0.052	0.079*	-0.037
	[0.049]	[0.046]	[0.047]	[0.040]	[0.046]	[0.040]	[0.045]	[0.038]
Immigration status (Non-immigrant)								
First generation immigrant	-0.126**	0.185***	-0.109*	0.172***	-0.138***	0.206***	-0.127**	0.192***
	[0.056]	[0.055]	[0.058]	[0.054]	[0.051]	[0.047]	[0.056]	[0.048]
Second generation immigrant	-0.084**	0.127***	-0.090**	0.128***	-0.077**	0.088***	-0.088**	0.100***
	[0.036]	[0.037]	[0.037]	[0.032]	[0.036]	[0.031]	[0.037]	[0.029]
Aboriginal (Non-Aboriginal)	0.114	-0.231**	0.066	-0.173*	0.097	-0.117	0.095	-0.111
	[0.118]	[0.105]	[0.116]	[0.092]	[0.122]	[0.121]	[0.121]	[0.119]
Disabled (Non-disabled)	0.154**	-0.265***	0.116*	-0.189***	0.113**	-0.139***	0.101*	-0.124***
	[0.062]	[0.049]	[0.060]	[0.046]	[0.054]	[0.048]	[0.053]	[0.041]
Overall grade in last year HS			-0.012***	0.022***			-0.006***	0.013***
			[0.002]	[0.001]			[0.002]	[0.002]
Overall engagement					-0.028	0.074***	-0.016	0.062***
					[0.022]	[0.018]	[0.022]	[0.017]
Self-esteem					-0.016	-0.003	-0.017	-0.007
					[0.021]	[0.019]	[0.021]	[0.018]
Self-efficacy					-0.019	0.044***	-0.011	0.024
					[0.019]	[0.015]	[0.019]	[0.015]
Self-mastery					0.005	0.018	0.010	0.018
					[0.022]	[0.018]	[0.023]	[0.017]
Social support					0.046**	-0.073***	0.038**	-0.058***
					[0.019]	[0.017]	[0.019]	[0.016]
Monitoring behaviour					0.008	0.016	0.007	0.013
					[0.020]	[0.018]	[0.020]	[0.017]
Nurturance behaviour					-0.021	-0.012	-0.026	-0.013
					[0.018]	[0.016]	[0.018]	[0.016]
Inconsistent discipline					-0.017	-0.006	-0.022	-0.001
					[0.016]	[0.014]	[0.016]	[0.013]
Reading ability					-0.001***	0.002***	-0.001***	0.002***
					[0.000]	[0.000]	[0.000]	[0.000]
Observations	1,170		1,170		1,170		1,170	

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01 **p < 0.05 *p < 0.1. The grade variable is the students' overall high school grades divided by 10. The reading ability variable used is the students' PISA reading scores divided by 100.

Table 6b
Multinomial estimates of access to college and university: Adding the additional explanatory variables, males (Ontario)

	Baseline		HS Grade		Scales and PISA		All	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Income below $50,000 (Others)	0.008	-0.017	0.003	-0.001	-0.008	0.026	0.003	0.011
	[0.046]	[0.040]	[0.042]	[0.037]	[0.045]	[0.039]	[0.042]	[0.035]
Parents with no PSE (Others)	0.049	-0.220***	0.028	-0.161***	0.031	-0.142***	0.023	-0.122***
	[0.042]	[0.029]	[0.039]	[0.032]	[0.039]	[0.030]	[0.037]	[0.030]
HS location: Rural (Urban)	0.004	-0.128***	-0.023	-0.078**	-0.015	-0.066*	-0.025	-0.055
	[0.048]	[0.037]	[0.045]	[0.038]	[0.044]	[0.037]	[0.042]	[0.035]
French minority (Others)	0.036	0.011	0.013	0.033	-0.057	0.130**	-0.049	0.114**
	[0.056]	[0.063]	[0.055]	[0.051]	[0.053]	[0.061]	[0.054]	[0.054]
Single parent (Two parents)	-0.033	-0.027	-0.034	-0.013	-0.043	-0.018	-0.045	-0.008
	[0.053]	[0.049]	[0.050]	[0.045]	[0.050]	[0.043]	[0.049]	[0.040]
Immigration status (Non-immigrant)								
First generation immigrant	-0.061	0.117**	-0.042	0.073	-0.063	0.123**	-0.061	0.109**
	[0.061]	[0.058]	[0.056]	[0.047]	[0.062]	[0.057]	[0.055]	[0.046]
Second generation immigrant	-0.058	0.087**	-0.049	0.069**	-0.069*	0.097***	-0.056	0.075**
	[0.041]	[0.039]	[0.037]	[0.034]	[0.038]	[0.033]	[0.036]	[0.030]
Aboriginal (Non-Aboriginal)	-0.056	-0.143	-0.028	-0.172**	-0.027	-0.109	-0.015	-0.134
	[0.111]	[0.089]	[0.108]	[0.081]	[0.111]	[0.109]	[0.115]	[0.096]
Disabled (Non-disabled)	0.061	-0.182***	0.047	-0.144***	0.052	-0.115***	0.052	-0.117***
	[0.055]	[0.039]	[0.052]	[0.043]	[0.053]	[0.041]	[0.052]	[0.041]
Overall grade in last year HS			-0.014***	0.025***			-0.010***	0.018***
			[0.001]	[0.001]			[0.002]	[0.002]
Overall engagement					-0.016	0.061***	-0.007	0.038**
					[0.021]	[0.019]	[0.020]	[0.018]
Self-esteem					-0.015	0.012	-0.020	0.017
					[0.024]	[0.020]	[0.023]	[0.019]
Self-efficacy					-0.012	0.039**	0.012	0.000
					[0.020]	[0.017]	[0.019]	[0.017]
Self-mastery					0.009	-0.016	0.004	-0.004
					[0.023]	[0.019]	[0.022]	[0.017]
Social support					-0.007	-0.017	-0.007	-0.014
					[0.020]	[0.017]	[0.019]	[0.016]
Monitoring behaviour					0.018	0.003	0.013	0.008
					[0.019]	[0.017]	[0.018]	[0.017]
Nurturance behaviour					-0.016	0.016	-0.013	0.012
					[0.018]	[0.016]	[0.017]	[0.014]
Inconsistent discipline					0.002	-0.037**	-0.005	-0.020
					[0.018]	[0.015]	[0.017]	[0.014]
Reading ability					-0.001***	0.002***	-0.001***	0.001***
					[0.000]	[0.000]	[0.000]	[0.000]
Observations	1,087		1,087		1,087		1,087	

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01 **p < 0.05 *p < 0.1. The grade variable is the students' overall high school grades divided by 10. The reading ability variable used is the students' PISA reading scores divided by 100.

