

*A MESA Project Research Paper*

# The Effects of Family Income, Parental Education and Other Background Factors on Access to Post-Secondary Education in Canada

**Evidence from the YITS**

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JUNE 2008

**MESA**  
Measuring the Effectiveness  
of Student Aid

## The MESA Project

*The Measuring the Effectiveness of Student Aid Project*, or the MESA Project, is a four-year research effort being conducted by the Educational Policy Institute and the School for Policy Studies at Queen's University on behalf of the Canada Millennium Scholarship Foundation. It has been designed to answer the following four questions:

- After graduating from high school, teenagers coming from low-income backgrounds face a choice as to attend college or university, or not. For those who did attend, how do they compare to those who did not?
- Does providing more funding in a student's first few years of further education attract more low-income students to post-secondary education?
- Does providing more funding in a student's first few years of further education make it more likely for low-income students to stay in and graduate?
- Are low-income students different across Canada?

This paper is part of a series of research papers solicited from some of the leading Canadian researchers in the field of post-secondary education; the researchers were asked to write about issues of access and persistence in post-secondary education in Canada. The requirements for the papers were that the researchers use one of several currently-existing Statistics Canada databases or another source of Canadian data. Each of the papers commissioned during this project is available for downloading from the MESA Project website at [www.mesa-project.org](http://www.mesa-project.org).

The findings and conclusions expressed in this paper are those of the authors and do not necessarily represent those of MESA Project.

Please cite as:

Finnie, Ross, and Mueller, Richard E. (2008). *The Effects of Family Income, Parental Education and Other Background Factors on Access to Post-Secondary Education in Canada: Evidence from the YITS*. A MESA Project Research Paper. Toronto, ON: Educational Policy Institute.

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## Abstract

This paper exploits the unprecedented rich information available in the Canadian Youth in Transition Survey, Sample A (YITS-A) to investigate issues related to access to post-secondary education (PSE). The questions we ask are basically two-fold: i) What are the various influences on access to PSE of an individual's background, including more traditional measures such as family income and parental education, as well as a broader set of measures such as high school grades, social/academic "engagement," and other cognitive and behavioural influences? and ii) How does including such a more extensive set of variables than has been possible in previous studies change the estimated effects of the more conventionally measured family/parental influences (family income and parental education) on access to PSE, and thus indicate how much of the latter influences operate through (or otherwise proxy) the effects of the broader set of variables, thereby isolating the direct – as opposed to indirect – influence of these traditional measures on access? Utilizing multinomial logit models to capture the choice of level of PSE (i.e., college versus university) we find that parental income is positively related to university attendance, while having only a minor effect on college, but this effect is greatly diminished once parental education is included in the estimation. Similarly, the importance of parental education to university attendance is somewhat diminished once certain measures of high school grades, academic "engagement," and a standardised reading test score are included – although, interestingly, these additional variables have little further affect on the family income influences. These results thus support other recent work which points to the importance of addressing earlier cognitive and behavioural influences, and family "culture" more generally as captured by parental education, in effecting change in the rates and patterns of participation in PSE – although family income does remain a significant independent factor, albeit of significantly reduced influence.

## Introduction

There now exists a substantial body of research on the importance of family background influences, tuition levels, and other related variables on access to post-secondary education (PSE) – in Canada as for other countries. For economists, this emphasis on financial factors makes perfect sense. The price mechanism is considered to be important in any investment decision – which is how the choice of schooling level is typically viewed. And the availability of the funds required to make the investment – in this context often proxied by or otherwise related to family income level – is an equally critical factor, especially in a context where capital markets may limit access to financing because prospective students are often unable to provide sufficient collateral to back their borrowing (see for example, Barr, 1993, Chapman, 1997).

Recent scholarly research in the area of access to PSE (e.g., Cunha, et al., 2006, Heckman, 2007) has, however, shifted 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. This line of research contends that it is long-term factors, such as family background, over short-term factors, such as credit constraints, which are of greatest importance in determining access to PSE. Since many of these factors are correlated with family income in the short-term period when PSE decisions are made, it is often erroneously stated that this short-term credit constraint is what prohibits low-income individuals from attending PSE. The implication of this work is powerful: policy should be more directed towards students earlier in life if the long-term goal is to increase PSE participation.

This is not to imply that financial resources are not important, only that they may be correlated with other variables which are also significant determinants of PSE participation, and thus there may have been a misguided assignment of the influence of these financial variables. For policy purposes, identifying the most important determinants of access to PSE is obviously important for choosing the most effective policy levers for changing access rates (and the underlying opportunities which drive those rates), especially if overall PSE budgets are more or less fixed and spending on one

access lever (e.g., loans, grants, or lower tuition) means less spending on another (e.g., earlier interventions).

Furthermore, if student loans and grants and/or decreased tuition are not having the desired effect on access and retention, then these resources may simply amount to “rent” accumulating to those whose PSE decisions are not sensitive to these financial variables and would have been attending anyway. Governments would perhaps likely do better at targeting their resources to, say, better preparing students for gaining admission into PSE institutions or improving individuals’ educational success or work habits at lower levels, ultimately enhancing the probability of PSE participation.

Carneiro and Heckman (2002) succinctly summarize the argument, noting that children whose parents have higher income have better access to quality schools, and these same parents shape the tastes and expectations of their children. They are also able to better nurture the intellect of their children by assisting and directing their studies. They also note that cognitive ability – at least as measured by IQ on standardized tests – is formed by the age of 14 and that the influences of family factors accumulate from birth so that scholastic ability is determined by the end of high school. Again, the implication of these arguments is that policies aimed at influencing young people at the time of transition from high school to PSE could be inappropriately targeted. Rather, any attempts at intervention should likely be conducted much earlier when the cognitive maturity of young people is being developed.

With the exception of Carneiro and Heckman (2002), and a handful of other recent studies of this generation which address the importance of family background on access to PSE (e.g., Cameron and Heckman, 1998; Ermisch and Francesconi, 2001; Keane and Wolpin, 2001; Cunha, et al., 2006; Heckman, 2007), relatively little data has been brought to bear on this topic, and we believe our data to have certain strengths that can be found in no previous studies, these being the particularly rich set of background variables that can be added to the models. This is especially true in the Canadian context, and to the best of our knowledge, ours is the first study using Canadian data which attempts to estimate the importance of a broader set of family and student background influences on access to PSE in this fashion.<sup>1</sup> In particular, we focus on the background of young adults at the time when they are 15-years old to assess the importance of these factors on entering either college or university.

The contribution of this paper is, therefore, to include a much richer series of background variables into the analysis, thus allowing us to analyse the effects of both the more traditionally measured determinants of access to PSE (e.g., family income) as well as the various sets of other background variables that also may be of importance. It is this latter group of factors that maybe correlated with financial variables, and yet may

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<sup>1</sup> Frenette (2007) also exploits these data, but address a different question: what factors explain the difference in PSE participation rates of individuals from different family income quartiles? He addresses this by using a standard Oaxaca decomposition approach.

themselves be important correlates of PSE participation amongst young people. These include various measures of high school grades, a range of “scale” variables which capture academic and social engagement and related psychological-sociological attributes, and a standardized international reading test score. We expect that the inclusion of these variables will attenuate the effects of traditional variables (such as parental education and income). We anticipate that some variables such as high school grades and standardized reading test results will have a positive and independent influence on PSE attendance, but we hold fewer *a priori* expectations about the signs and relative importance of many of the other variables, since the relationships between these variables are likely complex and have yet to be sufficiently studied in the literature. Estimating the effects of these variables and measuring the changes in the estimated effects of the more typical background variables when the broader sets are introduced, are the main focus of the paper.

Utilizing multinomial logit models to capture the particular level of PSE in which the individual participates (i.e., college versus university) generate results that are generally consistent with what is found in the existing literature in terms of the signs of the coefficients and the overall size of effects. In particular, we find that parental income is positively related to university attendance, but has a much smaller effect on college attendance, since it makes it more likely that an individual will participate in PSE, which generates a positive effect, but also more likely that university will be the level of choice, which has a negative influence. The strength of the income effect is, however, greatly diminished once parental education is included in the estimation, suggesting that when income is included without education it is largely capturing the effect of the latter, which is the dominant effect. In like fashion, the importance of parental education (especially on university attendance) is diminished to some degree – although it remains strong – once certain measures of high school grades, academic “engagement,” and standardized reading test scores (i.e., PISA results) are included. Interestingly, these additional variables do not further reduce the estimated importance of family income, suggesting that an independent income effect remains after all these factors are taken into account – even if it is not nearly as great as might be thought from estimates generated when a less complete set of explanatory variables is included. These results therefore support other recent work which points to the importance of addressing earlier cognitive and behavioural influences rather than current income in effecting change in the rates and patterns of participation in PSE.

The paper is organized as follows: the following section contains a review of the pertinent literature; Section III discusses the methodology employed; the data are discussed in Section IV; the results of the descriptive and multivariate analysis are the topic of Section V; and the final section summarizes the major findings and explores some of the policy implications of the findings.



## The Literature

As noted above, a good share of the literature on access to PSE amongst young people has addressed the impacts of tuition levels and family background (the two often interacted).

Carneiro and Heckman (2002) review the US literature and add new evidence supporting the paramount importance of long-term factors, such as family background, over short-term factors, such as credit constraints. 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.

Studies by Cameron and Heckman (1998, 2001), Keane and Wolpin (2001), and Cunha, et al. (2006), to name but a few, also support this conclusion. Similarly, Murray (2002) notes that successful (in terms of income) parents tend to have successful children. The implication of this research is that PSE participation is largely determined long before the actual point of entry into higher education and that relaxing short-term credit constraints have only have a minimal effect on participation. Keane (2002:293), for example, commenting on the income divide in college attendance in the US 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 attending PSE will be largely ineffective.

This body of work represents the point of departure for the current paper. We utilize the extensive background information contained in the YITS-A database to address access to PSE in Canada. Specifically, we add to the existing literature by including a more comprehensive set of background variables which are determined before entry into PSE to assess the impact of these variables on access to college and university and how introducing these additional variables affects estimates of the more conventional measures, such as family income, as well as parental education.

This work also fits into a specifically Canadian literature. The accumulated evidence suggests that the demand for PSE in Canada is price inelastic (Junor and Usher, 2004), although tuition increases may have a larger impact on individuals from low-income families (Coelli, 2005). Both Christophides, et al. (2001) and Corak, et al. (2003) include parental income in their models of PSE participation and find that it is important for university attendance, but not college, while tuition generally had little general effect, but may have more impact on individuals from low income families. Frenette (2005) and Drolet (2005) similarly find that PSE attendance gap between high- and low-income families is narrowed when colleges and universities are both considered, but that students from low-income family are less likely to attend either, especially university.

Two recent studies (Frenette, 2005, 2007), have also cast doubt on the credit constraint hypothesis. In the first study, Frenette uses the deregulation of professional program tuition in Ontario as a natural experiment. He discovers that it is students from middle class families who saw their participation in these programs decline the most, not those from lower-income families. In the second study, using the same YITS-A data we employ, he shows 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 majority (and almost all) of the gap. The combined results of this body of work again suggests that resources aimed at relaxing credit constraints (e.g., loans and even grants) may be misdirected and might be better utilized at improving student performance at (or before) the high school level or providing better information to students and their families about the costs and benefits of education.

## Methodology

This research uses a relatively standard empirical model for estimating access to PSE, where access is taken to be a function of different sets of influences, working from a smaller set of regressors, including the principal family background variables conventionally included in such models, and building to a more comprehensive set of regressors representing the other kinds of influences measured in the YITS-A – thus moving from a “short” regression to progressively “longer” regressions.

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  $X_i$  are vectors of covariates that influence Y, the  $\beta_i$  are the coefficients associated with each set of X, and  $\mu$  is the classical stochastic error term.

$X_1$  comprises the most conventional family background variables such as family income, parental education, family type, etc. which are typically taken in the literature to be the important indicators of the advantages of family background in terms of going on to PSE. That is, individuals from higher income families or (especially) those with more highly educated parents (it turns out) are more likely to go on to PSE, particularly at the university level. These simpler/shorter models will capture the total effects of these variables on access, regardless of the path of those influences (i.e., direct or indirect), while picking up the influences of other omitted factors with which they are correlated.

$X_2$  includes one element of the wider range of variables available in the YITS. This set is comprised of various (scholastic) “ability” measures, such as the individual’s high school grades (overall and in certain specific subjects, such as math and English), and other related indicators.

A next set of regressors,  $X_3$ , include other kinds of influences that have been gaining increasing attention as perhaps constituting some of the more important determinants of access to PSE. These include measures of “engagement” and “inclusion,” such as how connected the student felt to his or her high school, a student’s self-appraisal of confidence and competence, parental behaviours regarding monitoring and disciplining their children, etc.

It should be recognised that these additional influences do not necessarily have a natural, “econometrically-correct” ordering in terms of their inclusion, partly because we do not yet understand these processes very well. Further work will undoubtedly continue our advances in this respect. What is most important to the current analysis, however, is that:(i) they are all determined before the entry into PSE (which is when they have been measured – i.e., during the earlier pre-PSE cycles of the YITS-A), (ii) they can affect access to PSE, and (iii) they might in turn be related to family background. Hence, including them will comprise an exercise in moving towards (i) identifying a fuller set of influences of access to PSE, and (ii) seeing how adding such additional measures affects our understanding of the direct and indirect effects of family background on access to PSE.