V.3.3 Summary of the Gender Results

Two interesting differences between male and female students are apparent from these results. First, being a member of a disadvantaged group generally has a greater effect among females than males; and second, the effect of being from a low-income household is *especially* consequential for females as opposed to males.

V.4 Comparison to Other Regions

This section discusses how the results presented for Ontario so far compare to similar models using data from other parts of Canada. We begin with our baseline ("jointly estimated") models and then add the additional explanatory variables.

V.4.1 Baseline Models

The baseline models for the different regions are presented in Table 7. These results correspond to the "joint" results presented in Table 3. We examine each of the under-represented groups in turn.

Coming from a low-income household appears to be a lesser obstacle to university attendance for Ontario students than for students in the rest of Canada overall (the final set of results in the table) when students' other characteristics are controlled for. The low-family-income indicator has the largest effects in the Atlantic provinces and Quebec, while the Western provinces have slightly lower income effects than Ontario.

In contrast to the income effect, the effect for students with no family background of PSE is greater for Ontario than for the other regions and provinces. Being a first-generation PSE student matters least in Western Canada, where they are 16.4 percentage points less likely to attend university than other students, in contrast with the 23.6 percentage point difference in Ontario (Quebec is similar). That said, the university difference is partially offset by an 8.0 per cent higher college participation rate in Ontario, with no such offset in the West.

Table 7
Multinomial estimates of access to university and college: Baseline ("Jointly Estimated") model, by region

	Ontario		Atlantic Provinces		Quebec		Western Provinces		All Provinces Excluding Ontario	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Region (Atlantic Canada)										
Quebec									0.163***	-0.230***
									[0.015]	[0.012]
Western Canada									0.025**	-0.129***
									[0.011]	[0.010]
Gender: Female	-0.050**	0.171***	-0.051***	0.176***	-0.032	0.186***	-0.002	0.125***	-0.027***	0.152***
(Male)	[0.022]	[0.022]	[0.011]	[0.014]	[0.021]	[0.022]	[0.014]	[0.015]	[0.010]	[0.010]
Income below $50,000	0.016	-0.072***	0.061***	-0.194***	0.029	-0.131***	0.007	-0.054***	0.028**	-0.106***
(Others)	[0.031]	[0.027]	[0.015]	[0.017]	[0.025]	[0.020]	[0.017]	[0.017]	[0.012]	[0.012]
Parents with no PSE	0.080***	-0.236***	0.054***	-0.211***	-0.019	-0.180***	0.020	-0.164***	0.021*	-0.181***
(Others)	[0.029]	[0.021]	[0.015]	[0.018]	[0.024]	[0.018]	[0.017]	[0.016]	[0.012]	[0.011]
HS location: Rural	0.063*	-0.131***	0.086***	-0.099***	0.007	-0.041*	0.036**	-0.083***	0.039***	-0.076***
(Urban)	[0.033]	[0.027]	[0.014]	[0.015]	[0.027]	[0.024]	[0.017]	[0.016]	[0.012]	[0.011]
French minority (Others)	0.035	0.004	-0.010	0.029			-0.058	0.082	-0.013	0.033
	[0.036]	[0.037]	[0.016]	[0.020]			[0.044]	[0.059]	[0.020]	[0.022]
English minority (Others)					0.023	0.060**			0.010	0.076***
					[0.032]	[0.028]			[0.025]	[0.027]
Single parent	0.029	-0.028	-0.013	-0.023	0.018	0.016	-0.011	-0.038	0.002	-0.015
(Two parents)	[0.036]	[0.033]	[0.017]	[0.022]	[0.030]	[0.029]	[0.022]	[0.024]	[0.015]	[0.016]
Immigration status (Non-immigrant)										
First generation immigrant	-0.077*	0.145***	-0.073	0.226***	0.038	-0.023	-0.006	0.223***	-0.010	0.161***
	[0.041]	[0.039]	[0.064]	[0.069]	[0.057]	[0.047]	[0.028]	[0.030]	[0.023]	[0.023]
Second generation immigrant	-0.065**	0.101***	-0.104***	0.143***	-0.007	0.117***	0.013	0.103***	-0.006	0.105***
	[0.027]	[0.026]	[0.022]	[0.031]	[0.034]	[0.032]	[0.019]	[0.020]	[0.015]	[0.015]
Aboriginal	0.004	-0.222***	-0.051	-0.047	-0.035	-0.001	-0.038	-0.104***	-0.037	-0.069**
(Non-Aboriginal)	[0.078]	[0.060]	[0.032]	[0.044]	[0.089]	[0.081]	[0.034]	[0.036]	[0.028]	[0.029]
Disabled	0.082**	-0.207***	0.020	-0.121***	0.029	-0.137***	0.026	-0.150***	0.032**	-0.144***
(Non-disabled)	[0.039]	[0.028]	[0.017]	[0.020]	[0.036]	[0.025]	[0.020]	[0.018]	[0.015]	[0.014]
Observations	2,382		5,509		2,490		5,770		13,769	

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01 **p <0 .05 *p < 0.1. The grade variable is the students' overall high school grades divided by 10. The reading ability variable used is the students' PISA reading scores divided by 100.

As initially seen in the raw access rates, the university effect for rural students (i.e., they go less) is also greatest for Ontario, even when controlling for other factors. In the Atlantic region, there is a stronger substitution of college for university than in any other part of Canada. The rural effects are weakest in Quebec.