Various particular specifications of this model are estimated, all of which use a multinomial logit set-up to differentiate between access to college and university.<sup>2</sup> It is important here to explain the difference between these two kinds of PSE in the Canadian context. “University” includes what is conventionally referred to as “college” in the American context, and includes all types of programs that deliver bachelors degrees. Otherwise put, virtually all institutions in Canada that grant such degrees are referred to as “universities,” even if they only offer programs at the bachelors level, and regardless of their size. The classic liberal arts college that is found in the U.S. would thus be a university in Canada. In contrast, “colleges” , or what are often referred to more completely as “community colleges” offer shorter, more practical programs, usually lasting from a few months to two years (or even longer in some cases) and in many cases include trade schools. The resulting credential is a college *diploma* – as opposed to the *degrees* offered by universities.

Our multinomial setup up thus allows the regressors in our models to have different effects on college and university participation, while allowing these processes to be related.

One potential issue in the estimation of these models is the potential endogeneity of at least some of the right-hand side variables. For example, students who want to get into university will likely work harder to achieve the better grades in high school required to

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<sup>2</sup> We are aware that the use of a multinomial logit model requires the assumption of independence of irrelevant alternative, an assumption that is strong given that the decision to go to college or university are not likely independent. We estimated a number of the specifications outlined below using a multinomial probit model (which does not require this strong assumption). In none of the cases did the results change markedly from those presented below in Tables 2 and 3.

gain admission to this level of schooling (and to have more choice among those to which they are accepted). Thus, high school grades are not strictly exogenous to the PSE participation outcome. There exist a variety of ways to overcome (although not necessarily eliminate) this endogeneity problem. But in this paper we simply take such measures at face value, which is consistent with our goal of estimating the empirical relationships in question and seeing how they change (or not) as the model includes richer sets of regressors. Adding the more complete sets of explanatory variables may not eliminate the bias caused by endogeneity, but it should at least attenuate the problem.

## The Data

The Youth in Transition Survey – Sample A (or YITS-A) initially interviewed 15-year olds, their parents, and their high school administrators in 2000. Two follow-up surveys of the young people (only) were conducted in 2002 and then again in 2004. In this latter wave of the survey, the young people were 19-years of age, the point at which individuals have made at least their initial choices about entering PSE.

The dependent variables in our study – representing entry into either college or university – thus differentiate those who have decided to enter PSE at this point in their lives versus all others – including those who have decided not to attend as well as those who may go later. While it would also be interesting – and in some ways more interesting – to look at access when individuals are older and would therefore have had more time to return to their studies after not entering PSE directly from high school, other work has found that the relationship between participation in PSE and family background (as well as most other influences) does not differ very much with the age of the individuals included in the samples (at least among young people generally). Our analysis is in any event constrained by the data available, and we consider our estimates to at minimum provide an initial set of results which at least begin to get at the issues being addressed, perhaps to be returned to after the release of the 2006 survey YITS-A data.

While our study is national in scope, the exception to this general coverage is that the samples exclude those living in Quebec. Because Quebec has a special system of PSE – *Collège d'enseignement général et professionnel*, or CEGEP as it is commonly known – students in Quebec only attend secondary education up to the equivalent of grade 11, and then attend CEGEP to either prepare for university (two years of CEGEP) or to complete a technical program (usually two or three years of CEGEP). We drop Quebec from our analysis since there is no way in these data to disaggregate the two streams, and this could potentially confound our analysis, since university-bound students would be classified as college students if included in terms of their CEGEP attendance, and the

differentiation of college- and university-bound students is fundamental to our analysis. Observations from the territories are also eliminated due to small sample sizes.

PSE participation is defined in our analysis as the first program that a student entered, rather than the highest level attended. This is principally owing to the fact that more information is available on the first program than on subsequent programs as well as the fact that we are concerned with the specific transition from high school to PSE in this research. This said, given the relative youth of our samples, for most students the level of the first program is the same as the level of the highest program – at least so far in their lives. (With future waves of the YITS data, the dynamics relating to first versus subsequent programs could be addressed, including switches from one level of PSE to another (i.e., between college and university).

Since individuals who have studied outside of Canada might have quite different backgrounds and experiences, we eliminate them from the sample. For the same reason, non-Canadian citizens and those with unknown immigration status are dropped. Finally, we drop those individuals for which there are missing data as well as those who are continuing in high school, since we obviously do not observe any potential transition into PSE for this latter group.<sup>3</sup>

The final sample contains 7,852 males and 8,211 females. At times, however, this number is reduced slightly due to missing values of some of the variables included in the different models. A full accounting of the observations dropped from the sample is contained in Appendix Table A-1.

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<sup>3</sup> Another issue we ignore is the effect of working during school and the effect of employment, number of hours worked, etc. on the post-secondary education choice. It is our opinion this is an important and complex issue and one that is better left for a separate analysis using these or other data.

## Results

### The Baseline Models

The initial estimation results are presented in Table 1, for males and females. These represent a set of baseline estimates that are interesting on their own, and that provide a point of departure for the analysis that follows as additional variables are added to the model. The major result to come from this exercise and one that is increasingly prominent in the literature (e.g., Ermisch and Francesconi, 2001) is that the effect of parental income – especially in the late-teen years when PSE decisions are made – is diminished greatly once we control for parental education.<sup>4</sup>

For example, the results with controls for males that do not include parental education show that a parental income level of \$100,000 and over is associated with a 19.1 percentage point increase in the probability of attending university compared to the control group of \$50,000 to \$75,000. When parental education level is included, however, this figure drops to about six percentage points. For females, the corresponding estimates are 19.8 and 10.3 percentage points. For college access, there are no statistically significant income effects except in the final model for females, where those from the poorest families have significantly lower participation rates.

What is also interesting is that although direct comparison of the income and education effects is not possible because of the different nature (and metrics) of the two sets of measures (dollars versus years), the parental income effects appear to be much smaller in magnitude than those of parental education, at least with respect to university entrance. For example, having a parent with a bachelor's degree increases the probability of going to university by 31.2 percentage points for males, compared to

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<sup>4</sup> In the case of two-parent families, parental education represents the highest level of the two parents. Using other measures (such as the average level or the different levels of the two parents) yields similar findings.



someone from a family with high school as the highest level of parental education. Contrast this with the aforementioned six percentage point increase for males from families with incomes over \$100,000 compared to incomes in the \$50,000-75,000 range.

In addition, we note that parental education effects both college and university attendance – these influences running in opposite directions. Thus, for example, males with a parent with a graduate (or professional) degree are (*ceteris paribus*) 45.1 percent more likely to go to university than the comparison group (parents have completed high school), but this comes partly at the cost of 9.2 percent lower rates of college attendance. This makes sense: parental education changes not only how many individuals go on to PSE (the net increase of 35.9 percent represented by the two effects taken together in the example just given), but also the distribution of the kind of schooling they engage in (increasing university level schooling and decreasing college level participation). The multinomial logit model used here captures these effects in the econometrically appropriate manner, and also in a manner which is expositionally convenient.

Our results are also consistent with those provided by Sacerdote (2002), who also finds that father's income (as proxied by occupation) and father's education are important determinants of entrance to PSE. He compares children randomly assigned to adoptive families with children who live with their birth parents (the control group). He finds that both groups are similarly influenced by income, but education is an important determinant of PSE participation only for non-adoptees – which of course has meaning for the interpretation of the two kinds of influences. This finding is echoed by Plug and Vijverberg (2003) who model parental ability as having both a direct effect on their children's educational attainment as well as an indirect effect through income. They argue that higher ability parents earn higher incomes and these incomes are also important inputs into a child's education. They find that the effects of parental ability are reduced from about 70-75 per cent of the total ability transfer to some 55-60 per cent when the indirect effects of ability on income are included in the model. Restuccia and Urrutia (2004) show that most of the intergenerational persistence in educational attainment can be accounted for by innate ability, but that the quality of early education can enlarge these exogenous differences in ability over time.

### **Adding High School Grades to the Model**

Next we turn to analysing the influence on access to PSE of the grades that students received in high school at the time of the first wave of the survey in 2000 when these young people were 15-years old. The results of these estimations are presented in a condensed form in Tables 2a and 2b (males and females, respectively). The baseline results from the full model estimated in Table 1 are also included to facilitate the relevant comparisons.

The overall high school average grade (numerical score) has a negative effect on college participation and a positive effect on university participation. The estimates suggest that a ten-percentage point higher grade average will result in about a three-percentage point decrease in college attendance, but about a 21 percentage point increase in university participation. Thus, higher grades shift the distribution of PSE participation from college to university, with a strong net increase in PSE participation. These results are almost identical for both females and males.<sup>5</sup>

High school grades in each of math, language, and science (also numerical scores), also yield coefficients of the same sign, although of smaller magnitudes, suggesting that it is overall grades, rather than any individual grade, that is important in determining participation in university or college. Indeed, when the model is estimated with all grades included (column 5), it is the overall grade that is of paramount importance in determining university attendance.

An interesting particular result is that the math grade is numerically the least important in determining university attendance, whether the variable enters the model individually or jointly with the other grade variables. The lack of numeracy skills (at least as reflected by the math grade) does not appear to be as important as the language grade in any of the specifications for either sex. Of course this result could change if we were to look at specific area of study, with math grades likely to be related to entry into the sciences, engineering, and other disciplines which depend more on the related skill sets.

Another interesting result is that the effects of parental income remain relatively unchanged when high school grades are included, whereas the effect of parental education is attenuated, in some cases significantly so, in both the cases of males and females. For example, the effect of having parents who are a university graduate on males' university attendance declines from 45.1 percentage points in the model with no grade variables (the "Baseline" results), to 24.2 percent when they are all included (column 5). For women, the change is from 37.2 percent to 19.9 percent. These results suggest that the influence of parental education works, at least in part, through high school grades, whereas income is capturing something other than this – indeed, perhaps a "pure" income effect (an inference which is strengthened by the results which follow).

This finding is interesting to compare to what is reported in Carneiro and Heckman, 2002 (and in other work by Heckman and various co-authors). They find that the significant effects of family income on U.S. college attendance ("university" for us) are

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<sup>5</sup> Categorical grades were also tried in place of the continuous numerical grades in these two tables (e.g., 50-60%, 60-70%, etc.). The results were essentially the same as those presented here; those with higher grades were less likely to participate in college but more likely to participate in university. The numerical grades used here were set at the means of these categorical variables (e.g., 60-70 per cent equals 65 per cent, etc.). Appendix Table A-2 contains details of the grade distributions. Grades were also entered as a quadratic in the model. Again, there were no important differences with the results presented here.

largely eliminated once an IQ test score obtained when the person was in his or her mid teens is included in the model. Their interpretation – in a context where they do not include parental education in their models – is that family income is, in the absence of the test score, proxying a family’s inputs to the child’s schooling and other such influences. Our finding of a reduced parental education effect as high school grades are added presumably stems from a similar set of relationships, except that it is the effects of parental education on a child’s high school outcomes which is being captured when grades are omitted from the model, rather than the effects of family income on these. Meanwhile, our finding of an enduring income effect suggests money might be mattering at the point of entry into PSE in a way Heckman and Carneiro did not find.

### **Adding the Scale Variables**

The YITS also includes a set of “scale” variables, which are indices derived from batteries of questions designed to measure various aspects of a person’s engagement in high school, self-esteem, parental behaviours, etc. A full description of these variables, which are based on data collected in the first survey when the individuals in the sample were age-15, can be found in Appendix Table A-3. Accompanying summary statistics are contained in Table A-4.

These variables, with the exception of reading ability (see below), are normalized at mean zero and a standard deviation of one. This is important to keep in mind when interpreting the results below.<sup>6</sup> The influence of these scale variables on college and university attendance is reported in Tables 3a and 3b for males and females. These are again entered into the basic model individually and then jointly in the final column of these tables.<sup>7</sup>

Each of the three high school engagement variables (as well as the two subcategories that comprise the academic engagement variable – academic identification and academic participation) is positively related to university attendance, but has little influence on college attendance.

The most important of these is academic participation (a measure of attending school, doing homework, etc.) which is important on its own and also as comprising one-half of the academic engagement variable, which is a simple average of academic participation and academic identification, the latter being basically a measure of valuing and belonging at school. For females, being one standard deviation above the mean on this academic participation scale increases university attendance by about 13.9 percentage

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<sup>6</sup> The variables also tend to have substantial distributions (Appendix Table A-4), indicating that they are indeed capturing something, which is of course reflected in the significant effects they seem to carry as seen in the results which follow.

<sup>7</sup> To check for non-linearities, separate estimates were conducted using both a quadratic specification of the scale variables as well as categorical dummy variables. As with the case of high school grades, there are no important differences between these results and the results reported here.

points, and for males the figure is about 10.6 percentage points. Thus, students who attend class regularly, complete assignments on time, and spend more time studying, are much more likely to attend university than those who do not have these habits. The academic identification effects are significant, but a little weaker, in the 6-7 percent effect range.

In addition, the influence of parental education declines in importance once academic participation is included, suggesting that the two variables are positively correlated, presumably because parents with more education tend to teach their children to have good work habits and so on – or because they otherwise purchase the inputs (extracurricular activities, clubs, etc.) that build these behaviours, or because they otherwise transfer or generate the attributes that build academic participation.

Social engagement reflects the degree to which an individual feels accepted, respected and included in the high school environment, and although it is positively related to university participation for both males and females, the effects are relatively weak. Those who are one standard deviation above the mean on this measure, for example, are about two percentage points more likely to attend university. The measure has no significant effect on college attendance.

Self-perception would also seem to be an important determinant of PSE participation. Self-perception is captured by three separate variables: self-esteem is a measure of self-worth and self-acceptance, self-efficacy is the student's own perception of his or her competence and confidence in performing class work, and self-mastery is a measure of being in control of one's own destiny. Students who scored high on any or all of these measures might be more prepared to enter PSE, and the results in fact show that all three are positively and significantly correlated with university – but not college – attendance, at least when entered individually. Self-efficacy, however, has the largest effect for both males and females, about twice the impact of the other two measures.

Social support is statistically important for males, but the coefficient estimates are relatively small, and the variable is not significant for females. These results thus suggest that those who look to improving these elements of a young person's situation as a means of causing more of them to enrol in PSE would, therefore, appear to have the odds stacked against them in terms of getting significant results with any such strategies.

Parental behaviour is divided into three subcategories: "monitoring behaviour" addresses how well parents feel informed about the activities of their children, while "nurturance behaviour" and "inconsistent discipline" are both self-explanatory. Of these, monitoring behaviour is positively related to university attendance for both males and females, while nurturing is important only for males. Neither has any influence on college participation. Finally, inconsistent discipline is negatively related to participation in university for both sexes but again is not related to college participation. The

magnitudes of these influences lay in the 2-3 percentage range (university attendance) where significant, less where not (not surprisingly).

Reading ability is an extraordinarily important correlate of PSE participation. This variable has a mean of 500 and a standard deviation of 100 and was created from the cross-national Programme for International Student Assessment (PISA) reading test results. The point estimates show that females who were one-standard deviation above the mean were, on average, 23-percentage points more likely of attending university (and just slightly less likely to attend college). For males, the corresponding figure is 18-percentage points.

Of note here is the fact that the effects of parental education do not change very much when the scale variables are added, implying that these variables are not highly related in their effects. The exceptions to this are academic participation, self-efficacy, and reading ability in the case of university participation. In the first two instances the effects of parental education declines to a moderate degree, while the inclusion of the reading score decreases the value of parental education at the bachelor's and graduate levels (for example) by approximately one-third for both males and females (compare columns 1 and 13 in Tables 3a and 3b). The PISA reading score is a standardized test and these results are again comparable to those obtained by Carneiro and Heckman (2002) who also use standardized test scores to explain differences in college attendance in the United States.

It is important to note that the PISA scores are based on actual tests, whereas the high school grades (such as those shown in Tables 2a and 2b) are self-reported. Finnie and Meng (2005) have shown that these types of test score measures of skill perform better than self-assessments of skill. In particular, they use literacy as an example using both types of measures (i.e., test scores and self-reported ability), and find that the self-assessed measure tends to lead to a significant underestimation of the effect of literacy on employment compared to the test measure. In the present work, this bias may also be present, as indicated by the greater estimated effect and associated decrease in the magnitude of the parental education variable (mainly at the BA and graduate school levels) when the standardized test score is included (Tables 3) versus when the self-assessed measure of ability are included in the models (Tables 2).<sup>8</sup>

When all these scale variables are considered together (column 15 in the tables), the results continue to suggest relatively little influence on college participation – hardly surprising given the general lack of impact when entered individually.

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<sup>8</sup> One only needs to compare the decline in the BA and graduate school coefficient values in Tables 2 and Tables 3 when measures of reading ability are included. In the former case (column 3 of Tables 2a and 2b), it is the main language grade of the last year in high school (self-reported) which is included whereas in the latter case (column 13 of Tables 3a and 3b) it is the administrative PISA reading test score which is used. Inclusion of the self-reported measure results in a modest decline in the influences of parental education, whereas in the latter case these drops are quite dramatic.

For university attendance, however, and despite the large number of regressors included, some of which would be expected to be correlated and have somewhat similar effects, certain strong influences continue to be seen. In particular, academic participation, self-efficacy and reading ability all remain important, although the relative magnitudes of these variables continue to differ. A one-standard deviation increase from the mean of academic participation raises female university participation rates by about 8.8 percentage points on average. For males, the corresponding figure is 6.8 percentage points. One standard deviation above the mean on the self-efficacy scale means almost a five-percentage point increase in university attendance for both females and males.

Reading ability clearly has the largest effect. For females, a score one-standard deviation above the mean is associated with the woman being 19 percentage points more likely to attend university, and for males the corresponding figure is 15 percentage points. With the mean university participation rates for males and females in our sample being 30.9 and 44.7 per cent, respectively, reading ability is clearly a major determinant of who goes and who does not. Since reading ability is a skill derived over a period of time, this result is also consistent with the earlier work on this subject by Cameron and Heckman (1998, 2001) and Carneiro and Heckman (2002), all of which point to the importance of long-term family factors in determining success in PSE through the investments families make in their children's early cognitive and behavioural development.

Other variables that continue to show some significance, although in a more mixed fashion (men versus women) and indicating generally smaller effects, include social support, which continues to have the curious effect of slightly decreasing university participation (men and women) and increasing college participation in the case of women; parental monitoring, which has a small positive effect on university attendance for females; and inconsistent parental discipline, which has a small negative effect on university participation for males and females alike.

The general results presented above are also consistent with the sparse Canadian literature which attempts to include additional background factors in models of access to PSE. In particular, Finnie, Lascelles and Sweetman (2005) also find that including a variety of high school grades and other background variables reduces the influence of parental education on access (they do not have a family income variable). They also find that parental education is still an important influence after these grades and background variables are taken into consideration, especially at the university level. Our results are similar.

## **Overview of the Findings**

What can we make of these results taken together? The fact that academic participation at the high school level and higher PISA reading ability results are important determinants of university education seems obvious. The lesson here is that talent,

working hard and being responsible about one's studies is important. These effects are also clearly related to parental education (especially parents with a BA or above) as the coefficients on these variables indicate that they are less important (direct) determinants of university participation when these other background variables are added to the model.

The transmission mechanism from parent to child, however, cannot be ascertained from our estimates. Do highly educated parents push their children harder, provide them with more and/or better developmental inputs, or are reading ability and academic work habits transmitted by some other mechanism? Indeed, is there a pure (genetic) heritability component to these relationships? Understanding these relationships and mechanisms would, of course, be a useful line for further research, using the YITS data or other kinds of analysis.

The generally small and often insignificant coefficients on the parental behaviour variables seem to provide some supporting evidence for the kinds of explanation that lay beyond parents simply pushing their children to do better or providing them with richer developmental experiences. In any case, our results do underline the importance of family background and natural skill endowments as emphasized by Cameron and Heckman (2001), Keane and Wolpin (2001), and Carneiro and Heckman (2002), to name but three of the relevant recent studies.

Finally, the models all point to a smaller, but robust, direct/independent effect of family income on access to PSE, regardless of what other explanatory variables are added to the model – after the estimated influence decline sharply with the addition of the parental education variables. Family income is not, it seems, just capturing inputs to a child's development or the other kinds of influences which our fuller models are able to control for. Again, the precise manner in which family income directly affects access to PSE remains beyond the scope of this paper.



## Conclusions and Policy Implications

This research has addressed how various background factors are related to college and university in Canada, and a number of interesting results have been found. Most important, probably, is that our findings agree with the increasingly common result found in the literature that the impact of parental income is greatly reduced once a broader set of explanatory variables are added to the model. In our case, the greatest part of the decline occurs when parental education is included. In other words, parental education – and the various influences to which parental education appears to be related (such as a child’s reading ability in high school) – and not parental income is what largely drives young people to attend PSE in general, and university in particular. That being said, a smallish “pure” (direct) income effect remains. Our other major findings are as follows.

First, a major determinant of university participation is the individual’s score on the reading portion of the cross-country PISA test – probably our best measure of overall/general “ability,” while also representing a particular skill set (i.e., literacy).

Second, overall high school grades, as well as the three subject grades under consideration, also tend to be positively correlated with university attendance, and more weakly, negatively correlated with college attendance (as students with higher grades evidently shift their PSE participation from college to university). Furthermore, it is the overall high school grade, rather than any individual subject grade, which has the largest influence. This is an interesting result since it is often assumed that language arts and mathematics grades are the most important determinants of academic success. Still, our result makes sense in light of the fact that most students take a general studies program upon entering university, so it is not surprising that a comparably general credential is the most important determinant of PSE participation at that level. These results also make sense given the structure of the university and college systems in Canada; the former is more exclusive, with admission being based on high school grades, while the latter is generally characterised by more open admission policies.



Third, engagement at high school, especially academic participation, which essentially relates to an individual's work habits, is also a significant determinant of university (but not college) participation. In fact, it is the most important of all the engagement variables, although self-efficacy (or a feeling of competence and confidence at school) is also significant.

Fourth, when high school grades, academic participation, or the reading score on the PISA are added to the basic model, the direct effect of parental education is diminished, but is far from eliminated, and remains an important (independent) determinant of access to PSE, especially university. The largest drop in the parental education effect comes from the inclusion of the PISA reading ability score, probably the most reliable indicator of ability among the background variables included in the model (many of which are self-reported).

In other words, parental education appears to work through these other sets of variables (reading ability, course grades, student behaviours, etc.) to influence access to PSE. We cannot, however, identify from these estimates the precise path that this influence takes. It could be the result of highly educated parents expecting more of their children, teaching their children better work habits, providing them with more and better developmental inputs, shaping their preferences for PSE and the sorts of careers and lifestyles it entails, or it could be due to some other inputs or other characteristic passed on from parent to child which are correlated with parental education, but not observed nor controlled for in the estimates. Further disentangling these relationships would clearly be an important avenue for future research.

The policy implications of this research are not straightforward. Parental education is correlated with other background variables that are themselves important determinants of PSE participation. It is unrealistic to expect policy to change the exigent level of parental education, although policy could influence its level for today's young people for when they themselves are parents. Therefore, the short-term policy focus must be on the factors to which parental education is related, as well as the other direct influences on access to PSE identified in our models, such as reading ability, academic participation, and high school grades.

Still, this may not be as simple as it seems. Current research in this area (Cunha, et al., 2006; Cunha and Heckman, 2007) rejects the idea that economic outcomes such as access to higher education can be adequately explained using an additive nature/nurture dichotomy. Rather the acquisition of skills is complex and involves the interaction between cognitive, non-cognitive and environmental influences. Furthermore, investment in skill formation feeds on past investments in the same. Yet

although it is investments early in life which have the highest rate of return, the lack of these investments can (at least in part) be overcome by investments later in life.<sup>9</sup>

According to Heckman (2000) cognitive abilities (as measured by IQ) may peak early in life and remain stable after about age 10, but other abilities such as motivation, self-discipline, and social skills can be enhanced at later ages. These are factors which more or less correspond to the variables included in the present research which are positively related to university access. This implies that even those individuals with a low probability of PSE participation based on family background may be able to overcome this obstacle with the development of complementary skills as they move through childhood and into adolescence. It is the processes by which these complementary skills are acquired after ten years of age, but before the PSE decision is made, that would provide a most useful avenue of research in the medium-term, as policy makers ponder the question of bringing today's post-primary school students into PSE.

And it is perhaps here where new resources need to be principally targeted if access patterns are to be significantly changed, rather than – for example – continuing to focus on student financial aid. Adequate student aid is certainly a critical element of any access policy, but it is only one of many, and students need to i) be prepared for PSE, and ii) want to go to PSE before any aid policy can facilitate the resulting choices for entering the system. And it seems likely from this research and what others have been reporting of late that any gains in this respect will have to focus on more fundamental issues, and developments earlier in a person's life, rather than simply provide enough financial support at the point a person may choose to enter the system.

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<sup>9</sup> Heckman and Masterov (2007: 6) note: "Gaps in college attendance across socioeconomic groups are largely shaped by abilities formed in the early years. Gaps in child ability across families of different income levels are associated with parental environments and parenting practices. Early interventions can partially remediate these deficits. Later interventions are much less effective." Heckman (2007) also extensively discusses this factors associated with this participation gap between socioeconomic groups.