Students whose first language is French generally have similar access rates to PSE as English speakers (there are no statistically significant differences) when other student characteristics are controlled for across the country. Including the comparable linguistic minority variable for Quebec, we find that students in Quebec whose mother tongue is English are 6.0 per cent more likely to attend university than other students. (Note the importance of separating the language effects by region, as discussed above.)

As with the linguistic minority effect, the effect of being from a single-parent household is also reduced to statistical insignificance across the country when membership in the other under-represented groups is controlled for.

The positive effects on university attendance for first-generation immigrants are larger in the Atlantic and Western provinces than in Ontario, whereas, interestingly, there is no comparable effect for first-generation immigrants in Quebec. It should be kept in mind, however, that the percentage of immigrant students in Atlantic Canada is small, while the Western effect is weighted upward by the substantial number of Chinese immigrants there, who have previously been shown to have the highest access rates of all (Finnie & Mueller 2009b, 2010). Conversely, the Quebec effect may be due to the concentration of immigrants from Latin America and the Caribbean for whom the effects have been shown to be uniquely negative for the different immigrant groups (same references). The second-generation effect is also larger for the other provinces and regions than Ontario, while the second-generation immigrants in Quebec also show a relatively strong positive effect on university attendance, reflecting the earlier waves of immigrants whose children are represented in the YITS-A in this category.

The Aboriginal effect on university attendance is again greatest in Ontario, being over twice as large as in the region with the next-largest effect (Western Canada). In Quebec and Atlantic Canada, the lower university attendance rates previously seen are now observed to be explained almost entirely by the students' other characteristics. This finding suggests that Aboriginal youth in Ontario face particular problems, although these students comprise, as previously noted, a smaller share of the population as compared to other regions (except Quebec).

Similarly, the effect of having a disability on university access is greater in Ontario than in other provinces and regions. However, the off-setting positive effect on college attendance is present in Ontario only, suggesting that the substitution of college for university education that we observe among disabled persons in Ontario does not take place in other regions. The differences in PSE participation for disabled persons must be seen in this context.

The results of this first overall set of comparisons between Ontario and the other regions are thus mixed. In Ontario, coming from a low-income household matters less than in

other regions. On the other hand, being Aboriginal, disabled or from a rural area matters more, when other factors are controlled for, in Ontario than in other regions.

We must consider, however, that the larger "independent" effects of these groups in Ontario may be related to Ontario's smaller low-income effect. In the other regions, more of the differences between these groups may be explained by the effect of being from a low-income household, whereas those same kinds of income effects are smaller in Ontario, leaving a greater part of the group differences to be explained.

V.4.2 Adding the Additional Explanatory Variables
Figures 1 through 8 (Figure 6 has two parts) show the average marginal effects for the "group" variables on access to university by region from the four different models previously shown for Ontario in Table 4. From these, one can see the estimated effects as each additional set of explanatory variables (high school grades, scale variables and PISA scores, both of these) is added to the model, which already includes the other group variables (i.e., these are the "jointly estimated" models). The bars in the graphs that represent statistically significant estimates are in bold.

We focus here on university participation rates because this is where the differences are greatest. We see that in some regions of Canada, adding these extra variables greatly changes the magnitude of a given group's effect, while in other regions this is not the case. The regression model estimates upon which these figures are based are included in the appendix. Table 8 includes the final regressions with all the additional explanatory variables added in for all the provinces and regions together, showing both the college and university effects.

In Ontario, we again see how the low-income effect on university participation (Figure 1) is small to start with (i.e., in the "jointly estimated" model) and how controlling for the other factors reduces the effect to statistical insignificance. By contrast, this is not the case in the Atlantic provinces or in Quebec. Western Canada shows a similar pattern to that of Ontario.
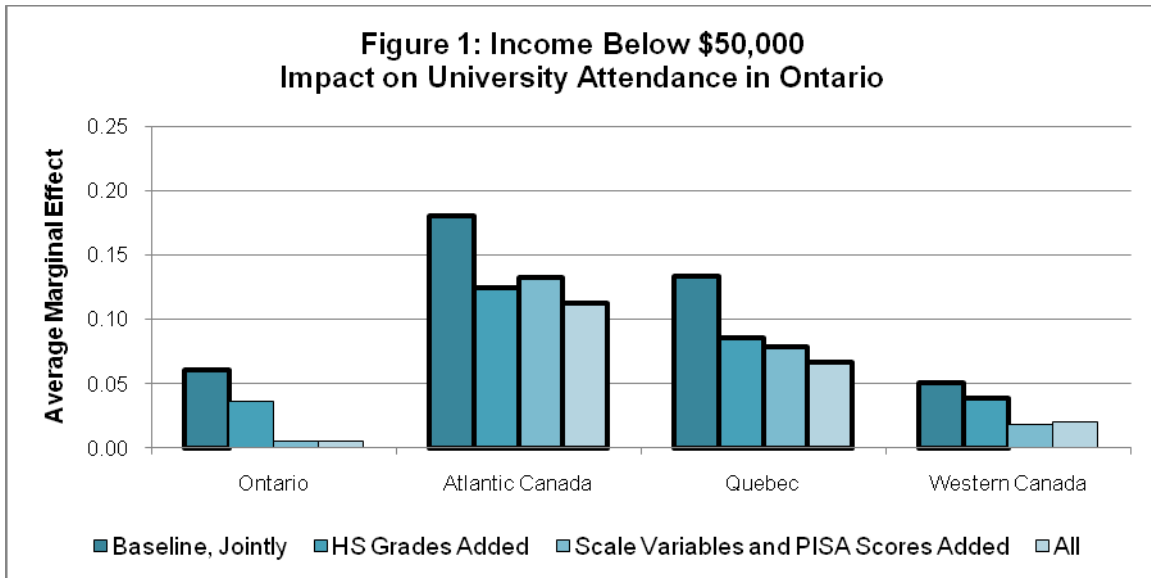
**Figure 1: Income Below $50,000
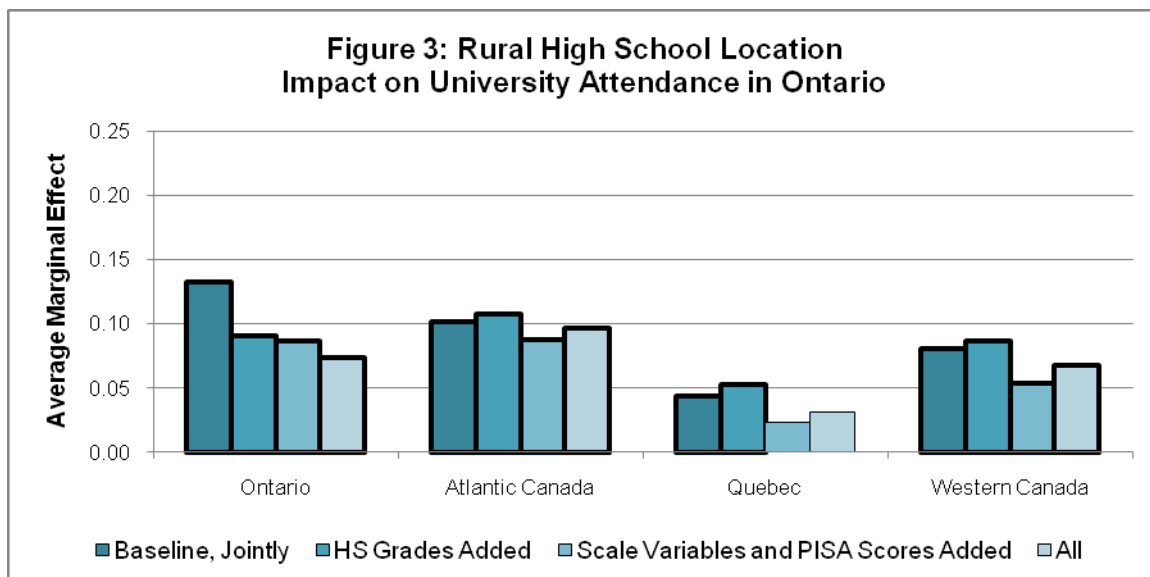Impact on University Attendance in Ontario**

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Bold borders denote statistical significance, at least at the p < 0.1 level.

In Ontario, as in other regions, the effect of being a first-generation PSE student (Figure 2) is reduced but still remains fairly strong when the additional explanatory variables are added. This supports our earlier conclusion that parental education has both direct and indirect effects on PSE attendance. The effects are a bit stronger in Ontario than elsewhere on university attendance, but the relative similarity of these effects across the regions, especially in contrast to the different income effects, is intriguing and merits further investigation. These results further demonstrate the importance of the two different effects: family income and parental education appear to be capturing two distinctly different sets of influences, with different effects in different provinces.
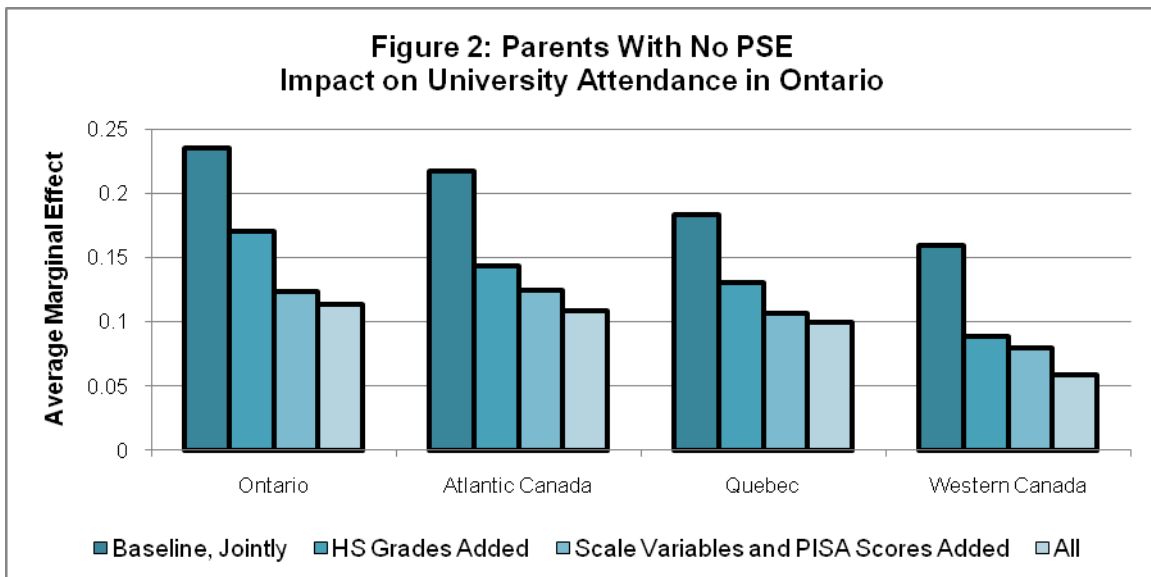
**Figure 2: Parents With No PSE
Impact on University Attendance in Ontario**

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Bold borders denote statistical significance, at least at the p < 0.1 level.