## Tables

**Table 1: Multinomial Logit Estimates of Access to College and University**

|   | Males                 |                      |                       |                      | Females               |                       |                       |                       |
|---|-----------------------|----------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|   | (1)                   |                      | (2)                   |                      | (1)                   |                       | (2)                   |                       |
|   | College               | University           | College               | University           | College               | University            | College               | University            |
| HS location - Urban (Rural)             | -0.0486***<br>[0.016] | 0.102***<br>[0.019]  | -0.0445***<br>[0.016] | 0.0755***<br>[0.018] | -0.0944***<br>[0.016] | 0.0686***<br>[0.019]  | -0.0825***<br>[0.016] | 0.0351*<br>[0.018]    |
| HS Province (ON)                        |                       |                      |                       |                      |                       |                       |                       |                       |
| Newfoundland and Labrador               | -0.111***<br>[0.023]  | 0.127***<br>[0.028]  | -0.112***<br>[0.023]  | 0.109***<br>[0.026]  | -0.130***<br>[0.022]  | 0.142***<br>[0.026]   | -0.124***<br>[0.022]  | 0.137***<br>[0.025]   |
| Prince Edward Island                    | -0.155***<br>[0.021]  | 0.238***<br>[0.029]  | -0.150***<br>[0.022]  | 0.200***<br>[0.027]  | -0.173***<br>[0.019]  | 0.216***<br>[0.025]   | -0.163***<br>[0.019]  | 0.188***<br>[0.024]   |
| Nova Scotia                             | -0.145***<br>[0.020]  | 0.242***<br>[0.026]  | -0.137***<br>[0.021]  | 0.193***<br>[0.025]  | -0.169***<br>[0.018]  | 0.219***<br>[0.023]   | -0.158***<br>[0.019]  | 0.195***<br>[0.023]   |
| New Brunswick                           | -0.165***<br>[0.020]  | 0.172***<br>[0.027]  | -0.165***<br>[0.019]  | 0.157***<br>[0.025]  | -0.163***<br>[0.019]  | 0.178***<br>[0.023]   | -0.157***<br>[0.019]  | 0.160***<br>[0.023]   |
| Manitoba                                | -0.215***<br>[0.016]  | 0.0898***<br>[0.029] | -0.211***<br>[0.016]  | 0.0768***<br>[0.027] | -0.148***<br>[0.020]  | 0.0784***<br>[0.026]  | -0.147***<br>[0.020]  | 0.0780***<br>[0.025]  |
| Saskatchewan                            | -0.170***<br>[0.018]  | 0.0825***<br>[0.025] | -0.174***<br>[0.018]  | 0.0673***<br>[0.023] | -0.139***<br>[0.019]  | 0.0437*<br>[0.025]    | -0.140***<br>[0.019]  | 0.0378<br>[0.023]     |
| Alberta                                 | -0.141***<br>[0.018]  | -0.0244<br>[0.021]   | -0.143***<br>[0.018]  | -0.0269<br>[0.020]   | -0.0909***<br>[0.020] | -0.0904***<br>[0.023] | -0.0957***<br>[0.019] | -0.0820***<br>[0.021] |
| British Columbia                        | -0.0868***<br>[0.020] | 0.00949<br>[0.022]   | -0.0882***<br>[0.020] | -0.00658<br>[0.020]  | -0.0592***<br>[0.020] | -0.0569**<br>[0.022]  | -0.0616***<br>[0.020] | -0.0596***<br>[0.021] |
| French minority outside QC (All Others) | 0.0574*<br>[0.031]    | -0.0135<br>[0.036]   | 0.0565*<br>[0.030]    | -0.0118<br>[0.032]   | 0.0464<br>[0.029]     | 0.0101<br>[0.032]     | 0.0520*<br>[0.029]    | 0.0125<br>[0.031]     |
| Family Type (Two Parents)               |                       |                      |                       |                      |                       |                       |                       |                       |
| Mother only                             | -0.0308<br>[0.024]    | 0.0107<br>[0.033]    | -0.0289<br>[0.025]    | -0.00589<br>[0.030]  | 0.0153<br>[0.024]     | 0.0216<br>[0.029]     | 0.0183<br>[0.024]     | 0.0124<br>[0.028]     |
| Father only                             | 0.00461<br>[0.053]    | -0.0546<br>[0.061]   | 0.0219<br>[0.056]     | -0.0719<br>[0.055]   | -0.0116<br>[0.053]    | -0.046<br>[0.066]     | -0.0121<br>[0.052]    | -0.0412<br>[0.060]    |
| Other                                   | -0.0394<br>[0.058]    | -0.0843<br>[0.084]   | -0.0299<br>[0.064]    | -0.0365<br>[0.10]    | -0.0305<br>[0.053]    | -0.186***<br>[0.068]  | -0.0368<br>[0.053]    | -0.161**<br>[0.063]   |
| Visible minority (All others)           | -0.0103<br>[0.027]    | 0.187***<br>[0.032]  | -0.00529<br>[0.027]   | 0.174***<br>[0.030]  | -0.00087<br>[0.027]   | 0.142***<br>[0.031]   | 0.0111<br>[0.027]     | 0.114***<br>[0.031]   |
| Canadian by immigration (by birth)      | -0.0259<br>[0.038]    | 0.150***<br>[0.046]  | -0.0026<br>[0.040]    | 0.0516<br>[0.044]    | -0.057<br>[0.035]     | 0.182***<br>[0.041]   | -0.0297<br>[0.037]    | 0.111***<br>[0.041]   |

**Table 1: Multinomial Logit Estimates of Access to College and University (continued)**

|   | Males              |                       |                       |                      | Females              |                      |                       |                       |
|---|--------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
|   | (1)                |                       | (2)                   |                      | (1)                  |                      | (2)                   |                       |
|   | College            | University            | College               | University           | College              | University           | College               | University            |
| Visible Minority & Canadian by immigration (others) | -0.0122<br>[0.055] | -0.112**<br>[0.046]   | -0.0188<br>[0.054]    | -0.0682<br>[0.053]   | 0.000965<br>[0.063]  | -0.0898<br>[0.062]   | -0.00651<br>[0.062]   | -0.0468<br>[0.062]    |
| Parental/guardian's Education (HS completed)        |                    |                       |                       |                      |                      |                      |                       |                       |
| Less than HS  |                    |                       | -0.0691**<br>[0.029]  | -0.0676**<br>[0.027] |                      |                      | -0.0353<br>[0.029]    | -0.118***<br>[0.032]  |
| Some PSE  |                    |                       | 0.0119<br>[0.031]     | 0.0585*<br>[0.033]   |                      |                      | 0.0409<br>[0.033]     | 0.0454<br>[0.035]     |
| Trade/College                                       |                    |                       | 0.0212<br>[0.021]     | 0.0761***<br>[0.022] |                      |                      | -0.0103<br>[0.020]    | 0.0618**<br>[0.024]   |
| University-below BA degree                          |                    |                       | -0.00123<br>[0.039]   | 0.163***<br>[0.046]  |                      |                      | -0.0811**<br>[0.034]  | 0.302***<br>[0.040]   |
| University-BA                                       |                    |                       | -0.0488**<br>[0.022]  | 0.312***<br>[0.030]  |                      |                      | -0.0807***<br>[0.022] | 0.299***<br>[0.027]   |
| University-Grad                                     |                    |                       | -0.0922***<br>[0.026] | 0.451***<br>[0.035]  |                      |                      | -0.143***<br>[0.025]  | 0.372***<br>[0.032]   |
| Other/unknown                                       |                    |                       | -                     | -                    |                      |                      | -                     | -                     |
| Parental Income Level (\$50000 to \$75000)          |                    |                       |                       |                      |                      |                      |                       |                       |
| Extremely low (\$0-\$5000)                          | 0.015<br>[0.071]   | -0.0209<br>[0.080]    | 0.0159<br>[0.071]     | 0.00268<br>[0.069]   | -0.101**<br>[0.046]  | -0.0773<br>[0.097]   | -0.0951**<br>[0.047]  | -0.087<br>[0.095]     |
| \$5000 to \$25000                                   | 0.016<br>[0.033]   | -0.108***<br>[0.034]  | 0.03<br>[0.035]       | -0.0481<br>[0.037]   | -0.0226<br>[0.029]   | -0.191***<br>[0.036] | -0.0288<br>[0.029]    | -0.102***<br>[0.038]  |
| \$25000 to \$50000                                  | 0.0198<br>[0.020]  | -0.0567***<br>[0.022] | 0.0228<br>[0.020]     | -0.0134<br>[0.021]   | -0.00074<br>[0.019]  | -0.124***<br>[0.023] | -0.00816<br>[0.020]   | -0.0815***<br>[0.023] |
| \$75000 to \$100000                                 | 0.00145<br>[0.019] | 0.110***<br>[0.025]   | 0.0167<br>[0.020]     | 0.0401*<br>[0.023]   | -0.0121<br>[0.020]   | 0.0659***<br>[0.024] | 0.00336<br>[0.020]    | 0.0205<br>[0.023]     |
| \$100000 and up                                     | -0.0105<br>[0.022] | 0.191***<br>[0.028]   | 0.0191<br>[0.023]     | 0.0601**<br>[0.026]  | -0.0526**<br>[0.022] | 0.198***<br>[0.025]  | -0.0143<br>[0.023]    | 0.103***<br>[0.026]   |
| Observations  | 7852               |                       | 7852                  |                      | 8311                 |                      | 8311                  |                       |

Notes: Average marginal effects are shown. Omitted categories are in parenthesis. Standard errors are in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table 2a: Effects of High School Grades on Access to College and University, Males**

|  | Baseline              |                      | (1)                   |                       | (2)                    |                       | (3)                   |                       | (4)                   |                       | (5)                  |                       |
|--|-----------------------|----------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|
|  | College               | University           | College               | University            | College                | University            | College               | University            | College               | University            | College              | University            |
| <b>Parental/guardian's Education</b><br>(HS completed) |                       |                      |                       |                       |                        |                       |                       |                       |                       |                       |                      |                       |
| Less than HS   | -0.0691**<br>[0.029]  | -0.0676**<br>[0.027] | -0.0624**<br>[0.0309] | -0.0473*<br>[0.0248]  | -0.0721**<br>[0.0297]  | -0.0671**<br>[0.0273] | -0.0717**<br>[0.0299] | -0.0591**<br>[0.0276] | -0.0594*<br>[0.0311]  | -0.0527*<br>[0.0269]  | -0.0551*<br>[0.0333] | -0.0475*<br>[0.0259]  |
| Some PSE   | 0.012<br>[0.031]      | 0.0585*<br>[0.033]   | 0.019<br>[0.0317]     | 0.013<br>[0.0249]     | 0.014<br>[0.0315]      | 0.044<br>[0.0296]     | 0.016<br>[0.0315]     | 0.043<br>[0.0297]     | 0.024<br>[0.0326]     | 0.050<br>[0.0312]     | 0.028<br>[0.0332]    | 0.008<br>[0.0257]     |
| Trade/College  | 0.021<br>[0.021]      | 0.0761***<br>[0.022] | 0.023<br>[0.0213]     | 0.0517***<br>[0.0194] | 0.018<br>[0.0212]      | 0.0709***<br>[0.0212] | 0.018<br>[0.0212]     | 0.0641***<br>[0.0209] | 0.018<br>[0.0214]     | 0.0736***<br>[0.0209] | 0.021<br>[0.0220]    | 0.0483**<br>[0.0196]  |
| University-below BA degree                             | -0.001<br>[0.039]     | 0.163***<br>[0.046]  | 0.004<br>[0.0396]     | 0.1146***<br>[0.0397] | -0.004<br>[0.0396]     | 0.1518***<br>[0.0441] | 0.004<br>[0.0407]     | 0.1366***<br>[0.0425] | -0.007<br>[0.0400]    | 0.1601***<br>[0.0423] | -0.002<br>[0.0410]   | 0.1161***<br>[0.0417] |
| University-BA  | -0.0488**<br>[0.022]  | 0.312***<br>[0.030]  | -0.031<br>[0.0224]    | 0.1981***<br>[0.0252] | -0.0428*<br>[0.0223]   | 0.2707***<br>[0.0287] | -0.0438**<br>[0.0220] | 0.2519***<br>[0.0278] | -0.0466**<br>[0.0223] | 0.2369***<br>[0.0263] | -0.031<br>[0.0230]   | 0.1692***<br>[0.0242] |
| University-Grad  | -0.0922***<br>[0.026] | 0.451***<br>[0.035]  | -0.0575**<br>[0.0286] | 0.2869***<br>[0.0306] | -0.0900***<br>[0.0268] | 0.3909***<br>[0.0335] | -0.0723**<br>[0.0282] | 0.3455***<br>[0.0349] | -0.0704**<br>[0.0284] | 0.3293***<br>[0.0329] | -0.0510*<br>[0.0298] | 0.2416***<br>[0.0304] |
| Other/unknown  | -                     | -                    | -                     | -                     | -                      | -                     | -                     | -                     | -                     | -                     | -                    | -                     |
| <b>Parental Income Level (\$50000 to \$75000)</b>      |                       |                      |                       |                       |                        |                       |                       |                       |                       |                       |                      |                       |
| Extremely low (\$0-\$5000)                             | 0.016<br>[0.071]      | 0.003<br>[0.069]     | 0.025<br>[0.0703]     | -0.026<br>[0.0496]    | 0.014<br>[0.0706]      | -0.004<br>[0.0629]    | 0.017<br>[0.0716]     | -0.010<br>[0.0614]    | -0.039<br>[0.0624]    | -0.004<br>[0.0708]    | -0.033<br>[0.0613]   | -0.032<br>[0.0549]    |
| \$5000 to \$25000                                      | 0.030<br>[0.035]      | -0.048<br>[0.037]    | 0.045<br>[0.0366]     | -0.047<br>[0.0341]    | 0.036<br>[0.0356]      | -0.034<br>[0.0365]    | 0.034<br>[0.0361]     | -0.032<br>[0.0380]    | 0.026<br>[0.0356]     | 0.008<br>[0.0395]     | 0.047<br>[0.0386]    | -0.013<br>[0.0371]    |
| \$25000 to \$50000                                     | 0.023<br>[0.020]      | -0.013<br>[0.021]    | 0.026<br>[0.0201]     | 0.000<br>[0.0183]     | 0.023<br>[0.0201]      | 0.000<br>[0.0206]     | 0.018<br>[0.0199]     | -0.002<br>[0.0201]    | 0.022<br>[0.0205]     | -0.003<br>[0.0200]    | 0.027<br>[0.0209]    | 0.010<br>[0.0185]     |
| \$75000 to \$100000                                    | 0.017<br>[0.020]      | 0.0401*<br>[0.023]   | 0.013<br>[0.0194]     | 0.0410**<br>[0.0190]  | 0.015<br>[0.0197]      | 0.0425*<br>[0.0221]   | 0.013<br>[0.0195]     | 0.0359*<br>[0.0210]   | 0.002<br>[0.0195]     | 0.0508**<br>[0.0211]  | 0.001<br>[0.0194]    | 0.0438**<br>[0.0188]  |
| \$100000 and up  | 0.019<br>[0.023]      | 0.0601**<br>[0.026]  | 0.020<br>[0.0228]     | 0.0629***<br>[0.0225] | 0.022<br>[0.0234]      | 0.0669***<br>[0.0248] | 0.019<br>[0.0231]     | 0.0570**<br>[0.0243]  | 0.016<br>[0.0235]     | 0.0519**<br>[0.0239]  | 0.018<br>[0.0233]    | 0.0608***<br>[0.0221] |

(continued)

**Table 2a: Effects of High School Grades on Access to College and University, Males (continued)**

|  | Baseline |            | (1)                    |                       | (2)                   |                       | (3)                    |                       | (4)                    |                       | (5)                   |                       |
|--|----------|------------|------------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|
|  | College  | University | College                | University            | College               | University            | College                | University            | College                | University            | College               | University            |
| Overall grade of last year HS<br>(numerical)       |          |            | -0.0033***<br>[0.0008] | 0.0211***<br>[0.0006] |                       |                       |                        |                       |                        |                       | -0.0022*<br>[0.0012]  | 0.0154***<br>[0.0011] |
| Math grade of last year HS<br>(numerical)          |          |            |                        |                       | -0.0012**<br>[0.0006] | 0.0101***<br>[0.0006] |                        |                       |                        |                       | 0.000<br>[0.0007]     | 0.001<br>[0.0007]     |
| Main language grade of last year HS<br>(numerical) |          |            |                        |                       |                       |                       | -0.0024***<br>[0.0007] | 0.0137***<br>[0.0006] |                        |                       | -0.0019**<br>[0.0008] | 0.0029***<br>[0.0008] |
| Science grade of HS (numerical)                    |          |            |                        |                       |                       |                       |                        |                       | -0.0012***<br>[0.0004] | 0.0125***<br>[0.0005] | 0.000<br>[0.0005]     | 0.0053***<br>[0.0006] |
| Observations                                       | 7852     |            | 7677                   |                       | 7626                  |                       | 7643                   |                       | 7223                   |                       | 6924                  |                       |

Notes: Average marginal effects are shown. Omitted categories are in parenthesis. Controls include all those in Table 1. Standard errors are in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Full results are available upon request.

Table 2b: Effects of High School Grades on Access to College and University, Females

|   | Baseline              |                       | (1)                    |                        | (2)                    |                        | (3)                    |                        | (4)                    |                        | (5)                    |                        |
|---|-----------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|   | College               | University            | College                | University             | College                | University             | College                | University             | College                | University             | College                | University             |
| Parental/guardian's Education<br>(HS completed) |                       |                       |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Less than HS                                    | -0.035<br>[0.029]     | -0.118***<br>[0.032]  | -0.037<br>[0.0293]     | -0.0675**<br>[0.0319]  | -0.039<br>[0.0292]     | -0.1092***<br>[0.0324] | -0.035<br>[0.0298]     | -0.0972***<br>[0.0329] | -0.043<br>[0.0284]     | -0.0714**<br>[0.0342]  | -0.045<br>[0.0294]     | -0.050<br>[0.0334]     |
| Some PSE  | 0.041<br>[0.033]      | 0.045<br>[0.035]      | 0.038<br>[0.0326]      | 0.047<br>[0.0332]      | 0.035<br>[0.0328]      | 0.048<br>[0.0353]      | 0.033<br>[0.0327]      | 0.027<br>[0.0336]      | 0.043<br>[0.0327]      | 0.042<br>[0.0332]      | 0.031<br>[0.0328]      | 0.049<br>[0.0330]      |
| Trade/College                                   | -0.010<br>[0.020]     | 0.0618**<br>[0.024]   | -0.010<br>[0.0201]     | 0.0436**<br>[0.0217]   | -0.012<br>[0.0205]     | 0.0623***<br>[0.0238]  | -0.012<br>[0.0202]     | 0.0434*<br>[0.0225]    | -0.006<br>[0.0201]     | 0.0395*<br>[0.0223]    | -0.011<br>[0.0203]     | 0.0363*<br>[0.0216]    |
| University-below BA degree                      | -0.0811**<br>[0.034]  | 0.302***<br>[0.040]   | -0.044<br>[0.0369]     | 0.1868***<br>[0.0352]  | -0.0772**<br>[0.0344]  | 0.2821***<br>[0.0390]  | -0.0708**<br>[0.0350]  | 0.2478***<br>[0.0380]  | -0.038<br>[0.0362]     | 0.2057***<br>[0.0365]  | -0.034<br>[0.0368]     | 0.1623***<br>[0.0342]  |
| University-BA                                   | -0.0807***<br>[0.022] | 0.299***<br>[0.027]   | -0.0522**<br>[0.0224]  | 0.1953***<br>[0.0249]  | -0.0791***<br>[0.0223] | 0.2802***<br>[0.0263]  | -0.0644***<br>[0.0228] | 0.2258***<br>[0.0262]  | -0.0454**<br>[0.0225]  | 0.2117***<br>[0.0256]  | -0.0399*<br>[0.0227]   | 0.1690***<br>[0.0250]  |
| University-Grad                                 | -0.143***<br>[0.025]  | 0.372***<br>[0.032]   | -0.0993***<br>[0.0284] | 0.2424***<br>[0.0301]  | -0.1329***<br>[0.0258] | 0.3407***<br>[0.0320]  | -0.1216***<br>[0.0272] | 0.2792***<br>[0.0325]  | -0.0955***<br>[0.0285] | 0.2518***<br>[0.0314]  | -0.0822***<br>[0.0302] | 0.1991***<br>[0.0295]  |
| Other/unknown                                   | -                     | -                     | -                      | -                      | -                      | -                      | -                      | -                      | -                      | -                      | -                      | -                      |
| Parental Income Level<br>(\$50000 to \$75000)   |                       |                       |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Extremely low (\$0-\$5000)                      | -0.0951**<br>[0.047]  | -0.087<br>[0.095]     | -0.1049**<br>[0.0461]  | -0.064<br>[0.0935]     | -0.1099**<br>[0.0446]  | -0.106<br>[0.0932]     | -0.1091**<br>[0.0445]  | -0.034<br>[0.0897]     | -0.1042**<br>[0.0458]  | -0.053<br>[0.0913]     | -0.1237***<br>[0.0407] | -0.041<br>[0.1000]     |
| \$5000 to \$25000                               | -0.029<br>[0.029]     | -0.102***<br>[0.038]  | -0.040<br>[0.0293]     | -0.0728**<br>[0.0365]  | -0.041<br>[0.0290]     | -0.0892**<br>[0.0391]  | -0.040<br>[0.0286]     | -0.0670*<br>[0.0352]   | -0.036<br>[0.0290]     | -0.049<br>[0.0361]     | -0.042<br>[0.0297]     | -0.041<br>[0.0360]     |
| \$25000 to \$50000                              | -0.008<br>[0.020]     | -0.0815***<br>[0.023] | -0.015<br>[0.0189]     | -0.0615***<br>[0.0203] | -0.012<br>[0.0195]     | -0.0801***<br>[0.0224] | -0.015<br>[0.0192]     | -0.0601***<br>[0.0218] | -0.015<br>[0.0192]     | -0.0649***<br>[0.0214] | -0.021<br>[0.0192]     | -0.0544***<br>[0.0203] |
| \$75000 to \$100000                             | 0.003<br>[0.020]      | 0.021<br>[0.023]      | -0.001<br>[0.0191]     | 0.030<br>[0.0199]      | -0.001<br>[0.0201]     | 0.012<br>[0.0221]      | 0.002<br>[0.0200]      | 0.024<br>[0.0218]      | -0.006<br>[0.0193]     | 0.030<br>[0.0208]      | -0.009<br>[0.0191]     | 0.032<br>[0.0196]      |
| \$100000 and up                                 | -0.014<br>[0.023]     | 0.103***<br>[0.026]   | -0.006<br>[0.0226]     | 0.0893***<br>[0.0236]  | -0.014<br>[0.0232]     | 0.0974***<br>[0.0260]  | -0.014<br>[0.0231]     | 0.1041***<br>[0.0254]  | -0.012<br>[0.0225]     | 0.0900***<br>[0.0238]  | -0.010<br>[0.0225]     | 0.0842***<br>[0.0235]  |

(continued)



**Table 2b: Effects of High School Grades on Access to College and University, Females (continued)**

|  | Baseline |            | (1)                    |                       | (2)                  |                       | (3)                  |                       | (4)                    |                       | (5)                    |                       |
|--|----------|------------|------------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|
|  | College  | University | College                | University            | College              | University            | College              | University            | College                | University            | College                | University            |
| Overall grade of last year HS<br>(numerical)       |          |            | -0.0034***<br>[0.0008] | 0.0219***<br>[0.0007] |                      |                       |                      |                       |                        |                       | -0.0019*<br>[0.0011]   | 0.0134***<br>[0.0012] |
| Math grade of last year HS<br>(numerical)          |          |            |                        |                       | -0.0010*<br>[0.0005] | 0.0080***<br>[0.0007] |                      |                       |                        |                       | 0.000<br>[0.0006]      | 0.000<br>[0.0007]     |
| Main language grade of last year HS<br>(numerical) |          |            |                        |                       |                      |                       | -0.0013*<br>[0.0007] | 0.0149***<br>[0.0007] |                        |                       | 0.000<br>[0.0008]      | 0.0038***<br>[0.0009] |
| Science grade of HS<br>(numerical)                 |          |            |                        |                       |                      |                       |                      |                       | -0.0030***<br>[0.0004] | 0.0133***<br>[0.0006] | -0.0024***<br>[0.0005] | 0.0075***<br>[0.0007] |
| Observations                                       | 8311     |            | 8204                   |                       | 8136                 |                       | 8160                 |                       | 7869                   |                       | 7642                   |                       |

Notes: Average marginal effects are shown. Omitted categories are in parenthesis. Controls include all those in Table 1. Standard errors are in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Full results are available upon request.

Table 3a: Effects of Student Background on Access to College and University, Males