Table 8:
Multinomial estimates of access to university and college: Adding the additional explanatory variables, by region

|	Ontario		Atlantic Provinces		Quebec		Western Provinces		All Provinces Excluding Ontario	
	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.	Coll.	Univ.
Gender: female	-0.015	0.068***	-0.017	0.061***	-0.030	0.117***	0.004	0.059***	-0.013	0.081***
(Male)	[0.024]	[0.020]	[0.012]	[0.014]	[0.023]	[0.020]	[0.015]	[0.015]	[0.012]	[0.011]
Income below $50,000	-0.014	-0.005	0.038***	-0.113***	0.013	-0.067***	-0.001	-0.020	0.016	-0.048***
(Others)	[0.029]	[0.023]	[0.014]	[0.015]	[0.025]	[0.019]	[0.016]	[0.016]	[0.013]	[0.011]
Parents with no PSE	0.024	-0.114***	0.018	-0.109***	-0.004	-0.100***	0.000	-0.059***	0.018	-0.105***
(Others)	[0.027]	[0.021]	[0.014]	[0.015]	[0.023]	[0.018]	[0.016]	[0.016]	[0.013]	[0.011]
HS location: Rural	0.023	-0.074***	0.089***	-0.097***	0.000	-0.031	0.039**	-0.068***	0.020*	-0.038***
(Urban)	[0.031]	[0.025]	[0.014]	[0.014]	[0.026]	[0.021]	[0.017]	[0.015]	[0.012]	[0.010]
French minority (Others)	-0.029	0.088***	-0.013	-0.018			-0.083**	0.084**	0.110***	-0.014
	[0.033]	[0.030]	[0.017]	[0.021]			[0.041]	[0.041]	[0.028]	[0.021]
English minority (Others)					0.012	0.068***			-0.079***	0.182***
					[0.031]	[0.023]			[0.018]	[0.019]
Single parent	0.017	-0.025	-0.013	-0.023	-0.004	0.012	-0.010	-0.032	-0.001	-0.022
(Two parents)	[0.034]	[0.027]	[0.017]	[0.022]	[0.030]	[0.025]	[0.022]	[0.022]	[0.016]	[0.015]
Immigration status (Non-immigrant)										
First generation immigrant	-0.093**	0.145***	-0.051	0.141*	0.043	0.035	0.001	0.196***	-0.017	0.164***
	[0.040]	[0.033]	[0.070]	[0.079]	[0.057]	[0.047]	[0.027]	[0.028]	[0.024]	[0.024]
Second generation immigrant	-0.073***	0.089***	-0.091***	0.093***	0.007	0.133***	0.021	0.065***	-0.022	0.102***
	[0.026]	[0.021]	[0.023]	[0.029]	[0.034]	[0.028]	[0.019]	[0.018]	[0.015]	[0.014]
Aboriginal	0.017	-0.120	-0.079***	0.018	-0.028	0.039	-0.047	-0.023	-0.075***	0.017
(Non-Aboriginal)	[0.083]	[0.073]	[0.028]	[0.043]	[0.091]	[0.080]	[0.033]	[0.039]	[0.029]	[0.030]
Disabled	0.074**	-0.120***	-0.002	-0.025	0.073**	-0.122***	0.025	-0.072***	0.017	-0.063***
(Non-disabled)	[0.037]	[0.029]	[0.016]	[0.019]	[0.036]	[0.025]	[0.021]	[0.019]	[0.016]	[0.014]
Observations	2,257		5,172		2,347		5,461		12,980	

Notes: Average marginal effects are shown. Omitted categories are in parentheses. Standard errors are in brackets. ***p < 0.01 ** p < 0.05 *p < 0.1. The high school grade, PISA reading scores and scale variables included in other "Adding Additional Explanatory Variables" regressions were also included in these regressions.

In all regions except Quebec, the effect of being a rural student on university attendance remains fairly strong and statistically significant when the additional variables are included (Figure 3). In Quebec, however, the effect is reduced to statistical insignificance when the high school variables and PISA reading score variable are added.

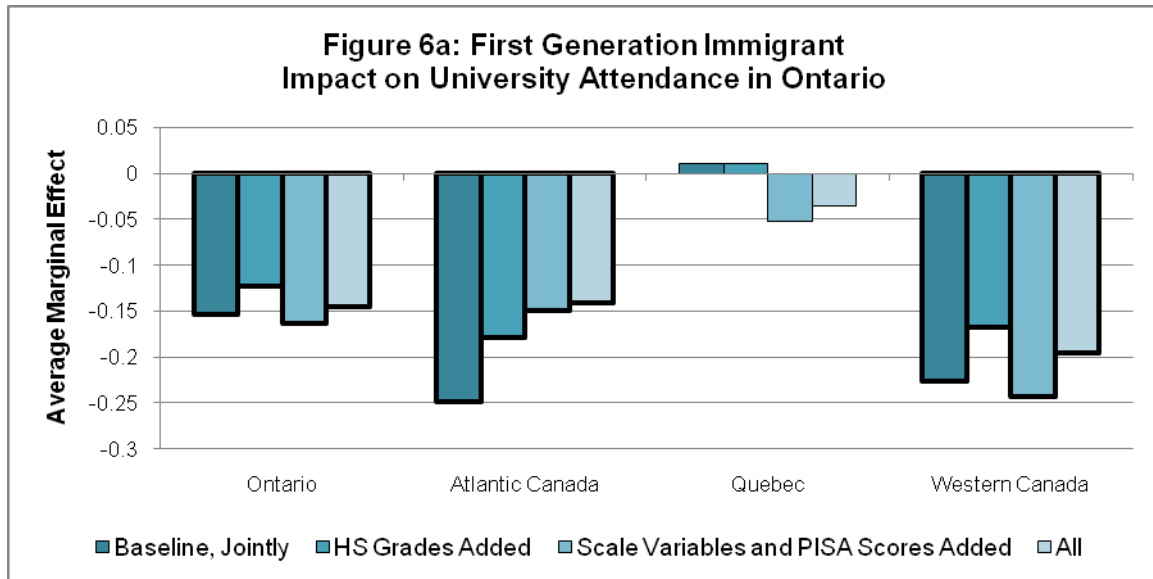**Figure 3: Rural High School Location Impact on University Attendance in Ontario**

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Bold borders denote statistical significance, at least at the p < 0.1 level.