|  | Baseline   |            | (1)        |            | (2)        |            | (3)        |            | (4)        |            | (5)        |            | (6)        |            | (7)        |            |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|  | College    | University | College    | University | College    | University | College    | University | College    | University | College    | University | College    | University | College    | University |
| Parental/guardian's Education (HS completed) |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| Less than HS                                 | -0.0691**  | -0.0676**  | -0.0683**  | -0.0599**  | -0.0662**  | -0.0535*   | -0.0668**  | -0.0523*   | -0.0688**  | -0.0657**  | -0.0675**  | -0.0591**  | -0.0558*   | -0.0596**  | -0.0645**  | -0.0555**  |
|  | [0.029]    | [0.027]    | [0.0292]   | [0.0273]   | [0.0293]   | [0.0278]   | [0.0292]   | [0.0274]   | [0.0292]   | [0.0276]   | [0.0292]   | [0.0279]   | [0.0306]   | [0.0292]   | [0.0298]   | [0.0274]   |
| Some PSE                                     | 0.012      | 0.0585*    | 0.0125     | 0.0551*    | 0.0098     | 0.0524*    | 0.0111     | 0.0519*    | 0.0116     | 0.0598*    | 0.0135     | 0.0578*    | 0.016      | 0.0544     | 0.0113     | 0.0451     |
|  | [0.031]    | [0.033]    | [0.0313]   | [0.0321]   | [0.0311]   | [0.0308]   | [0.0312]   | [0.0308]   | [0.0313]   | [0.0334]   | [0.0313]   | [0.0326]   | [0.0317]   | [0.0335]   | [0.0315]   | [0.0314]   |
| Trade/College                                | 0.021      | 0.0761***  | 0.0212     | 0.0767***  | 0.0188     | 0.0677***  | 0.0196     | 0.0713***  | 0.0206     | 0.0777***  | 0.0218     | 0.0769***  | 0.0248     | 0.0751***  | 0.0196     | 0.0774***  |
|  | [0.021]    | [0.022]    | [0.0209]   | [0.0214]   | [0.0209]   | [0.0205]   | [0.0209]   | [0.0207]   | [0.0209]   | [0.0217]   | [0.0209]   | [0.0212]   | [0.0211]   | [0.0217]   | [0.0210]   | [0.0213]   |
| University-below BA degree                   | -0.001     | 0.163***   | -0.0019    | 0.1637***  | -0.0011    | 0.1417***  | -0.0007    | 0.1493***  | -0.0001    | 0.1599***  | 0.0003     | 0.1513***  | 0.0024     | 0.1499***  | 0.003      | 0.1458***  |
|  | [0.039]    | [0.046]    | [0.0395]   | [0.0453]   | [0.0395]   | [0.0447]   | [0.0395]   | [0.0441]   | [0.0395]   | [0.0461]   | [0.0396]   | [0.0447]   | [0.0400]   | [0.0449]   | [0.0396]   | [0.0433]   |
| University-BA                                | -0.0488**  | 0.312***   | -0.0487**  | 0.3063***  | -0.0484**  | 0.2645***  | -0.0483**  | 0.2779***  | -0.0506**  | 0.3135***  | -0.0491**  | 0.3001***  | -0.0466**  | 0.3008***  | -0.0460**  | 0.2794***  |
|  | [0.022]    | [0.030]    | [0.0217]   | [0.0293]   | [0.0219]   | [0.0282]   | [0.0218]   | [0.0283]   | [0.0215]   | [0.0297]   | [0.0216]   | [0.0289]   | [0.0220]   | [0.0292]   | [0.0220]   | [0.0286]   |
| University-Grad                              | -0.0922*** | 0.451***   | -0.0921*** | 0.4450***  | -0.0907*** | 0.4196***  | -0.0911*** | 0.4249***  | -0.0922*** | 0.4509***  | -0.0911*** | 0.4405***  | -0.0893*** | 0.4308***  | -0.0804*** | 0.3960***  |
|  | [0.026]    | [0.035]    | [0.0264]   | [0.0356]   | [0.0268]   | [0.0342]   | [0.0266]   | [0.0348]   | [0.0264]   | [0.0354]   | [0.0264]   | [0.0352]   | [0.0266]   | [0.0356]   | [0.0273]   | [0.0352]   |
| Other/unknown                                | -          | -          | -0.2232*** | -0.054     | -0.2244*** | -0.0465    | -0.2236*** | -0.0516    | -0.2234*** | -0.0413    | -0.2225*** | -0.013     | -0.2189*** | -0.0231    | -0.2227*** | -0.0247    |
|  | -          | -          | [0.0135]   | [0.1313]   | [0.0135]   | [0.1356]   | [0.0138]   | [0.1279]   | [0.0130]   | [0.1483]   | [0.0138]   | [0.1637]   | [0.0150]   | [0.1623]   | [0.0136]   | [0.1470]   |
| Parental Income Level (\$50000 to \$75000)   |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| Extremely low (\$0-\$5000)                   | 0.016      | 0.003      | 0.0154     | -0.0001    | 0.0222     | -0.002     | 0.0191     | -0.0049    | 0.0173     | -0.0001    | 0.0206     | -0.0057    | -0.0284    | 0.0131     | 0.019      | 0.0091     |
|  | [0.071]    | [0.069]    | [0.0703]   | [0.0655]   | [0.0716]   | [0.0588]   | [0.0705]   | [0.0588]   | [0.0714]   | [0.0680]   | [0.0722]   | [0.0634]   | [0.0620]   | [0.0746]   | [0.0720]   | [0.0654]   |
| \$5000 to \$25000                            | 0.030      | -0.048     | 0.0311     | -0.0511    | 0.0314     | -0.0431    | 0.0325     | -0.0489    | 0.0296     | -0.045     | 0.0308     | -0.0418    | 0.0315     | -0.0395    | 0.0353     | -0.041     |
|  | [0.035]    | [0.037]    | [0.0353]   | [0.0375]   | [0.0351]   | [0.0359]   | [0.0356]   | [0.0365]   | [0.0348]   | [0.0377]   | [0.0353]   | [0.0375]   | [0.0356]   | [0.0382]   | [0.0355]   | [0.0379]   |
| \$25000 to \$50000                           | 0.023      | -0.013     | 0.022      | -0.0093    | 0.0213     | -0.0044    | 0.0209     | -0.0044    | 0.022      | -0.0119    | 0.0204     | -0.0061    | 0.0186     | -0.0069    | 0.0213     | -0.0021    |
|  | [0.020]    | [0.021]    | [0.0199]   | [0.0208]   | [0.0198]   | [0.0204]   | [0.0198]   | [0.0202]   | [0.0199]   | [0.0213]   | [0.0198]   | [0.0207]   | [0.0201]   | [0.0212]   | [0.0198]   | [0.0202]   |
| \$75000 to \$100000                          | 0.017      | 0.0401*    | 0.0154     | 0.0456**   | 0.0166     | 0.0273     | 0.0153     | 0.0377*    | 0.0151     | 0.0416*    | 0.0142     | 0.0422*    | 0.0093     | 0.0485**   | 0.0159     | 0.0382*    |
|  | [0.020]    | [0.023]    | [0.0197]   | [0.0223]   | [0.0197]   | [0.0216]   | [0.0196]   | [0.0214]   | [0.0197]   | [0.0230]   | [0.0197]   | [0.0223]   | [0.0199]   | [0.0227]   | [0.0197]   | [0.0219]   |
| \$100000 and up                              | 0.019      | 0.0601***  | 0.0198     | 0.0583**   | 0.0187     | 0.0459*    | 0.0197     | 0.0508**   | 0.02       | 0.0570**   | 0.0191     | 0.0507**   | 0.0169     | 0.0527**   | 0.0255     | 0.0431*    |
|  | [0.023]    | [0.026]    | [0.0235]   | [0.0256]   | [0.0235]   | [0.0250]   | [0.0235]   | [0.0247]   | [0.0235]   | [0.0265]   | [0.0234]   | [0.0257]   | [0.0237]   | [0.0259]   | [0.0236]   | [0.0252]   |

(continued)

**Table 3a: Effects of Student Background on Access to College and University, Males (continued)**

|  | Baseline |            | (1)                |                       | (2)                |                       | (3)                |                       | (4)                 |                       | (5)                 |                       | (6)                |                       | (7)                 |                       |
|--|----------|------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|--------------------|-----------------------|---------------------|-----------------------|
|  | College  | University | College            | University            | College            | University            | College            | University            | College             | University            | College             | University            | College            | University            | College             | University            |
| HS Engagements   |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| <i>Academic identification</i>                         |          |            | 0.0018<br>[0.0072] | 0.0670***<br>[0.0073] |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| <i>Academic participation</i>                          |          |            |                    |                       | 0.0074<br>[0.0073] | 0.1055***<br>[0.0076] |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Academic engagement                                    |          |            |                    |                       |                    |                       | 0.0054<br>[0.0072] | 0.1048***<br>[0.0073] |                     |                       |                     |                       |                    |                       |                     |                       |
| Social engagement                                      |          |            |                    |                       |                    |                       |                    |                       | -0.0064<br>[0.0067] | 0.0249***<br>[0.0077] |                     |                       |                    |                       |                     |                       |
| Overall engagement                                     |          |            |                    |                       |                    |                       |                    |                       |                     |                       | -0.0009<br>[0.0070] | 0.0729***<br>[0.0075] |                    |                       |                     |                       |
| Self-perception:                                       |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Self-esteem  |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       | 0.0071<br>[0.0070] | 0.0647***<br>[0.0077] |                     |                       |
| Self-efficacy  |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       | -0.0069<br>[0.0068] | 0.1081***<br>[0.0069] |
| Self-mastery   |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Social Support:  |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Parents' Behaviours:                                   |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Monitoring behaviour                                   |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Nurturance behaviour                                   |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Inconsistent discipline (Rejection-oriented behaviour) |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Reading Ability:                                       |          |            |                    |                       |                    |                       |                    |                       |                     |                       |                     |                       |                    |                       |                     |                       |
| Observations   | 7852     |            | 7850               |                       | 7850               |                       | 7850               |                       | 7846                |                       | 7846                |                       | 7597               |                       | 7749                |                       |

Table 3a: Effects of Student Background on Access to College and University, Males (continued)

|  | (8)        |            | (9)        |            | (10)       |            | (11)       |            | (12)       |            | (13)       |            | (14)       |            | (15)       |            |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|  | College    | University | College    | University | College    | University | College    | University | College    | University | College    | University | College    | University | College    | University |
| Parental/guardian's Education (HS completed) |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| Less than HS                                 | -0.0535*   | -0.0614**  | -0.0703**  | -0.0651**  | -0.0659**  | -0.0643**  | -0.0686**  | -0.0652**  | -0.0677**  | -0.0654**  | -0.0620**  | -0.0359    | -0.0597**  | -0.0319    | -0.045     | -0.0317    |
|  | [0.0310]   | [0.0295]   | [0.0293]   | [0.0278]   | [0.0293]   | [0.0278]   | [0.0292]   | [0.0278]   | [0.0292]   | [0.0276]   | [0.0296]   | [0.0282]   | [0.0297]   | [0.0273]   | [0.0312]   | [0.0281]   |
| Some PSE                                     | 0.0137     | 0.0525     | 0.014      | 0.0578*    | 0.0119     | 0.0595*    | 0.0099     | 0.0598*    | 0.0104     | 0.0585*    | 0.0136     | 0.0237     | 0.0125     | 0.0211     | 0.0121     | 0.0209     |
|  | [0.0317]   | [0.0337]   | [0.0317]   | [0.0333]   | [0.0313]   | [0.0334]   | [0.0312]   | [0.0333]   | [0.0313]   | [0.0329]   | [0.0311]   | [0.0287]   | [0.0310]   | [0.0272]   | [0.0315]   | [0.0286]   |
| Trade/College                                | 0.0238     | 0.0739***  | 0.0181     | 0.0776***  | 0.0215     | 0.0733***  | 0.0214     | 0.0761***  | 0.0213     | 0.0790***  | 0.0215     | 0.0450**   | 0.0201     | 0.0419**   | 0.021      | 0.0465**   |
|  | [0.0212]   | [0.0220]   | [0.0209]   | [0.0217]   | [0.0209]   | [0.0215]   | [0.0209]   | [0.0216]   | [0.0209]   | [0.0216]   | [0.0206]   | [0.0192]   | [0.0205]   | [0.0184]   | [0.0209]   | [0.0191]   |
| University-below BA degree                   | 0.0004     | 0.1520***  | -0.0044    | 0.1570***  | -0.0014    | 0.1548***  | -0.0021    | 0.1662***  | -0.0022    | 0.1615***  | 0.0054     | 0.0916**   | 0.0049     | 0.0895**   | 0.005      | 0.0914**   |
|  | [0.0399]   | [0.0447]   | [0.0395]   | [0.0453]   | [0.0397]   | [0.0458]   | [0.0394]   | [0.0463]   | [0.0395]   | [0.0459]   | [0.0398]   | [0.0386]   | [0.0393]   | [0.0372]   | [0.0398]   | [0.0377]   |
| University-BA                                | -0.0494**  | 0.3062***  | -0.0510**  | 0.3089***  | -0.0491**  | 0.3091***  | -0.0490**  | 0.3141***  | -0.0492**  | 0.3083***  | -0.0373*   | 0.2214***  | -0.0405*   | 0.2008***  | -0.0377*   | 0.1941***  |
|  | [0.0220]   | [0.0297]   | [0.0217]   | [0.0296]   | [0.0217]   | [0.0296]   | [0.0216]   | [0.0297]   | [0.0217]   | [0.0295]   | [0.0217]   | [0.0258]   | [0.0214]   | [0.0246]   | [0.0220]   | [0.0251]   |
| University-Grad                              | -0.0910*** | 0.4345***  | -0.0950*** | 0.4502***  | -0.0923*** | 0.4509***  | -0.0931*** | 0.4554***  | -0.0918*** | 0.4422***  | -0.0595**  | 0.2899***  | -0.0563*   | 0.2799***  | -0.0546*   | 0.2700***  |
|  | [0.0266]   | [0.0356]   | [0.0264]   | [0.0355]   | [0.0262]   | [0.0349]   | [0.0262]   | [0.0348]   | [0.0266]   | [0.0349]   | [0.0287]   | [0.0321]   | [0.0290]   | [0.0314]   | [0.0293]   | [0.0324]   |
| Other/unknown                                | -0.2196*** | -0.0241    | -0.2251*** | -0.0744    | -0.2238*** | -0.0632    | -0.2233*** | -0.0551    | -0.2225*** | -0.0283    | -0.2227*** | 0.0272     | -0.2238*** | 0.029      | -0.2199*** | 0.0475     |
|  | [0.0151]   | [0.1629]   | [0.0129]   | [0.1201]   | [0.0129]   | [0.1297]   | [0.0132]   | [0.1368]   | [0.0141]   | [0.1575]   | [0.0140]   | [0.1790]   | [0.0133]   | [0.1636]   | [0.0147]   | [0.1687]   |
| Parental Income Level (\$50000 to \$75000)   |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| Extremely low (\$0-\$5000)                   | -0.0264    | -0.0044    | 0.0159     | -0.0013    | 0.0213     | 0.0124     | 0.0159     | 0.0014     | 0.019      | -0.0048    | 0.0095     | 0.0117     | 0.0166     | 0.0005     | -0.0175    | 0.0182     |
|  | [0.0618]   | [0.0728]   | [0.0721]   | [0.0680]   | [0.0705]   | [0.0698]   | [0.0710]   | [0.0693]   | [0.0708]   | [0.0663]   | [0.0687]   | [0.0624]   | [0.0686]   | [0.0539]   | [0.0619]   | [0.0572]   |
| \$5000 to \$25000                            | 0.0313     | -0.0403    | 0.0305     | -0.049     | 0.0333     | -0.0524    | 0.0289     | -0.046     | 0.0282     | -0.0483    | 0.0234     | -0.0036    | 0.0246     | -0.0093    | 0.0313     | -0.0116    |
|  | [0.0355]   | [0.0384]   | [0.0349]   | [0.0374]   | [0.0347]   | [0.0368]   | [0.0344]   | [0.0372]   | [0.0344]   | [0.0370]   | [0.0335]   | [0.0351]   | [0.0343]   | [0.0337]   | [0.0353]   | [0.0346]   |
| \$25000 to \$50000                           | 0.0207     | -0.0048    | 0.0226     | -0.0133    | 0.0224     | -0.0153    | 0.0231     | -0.0156    | 0.0226     | -0.0135    | 0.0196     | 0.0066     | 0.0173     | 0.0126     | 0.0178     | 0.0197     |
|  | [0.0203]   | [0.0216]   | [0.0200]   | [0.0210]   | [0.0198]   | [0.0213]   | [0.0199]   | [0.0214]   | [0.0199]   | [0.0212]   | [0.0196]   | [0.0193]   | [0.0195]   | [0.0186]   | [0.0199]   | [0.0192]   |
| \$75000 to \$100000                          | 0.0092     | 0.0513**   | 0.0143     | 0.0439*    | 0.0157     | 0.0393*    | 0.0165     | 0.0387*    | 0.0161     | 0.0438*    | 0.0173     | 0.0356*    | 0.013      | 0.0337*    | 0.0079     | 0.0369*    |
|  | [0.0199]   | [0.0232]   | [0.0197]   | [0.0229]   | [0.0197]   | [0.0229]   | [0.0198]   | [0.0230]   | [0.0197]   | [0.0228]   | [0.0194]   | [0.0203]   | [0.0192]   | [0.0193]   | [0.0193]   | [0.0197]   |
| \$100000 and up                              | 0.0172     | 0.0547**   | 0.0216     | 0.0560**   | 0.019      | 0.0601**   | 0.0193     | 0.0581**   | 0.0182     | 0.0625**   | 0.0214     | 0.0446*    | 0.0208     | 0.0408*    | 0.0245     | 0.0403*    |
|  | [0.0237]   | [0.0262]   | [0.0236]   | [0.0261]   | [0.0234]   | [0.0261]   | [0.0235]   | [0.0264]   | [0.0234]   | [0.0261]   | [0.0229]   | [0.0233]   | [0.0228]   | [0.0225]   | [0.0234]   | [0.0231]   |

**Table 3a: Effects of Student Background on Access to College and University, Males (continued)**

|  | (8)                |                       | (9)                 |                       | (10)                |                       | (11)               |                       | (12)    |            | (13)    |            | (14)                |                       | (15)                  |                        |                        |                       |                        |                       |
|--|--------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|--------------------|-----------------------|---------|------------|---------|------------|---------------------|-----------------------|-----------------------|------------------------|------------------------|-----------------------|------------------------|-----------------------|
|  | College            | University            | College             | University            | College             | University            | College            | University            | College | University | College | University | College             | University            | College               | University             |                        |                       |                        |                       |
| HS Engagements   |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Academic identification                                |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            | -0.0006<br>[0.0081] | 0.0252***<br>[0.0074] | -0.0014<br>[0.0087]   | 0.0113<br>[0.0081]     |                        |                       |                        |                       |
| Academic participation                                 |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            | 0.0064<br>[0.0079]  | 0.0681***<br>[0.0078] | 0.0071<br>[0.0082]    | 0.0677***<br>[0.0082]  |                        |                       |                        |                       |
| Academic engagement                                    |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Social engagement                                      |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            | -0.0098<br>[0.0070] | 0.006<br>[0.0070]     | -0.0160**<br>[0.0082] | 0.0054<br>[0.0082]     |                        |                       |                        |                       |
| Overall engagement                                     |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Self-perception:                                       |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Self-esteem  |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       | 0.0099<br>[0.0107]    | 0.0081<br>[0.0105]     |                        |                       |                        |                       |
| Self-efficacy  |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       | -0.0127<br>[0.0081]   | 0.0486***<br>[0.0077]  |                        |                       |                        |                       |
| Self-mastery   | 0.0085<br>[0.0071] | 0.0513***<br>[0.0074] |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       | 0.011<br>[0.0097]     | 0.001<br>[0.0092]      |                        |                       |                        |                       |
| Social Support:  |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Social support   |                    |                       | -0.0029<br>[0.0071] | 0.0459***<br>[0.0078] |                     |                       |                    |                       |         |            |         |            |                     |                       |                       | -0.0036<br>[0.0090]    | -0.0151*<br>[0.0088]   |                       |                        |                       |
| Parents' Behaviours:                                   |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Monitoring behaviour                                   |                    |                       |                     |                       | 0.0149*<br>[0.0077] | 0.0302***<br>[0.0084] |                    |                       |         |            |         |            |                     |                       |                       | 0.0130*<br>[0.0079]    | 0.0091<br>[0.0081]     |                       |                        |                       |
| Nurturance behaviour                                   |                    |                       |                     |                       |                     |                       | -0.001<br>[0.0071] | 0.0223***<br>[0.0079] |         |            |         |            |                     |                       |                       | -0.0074<br>[0.0076]    | 0.0015<br>[0.0076]     |                       |                        |                       |
| Inconsistent discipline (Rejection-oriented behaviour) |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       | -0.0067<br>[0.0071]   | -0.0357***<br>[0.0075] | -0.0075<br>[0.0075]    | -0.0128*<br>[0.0074]  |                        |                       |
| Reading Ability:                                       |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       |                       |                        |                        |                       |                        |                       |
| Reading ability  |                    |                       |                     |                       |                     |                       |                    |                       |         |            |         |            |                     |                       | -0.0002**<br>[0.0001] | 0.0018***<br>[0.0001]  | -0.0002***<br>[0.0001] | 0.0017***<br>[0.0001] | -0.0002***<br>[0.0001] | 0.0015***<br>[0.0001] |
| Observations   | 7569               |                       | 7774                |                       | 7846                |                       | 7850               |                       | 7850    |            | 7844    |            | 7838                |                       |                       | 7426                   |                        |                       |                        |                       |

Notes: Average marginal effects are shown. Omitted categories are in parenthesis. Controls include all those in Table 1. Standard errors are in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Full results are available upon request.

Table 3b: Effects of Student Background on Access to College and University, Females

|   | Baseline              |                       | (1)                    |                        | (2)                    |                        | (3)                    |                        | (4)                    |                        | (5)                    |                        | (6)                    |                        | (7)                    |                        |
|---|-----------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|   | College               | University            | College                | University             | College                | University             | College                | University             | College                | University             | College                | University             | College                | University             | College                | University             |
| <b>Parental/guardian's Education (HS completed)</b> |                       |                       |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Less than HS  | -0.0353<br>[0.029]    | -0.118***<br>[0.032]  | -0.0346<br>[0.0290]    | -0.1142***<br>[0.0321] | -0.0333<br>[0.0288]    | -0.1091***<br>[0.0323] | -0.0334<br>[0.0291]    | -0.1090***<br>[0.0326] | -0.0335<br>[0.0289]    | -0.1159***<br>[0.0318] | -0.0334<br>[0.0289]    | -0.1090***<br>[0.0323] | -0.036<br>[0.0282]     | -0.1036***<br>[0.0323] | -0.0368<br>[0.0294]    | -0.1028***<br>[0.0337] |
| Some PSE  | 0.0409<br>[0.033]     | 0.0454<br>[0.035]     | 0.0398<br>[0.0330]     | 0.0444<br>[0.0347]     | 0.0439<br>[0.0325]     | 0.0328<br>[0.0328]     | 0.0406<br>[0.0327]     | 0.0384<br>[0.0332]     | 0.041<br>[0.0330]      | 0.0459<br>[0.0351]     | 0.0398<br>[0.0328]     | 0.044<br>[0.0340]      | 0.0402<br>[0.0328]     | 0.0446<br>[0.0350]     | 0.0381<br>[0.0326]     | 0.0374<br>[0.0340]     |
| Trade/College                                       | -0.0103<br>[0.020]    | 0.0618**<br>[0.024]   | -0.0109<br>[0.0203]    | 0.0630***<br>[0.0237]  | -0.0047<br>[0.0200]    | 0.0448*<br>[0.0231]    | -0.0084<br>[0.0201]    | 0.0545**<br>[0.0232]   | -0.0104<br>[0.0203]    | 0.0626***<br>[0.0239]  | -0.0106<br>[0.0202]    | 0.0610***<br>[0.0235]  | -0.009<br>[0.0204]     | 0.0560**<br>[0.0241]   | -0.0094<br>[0.0202]    | 0.0494**<br>[0.0233]   |
| University-below BA degree                          | -0.0811**<br>[0.034]  | 0.302***<br>[0.040]   | -0.0773**<br>[0.0346]  | 0.2925***<br>[0.0391]  | -0.0632*<br>[0.0351]   | 0.2542***<br>[0.0404]  | -0.0679*<br>[0.0350]   | 0.2665***<br>[0.0391]  | -0.0815**<br>[0.0340]  | 0.3032***<br>[0.0394]  | -0.0790**<br>[0.0341]  | 0.2929***<br>[0.0389]  | -0.0839**<br>[0.0341]  | 0.2903***<br>[0.0407]  | -0.0714**<br>[0.0349]  | 0.2728***<br>[0.0392]  |
| University-BA                                       | -0.0807***<br>[0.022] | 0.299***<br>[0.027]   | -0.0780***<br>[0.0225] | 0.2884***<br>[0.0268]  | -0.0632***<br>[0.0225] | 0.2496***<br>[0.0264]  | -0.0687***<br>[0.0226] | 0.2621***<br>[0.0266]  | -0.0811***<br>[0.0224] | 0.2968***<br>[0.0267]  | -0.0772***<br>[0.0225] | 0.2819***<br>[0.0265]  | -0.0729***<br>[0.0229] | 0.2806***<br>[0.0271]  | -0.0750***<br>[0.0222] | 0.2673***<br>[0.0266]  |
| University-Grad                                     | -0.143***<br>[0.025]  | 0.372***<br>[0.032]   | -0.1390***<br>[0.0250] | 0.3568***<br>[0.0324]  | -0.1226***<br>[0.0263] | 0.3107***<br>[0.0325]  | -0.1279***<br>[0.0262] | 0.3226***<br>[0.0328]  | -0.1428***<br>[0.0245] | 0.3708***<br>[0.0318]  | -0.1380***<br>[0.0251] | 0.3511***<br>[0.0322]  | -0.1424***<br>[0.0240] | 0.3535***<br>[0.0321]  | -0.1334***<br>[0.0254] | 0.3208***<br>[0.0321]  |
| Other/unknown                                       | -<br>-                | -<br>-                | -0.1217<br>[0.1290]    | -0.2256**<br>[0.0965]  | -0.1153<br>[0.1273]    | -0.1454<br>[0.1346]    | -0.116<br>[0.1289]     | -0.1964*<br>[0.1111]   | -0.126<br>[0.1273]     | -0.2228**<br>[0.1000]  | -0.1233<br>[0.1274]    | -0.2315**<br>[0.0927]  | -0.1023<br>[0.1350]    | -0.2421***<br>[0.0915] | -0.1193<br>[0.1283]    | -0.1561<br>[0.1336]    |
| <b>Parental Income Level (\$50000 to \$75000)</b>   |                       |                       |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Extremely low (\$0-\$5000)                          | -0.0951**<br>[0.047]  | -0.087<br>[0.095]     | -0.0969**<br>[0.0471]  | -0.0746<br>[0.0931]    | -0.1028**<br>[0.0451]  | -0.0505<br>[0.0958]    | -0.1002**<br>[0.0460]  | -0.0565<br>[0.0950]    | -0.0923*<br>[0.0476]   | -0.0741<br>[0.0955]    | -0.0975**<br>[0.0467]  | -0.0513<br>[0.0951]    | -0.0928*<br>[0.0476]   | -0.0817<br>[0.0989]    | -0.1005**<br>[0.0473]  | -0.0694<br>[0.0933]    |
| \$5000 to \$25000                                   | -0.0288<br>[0.029]    | -0.102***<br>[0.038]  | -0.0268<br>[0.0295]    | -0.1150***<br>[0.0368] | -0.0277<br>[0.0293]    | -0.1043***<br>[0.0367] | -0.0249<br>[0.0295]    | -0.1173***<br>[0.0360] | -0.0283<br>[0.0294]    | -0.0986***<br>[0.0376] | -0.0279<br>[0.0294]    | -0.1031***<br>[0.0371] | -0.0219<br>[0.0301]    | -0.0962**<br>[0.0374]  | -0.0318<br>[0.0294]    | -0.0946**<br>[0.0376]  |
| \$25000 to \$50000                                  | -0.00816<br>[0.020]   | -0.0815***<br>[0.023] | -0.0068<br>[0.0195]    | -0.0891***<br>[0.0225] | -0.0093<br>[0.0193]    | -0.0788***<br>[0.0225] | -0.0064<br>[0.0194]    | -0.0885***<br>[0.0222] | -0.0077<br>[0.0195]    | -0.0787***<br>[0.0228] | -0.0087<br>[0.0195]    | -0.0784***<br>[0.0224] | -0.0126<br>[0.0194]    | -0.0678***<br>[0.0228] | -0.0137<br>[0.0193]    | -0.0719***<br>[0.0222] |
| \$75000 to \$100000                                 | 0.00336<br>[0.020]    | 0.0205<br>[0.023]     | 0.004<br>[0.0202]      | 0.0195<br>[0.0222]     | 0.0031<br>[0.0200]     | 0.0185<br>[0.0218]     | 0.0037<br>[0.0200]     | 0.0185<br>[0.0218]     | 0.0037<br>[0.0202]     | 0.0204<br>[0.0226]     | 0.0036<br>[0.0202]     | 0.0195<br>[0.0223]     | -0.0007<br>[0.0202]    | 0.0262<br>[0.0225]     | 0.0008<br>[0.0200]     | 0.0274<br>[0.0217]     |
| \$100000 and up                                     | -0.0143<br>[0.023]    | 0.103***<br>[0.026]   | -0.0154<br>[0.0231]    | 0.1038***<br>[0.0255]  | -0.0117<br>[0.0230]    | 0.0936***<br>[0.0249]  | -0.0147<br>[0.0229]    | 0.0989***<br>[0.0250]  | -0.0142<br>[0.0233]    | 0.1057***<br>[0.0257]  | -0.0166<br>[0.0230]    | 0.1070***<br>[0.0253]  | -0.0177<br>[0.0234]    | 0.1094***<br>[0.0258]  | -0.0178<br>[0.0230]    | 0.1083***<br>[0.0253]  |
| <b>HS Engagements</b>                               |                       |                       |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Academic identification                             |                       |                       | 0.004<br>[0.0076]      | 0.0643***<br>[0.0082]  |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Academic participation                              |                       |                       |                        |                        | -0.0163**<br>[0.0082]  | 0.1389***<br>[0.0089]  |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Academic engagement                                 |                       |                       |                        |                        |                        |                        | -0.007<br>[0.0079]     | 0.1183***<br>[0.0084]  |                        |                        |                        |                        |                        |                        |                        |                        |
| Social engagement                                   |                       |                       |                        |                        |                        |                        |                        |                        | 0.0114*<br>[0.0067]    | 0.0229***<br>[0.0079]  |                        |                        |                        |                        |                        |                        |
| Overall engagement                                  |                       |                       |                        |                        |                        |                        |                        |                        |                        |                        | 0.0065<br>[0.0071]     | 0.0756***<br>[0.0080]  |                        |                        |                        |                        |