In both Ontario and Western Canada, the positive effect of being part of a French-speaking minority on university participation (shown by the negative bars in Figure 4, as explained there) emerges, and grows in magnitude and gains statistical significance, when the high school variables and (in particular) reading score are added. In Atlantic Canada and Quebec, the language minority variable is negative and significant in all model specifications and varies little with the addition of the extra variables. Separate English and French educational systems in New Brunswick could provide an explanation for the Atlantic Canada results. In New Brunswick, French students would perhaps be more likely to be enrolled in French-language schools and take the French version of the PISA reading test than in other provinces, for example (see the preceding discussion on this point).
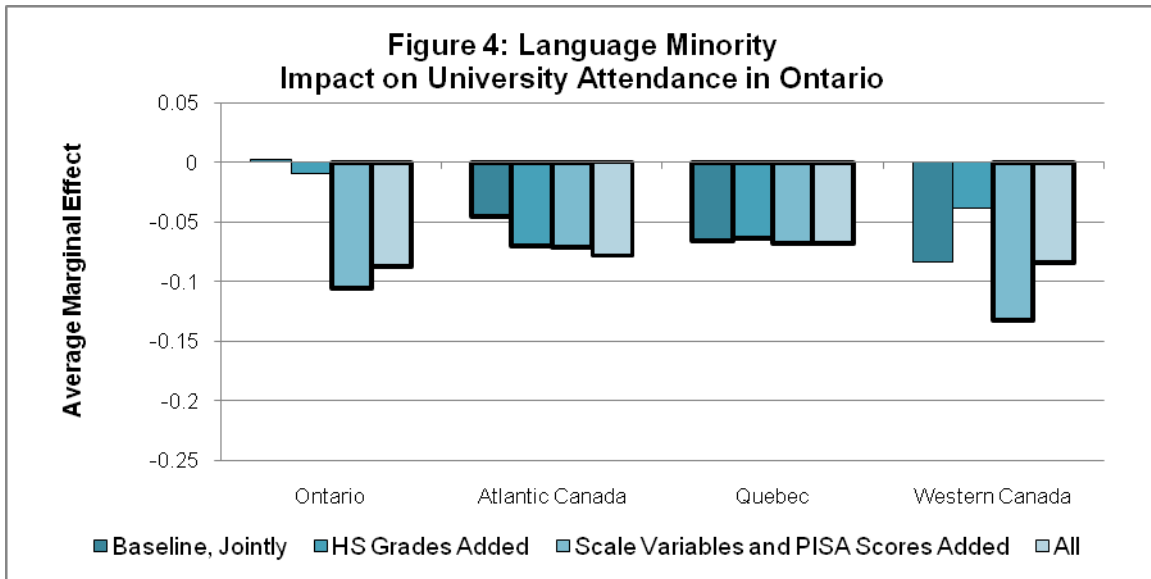
Figure 4: Language Minority
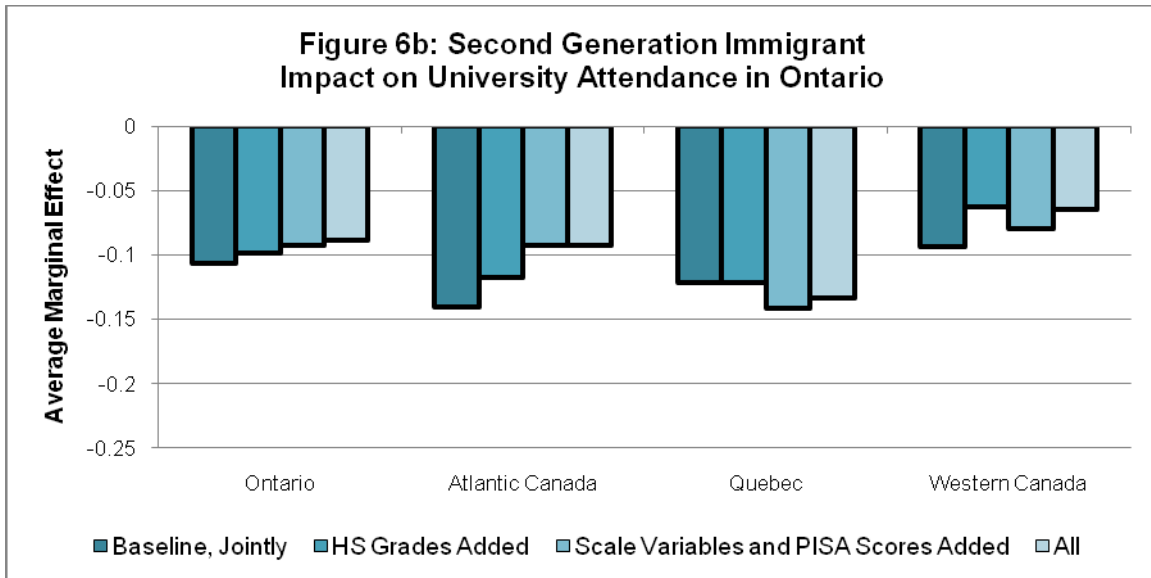**Impact on University Attendance in Ontario**

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Negative effects represent higher access rates. Bold borders denote statistical significance, at least at the p < 0.1 level.

As seen previously, the single-parent effect on university access (Figure 5) is already reduced to statistical insignificance (and small estimated magnitudes) by the inclusion of the other groups in the joint models (except for a small remaining effect in Western Canada), so the effect of adding the additional variables to the regional models does not change the results very much (Figure 5).
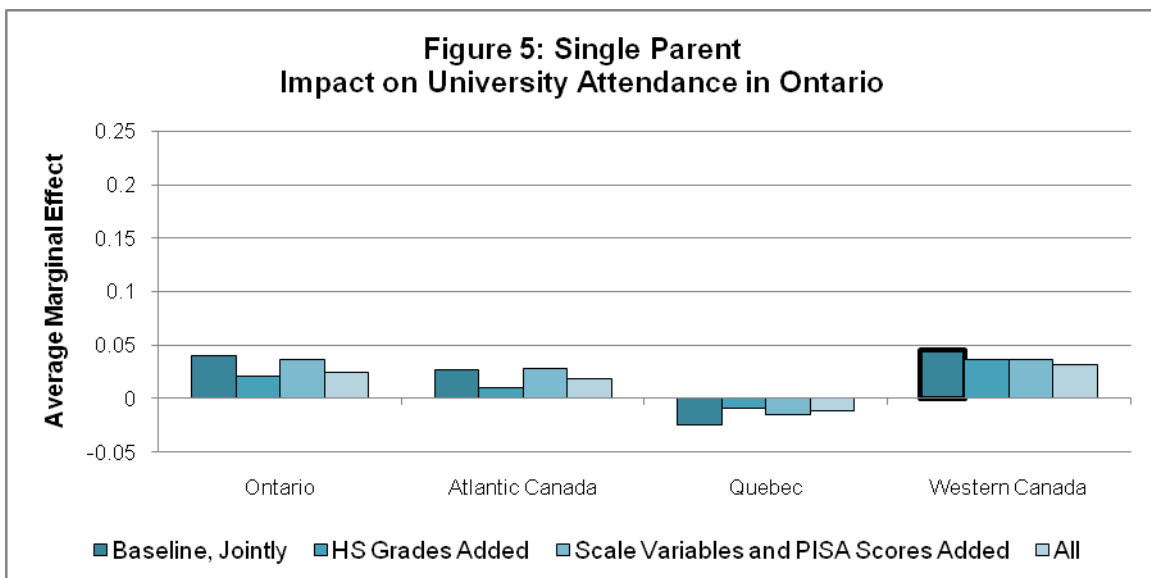
Figure 5: Single Parent
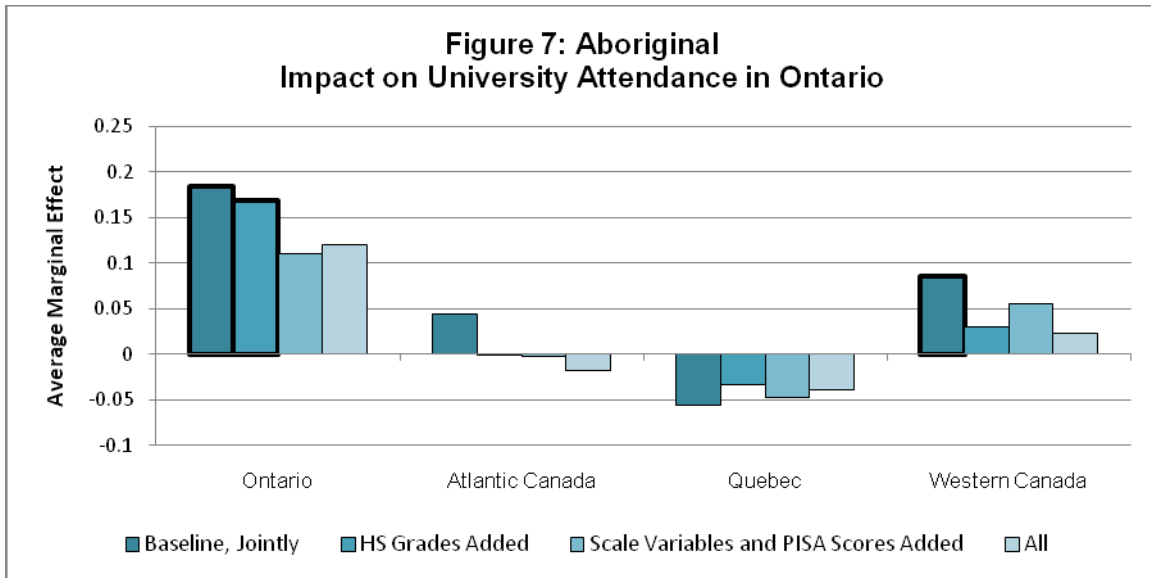**Impact on University Attendance in Ontario**

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Negative effects represent higher access rates. Bold borders denote statistical significance, at least at the p < 0.1 level.

In Ontario, Atlantic Canada and Western Canada, strong first- and second-generation immigrant effects on university participation remain when high school grades, scale variables and PISA reading scores are taken into account (Figures 6a and 6b). In Quebec, however, the effect of being a first-generation immigrant is statistically insignificant everywhere, which may have important implications regarding the integration of their immigrants and the future growth of their economy (Finnie & and Mueller, 2009b, 2010). The second-generation immigrant effect is similar across all provinces and regions, including Quebec.

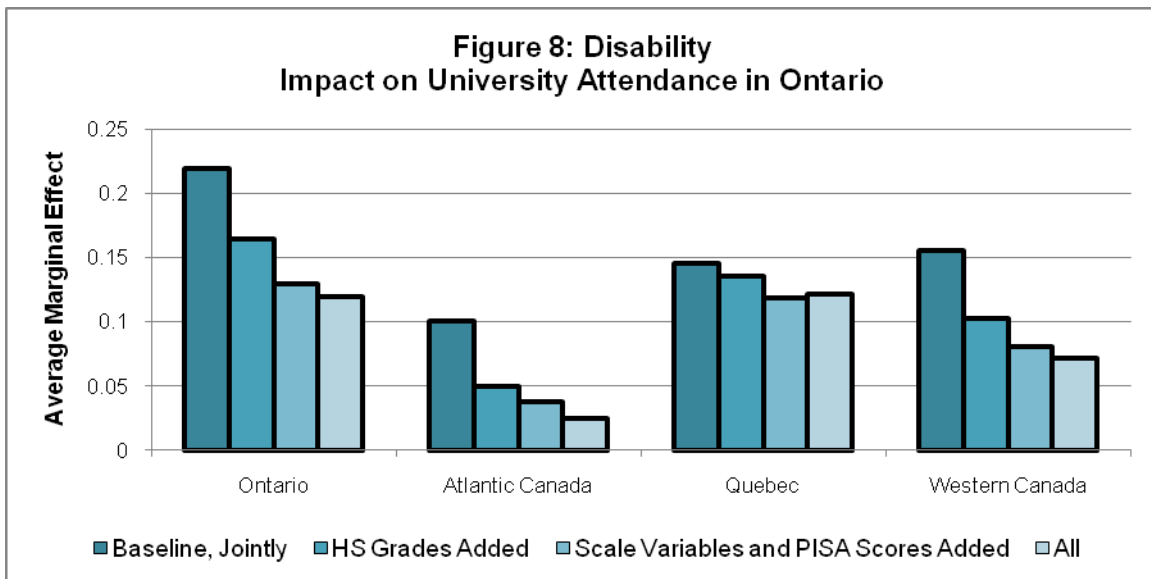Figure 6a: First Generation Immigrant Impact on University Attendance in Ontario

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Negative effects represent higher access rates. Bold borders denote statistical significance, at least at the p < 0.1 level.

Figure 6b: Second Generation Immigrant Impact on University Attendance in Ontario

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Negative effects represent higher access rates. Bold borders denote statistical significance, at least at the p < 0.1 level.

In Ontario and Western Canada, the substantial Aboriginal effects on university access (Figure 7) – especially in Ontario – become insignificant when grades, scale variables and PISA reading scores are added to the model. But the point estimates are still substantial, especially in Ontario, and the loss of statistical significance is probably – as already noted – at least partly related to the limited sample sizes. In Atlantic Canada and Quebec, the Aboriginal effect is already insignificant in the baseline model. Note, as well, that in these regions there is a significant negative Aboriginal effect on college attendance when the other variables are added (Table 8).

Figure 7: Aboriginal
Impact on University Attendance in Ontario

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Bold borders denote statistical significance, at least at the $p < 0.1$ level.

As in Ontario, the effect on university participation of having a disability remains when the additional explanatory variables are added to the model in both Quebec and the Western provinces (Figure 8). In Atlantic Canada, the smaller effect that is seen disappears when those variables are added. The effects in Ontario are generally greater than in other areas of the country.

Figure 8: Disability
Impact on University Attendance in Ontario

Source: Table 4 and Appendix Tables 1a, 2a, 3a. The values in the tables have been inverted so the heights of the bars represent the magnitudes of the effects. Bold borders denote statistical significance, at least at the $p < 0.1$ level.

V.4.3 Summary of the Regional Comparisons

In summary, for some of the under-represented groups, Ontario does not compare favourably to the rest of Canada. In particular, Aboriginal and disabled youth are less likely to attend university if they are from Ontario as compared to other provinces and regions. Conversely, family income seems to matter less in Ontario than in at least some other provinces and regions (Atlantic Canada and Quebec). Having no family history of PSE matters substantially more in Ontario than in the West, and in some cases, more than in Quebec and Atlantic Canada, depending on the particular specification. These different patterns may, in fact, be linked and there may be a relationship between the smaller effects of family income and the greater effects of some of the other factors on under-represented groups in Ontario.

The results by region by gender are reported in the appendix tables, but are not discussed here.

VI. Conclusion

With the great importance placed on postsecondary education as a driver of Ontario's competitiveness in the global economy, as well as the social imperative of opening up the improved life chances PSE provides to those who have the will to pursue higher education and also possess the academic qualifications to do so, it becomes critical to identify groups who do not participate in PSE to the same extent as other Ontarians. In order to allow policy-makers to formulate effective policy that will improve access to PSE for these groups, a solid empirical foundation regarding the situation is necessary. With the goal of providing such a foundation, this paper has explored the patterns of PSE access for a set of under-represented and minority groups in Ontario.

The rich data available in the Youth in Transition Survey, Cohort A (YITS-A) allows for the identification of under-represented groups in PSE for one cohort of young Ontarians, for the tracking of these individuals into their PSE years, for an analysis that controls for a range of other factors that affect access to PSE that may be related to the observed patterns (e.g., high school grades, other high school measures, PISA test scores) and for comparisons with other Canadian provinces and regions. Such data are unique in Canada and, arguably, at the global level.

After presenting some simple descriptive results as an introduction to the analysis, we model PSE participation using a regression framework that allows us to study the interactions of belonging to these different groups and to take into account other factors to which membership in the groups may be related that also affect access to PSE (grades, PISA scores, and so on). This approach highlights the effects that persist when other factors are controlled for and others that do not persist.

To highlight just a few of the major findings, we find that for Ontario students, not having a family history of PSE attendance (i.e., their parents did not attend a postsecondary institution) is much more important than being from a low-income household. While this general pattern is true in other parts of Canada, the parental education effects are

generally somewhat stronger in Ontario than elsewhere, while the income effects are consistently smaller, especially as compared to Atlantic Canada and Quebec. These different effects of family background may reflect the overall affordability of PSE in Ontario (as related to tuition fees and the student financial aid system), other aspects of the PSE system (such as admission standards) and the "cultural" influences that operate at the family level, which are increasingly understood as being the most important drivers of participation in PSE. Further research would be required to unravel these influences and other related ones.

Aboriginal and disabled youth are also strongly under-represented groups in university in Ontario, the disability effect offset to some degree by higher college participation rates. Rural students are also significantly underrepresented, but not to as great a degree, and the countervailing positive effect on college attendance is again substantial. These results still hold when belonging to one of the other groups is controlled for (i.e., perhaps at the same time coming from a low-income family, having parents with no history of PSE and so on) and even when the other sets of additional explanatory variables are included (grades, etc.). Ontario does not compare favourably to other regions in these results.

Intriguingly, although females generally have significantly higher PSE (especially university) attendance rates than males, females who are members of these under-represented groups are more disadvantaged than males both within Ontario and across Canada. Further investigation of these patterns is surely warranted. Are the underlying causes "economic," "cultural" or something else?

This type of statistical analysis cannot fully identify the reasons behind the underrepresentation of these groups (or overrepresentation in the case of the children of immigrants or Francophones), but we can suggest that those reasons and the means by which they influence the participation of Ontarians in PSE vary considerably across the under-represented groups. There is surely no "one size fits all" solution to be found. More research using the incredibly rich YITS and possibly other data sources, as well as involving other research methods (including qualitative approaches), would, of course, be able to tell us more. The issues regarding the challenges of PSE access facing under-represented groups are important and becoming better informed about them is the first step in addressing them in an effective and efficient manner.

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