**Table 3b: Effects of Student Background on Access to College and University, Females (continued)**

|  | Baseline |            | (1)     |            | (2)     |            | (3)     |            | (4)     |            | (5)     |            | (6)      |            | (7)      |            |
|--|----------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|----------|------------|----------|------------|
|  | College  | University | College | University | College | University | College | University | College | University | College | University | College  | University | College  | University |
| Self-perception:   |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Self-esteem  |          |            |         |            |         |            |         |            |         |            |         |            | 0.0007   | 0.0639***  |          |            |
|  |          |            |         |            |         |            |         |            |         |            |         |            | [0.0070] | [0.0081]   |          |            |
| Self-efficacy  |          |            |         |            |         |            |         |            |         |            |         |            |          |            | -0.0093  | 0.1134***  |
|  |          |            |         |            |         |            |         |            |         |            |         |            |          |            | [0.0072] | [0.0076]   |
| Self-mastery   |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Social Support:  |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Parents' Behaviours:   |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Monitoring behaviour   |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Nurturance behaviour   |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Inconsistent discipline<br>(Rejection-oriented<br>behaviour) |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Reading Ability:   |          |            |         |            |         |            |         |            |         |            |         |            |          |            |          |            |
| Observations   | 8311     |            | 8311    |            | 8309    |            | 8309    |            | 8311    |            | 8309    |            | 8171     |            | 8252     |            |

Notes: Average marginal effects are shown. Omitted categories are in parenthesis. Controls include all those in Table 1. Standard errors are in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Full results are available upon request.

Table 3b: Effects of Student Background on Access to College and University, Females (continued)

|  | Baseline               |                        | (1)                    |                        | (2)                    |                        | (3)                    |                        | (4)                    |                        | (5)                    |                       | (6)                    |                        | (7)                    |                       |
|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|-----------------------|
|  | College                | University             | College                | University             | College                | University             | College                | University             | College                | University             | College                | University            | College                | University             | College                | University            |
| <b>Parental/guardian's Education</b><br>(HS completed) |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       |                        |                        |                        |                       |
| Less than HS   | -0.0346<br>[0.0284]    | -0.1087***<br>[0.0321] | -0.0383<br>[0.0289]    | -0.1187***<br>[0.0321] | -0.0355<br>[0.0289]    | -0.1161***<br>[0.0318] | -0.0359<br>[0.0289]    | -0.1174***<br>[0.0318] | -0.0344<br>[0.0288]    | -0.1194***<br>[0.0319] | -0.0334<br>[0.0292]    | -0.0732**<br>[0.0324] | -0.0323<br>[0.0287]    | -0.0667**<br>[0.0322]  | -0.0365<br>[0.0285]    | -0.0602*<br>[0.0331]  |
| Some PSE   | 0.0391<br>[0.0329]     | 0.0485<br>[0.0353]     | 0.0387<br>[0.0331]     | 0.0468<br>[0.0357]     | 0.0412<br>[0.0332]     | 0.0448<br>[0.0353]     | 0.0406<br>[0.0330]     | 0.0463<br>[0.0354]     | 0.0404<br>[0.0330]     | 0.0427<br>[0.0353]     | 0.0498<br>[0.0319]     | 0.0123<br>[0.0304]    | 0.0518<br>[0.0316]     | 0.0066<br>[0.0291]     | 0.0472<br>[0.0318]     | 0.0137<br>[0.0297]    |
| Trade/College  | -0.0087<br>[0.0204]    | 0.0532**<br>[0.0241]   | -0.0131<br>[0.0203]    | 0.0613**<br>[0.0241]   | -0.0117<br>[0.0203]    | 0.0624***<br>[0.0240]  | -0.0105<br>[0.0203]    | 0.0626***<br>[0.0240]  | -0.0103<br>[0.0203]    | 0.0599**<br>[0.0240]   | 0.0016<br>[0.0198]     | 0.0226<br>[0.0212]    | 0.0041<br>[0.0195]     | 0.0166<br>[0.0207]     | 0.0017<br>[0.0197]     | 0.0145<br>[0.0210]    |
| University-below BA degree                             | -0.0831**<br>[0.0342]  | 0.2911***<br>[0.0402]  | -0.0874***<br>[0.0339] | 0.3028***<br>[0.0397]  | -0.0808**<br>[0.0342]  | 0.3012***<br>[0.0396]  | -0.0820**<br>[0.0340]  | 0.3029***<br>[0.0398]  | -0.0801**<br>[0.0342]  | 0.2950***<br>[0.0396]  | -0.0276<br>[0.0370]    | 0.1653***<br>[0.0371] | -0.0156<br>[0.0377]    | 0.1402***<br>[0.0369]  | -0.0259<br>[0.0381]    | 0.1420***<br>[0.0367] |
| University-BA  | -0.0736***<br>[0.0229] | 0.2856***<br>[0.0271]  | -0.0849***<br>[0.0224] | 0.2967***<br>[0.0270]  | -0.0793***<br>[0.0225] | 0.2951***<br>[0.0268]  | -0.0808***<br>[0.0224] | 0.2990***<br>[0.0268]  | -0.0790***<br>[0.0226] | 0.2897***<br>[0.0269]  | -0.0380*<br>[0.0226]   | 0.1705***<br>[0.0252] | -0.0287<br>[0.0225]    | 0.1458***<br>[0.0246]  | -0.0291<br>[0.0229]    | 0.1422***<br>[0.0251] |
| University-Grad  | -0.1437***<br>[0.0238] | 0.3624***<br>[0.0318]  | -0.1524***<br>[0.0229] | 0.3738***<br>[0.0315]  | -0.1445***<br>[0.0244] | 0.3756***<br>[0.0318]  | -0.1432***<br>[0.0245] | 0.3731***<br>[0.0319]  | -0.1410***<br>[0.0248] | 0.3617***<br>[0.0322]  | -0.0942***<br>[0.0280] | 0.2166***<br>[0.0304] | -0.0820***<br>[0.0287] | 0.1788***<br>[0.0300]  | -0.0954***<br>[0.0278] | 0.1795***<br>[0.0302] |
| Other/unknown  | -0.0998<br>[0.1341]    | -0.2445***<br>[0.0865] | 0.1242<br>[0.1802]     | 0.032<br>[0.2022]      | -0.1169<br>[0.1316]    | -0.2089*<br>[0.1085]   | -0.1168<br>[0.1313]    | -0.2050*<br>[0.1106]   | -0.1277<br>[0.1309]    | -0.2467***<br>[0.0874] | -0.1241<br>[0.1202]    | -0.087<br>[0.1304]    | -0.1349<br>[0.1131]    | -0.0837<br>[0.1294]    | 0.1213<br>[0.1635]     | 0.0154<br>[0.1348]    |
| <b>Parental Income Level (\$50000 to \$75000)</b>      |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       |                        |                        |                        |                       |
| Extremely low (\$0-\$5000)                             | -0.0881*<br>[0.0495]   | -0.0697<br>[0.0989]    | -0.0924*<br>[0.0482]   | -0.0861<br>[0.0953]    | -0.0931**<br>[0.0475]  | -0.0808<br>[0.0990]    | -0.0957**<br>[0.0467]  | -0.0867<br>[0.0953]    | -0.0961**<br>[0.0464]  | -0.0675<br>[0.0956]    | -0.1149***<br>[0.0410] | 0.0082<br>[0.0923]    | -0.1157***<br>[0.0405] | 0.03<br>[0.0988]       | -0.1106**<br>[0.0437]  | 0.037<br>[0.1009]     |
| \$5000 to \$25000                                      | -0.0215<br>[0.0301]    | -0.0965**<br>[0.0378]  | -0.0256<br>[0.0299]    | -0.0980***<br>[0.0376] | -0.0288<br>[0.0294]    | -0.1021***<br>[0.0374] | -0.0283<br>[0.0294]    | -0.1022***<br>[0.0376] | -0.0284<br>[0.0294]    | -0.1042***<br>[0.0372] | -0.0424<br>[0.0281]    | -0.0355<br>[0.0344]   | -0.0404<br>[0.0279]    | -0.0454<br>[0.0332]    | -0.0291<br>[0.0293]    | -0.046<br>[0.0335]    |
| \$25000 to \$50000                                     | -0.0098<br>[0.0195]    | -0.0720***<br>[0.0229] | -0.0137<br>[0.0194]    | -0.0779***<br>[0.0230] | -0.0086<br>[0.0195]    | -0.0799***<br>[0.0230] | -0.0078<br>[0.0195]    | -0.0820***<br>[0.0230] | -0.0078<br>[0.0195]    | -0.0806***<br>[0.0229] | -0.0158<br>[0.0189]    | -0.0465**<br>[0.0197] | -0.0145<br>[0.0186]    | -0.0505***<br>[0.0194] | -0.02<br>[0.0188]      | -0.0451**<br>[0.0198] |
| \$75000 to \$100000                                    | 0.0007<br>[0.0202]     | 0.0233<br>[0.0225]     | 0.0031<br>[0.0202]     | 0.0232<br>[0.0227]     | 0.0014<br>[0.0202]     | 0.0227<br>[0.0225]     | 0.0032<br>[0.0202]     | 0.0207<br>[0.0226]     | 0.0023<br>[0.0202]     | 0.0222<br>[0.0225]     | -0.0017<br>[0.0191]    | 0.0351*<br>[0.0202]   | -0.0007<br>[0.0189]    | 0.0323<br>[0.0198]     | -0.0061<br>[0.0189]    | 0.0386*<br>[0.0198]   |
| \$100000 and up  | -0.0166<br>[0.0233]    | 0.1025***<br>[0.0258]  | -0.0137<br>[0.0233]    | 0.1009***<br>[0.0259]  | -0.0153<br>[0.0233]    | 0.1054***<br>[0.0257]  | -0.0139<br>[0.0233]    | 0.1027***<br>[0.0258]  | -0.0149<br>[0.0233]    | 0.1045***<br>[0.0257]  | -0.0096<br>[0.0224]    | 0.0924***<br>[0.0237] | -0.0074<br>[0.0221]    | 0.0880***<br>[0.0232]  | -0.0129<br>[0.0223]    | 0.0933***<br>[0.0233] |
| <b>HS Engagements</b>                                  |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       |                        |                        |                        |                       |
| Academic identification                                |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       | 0.0045<br>[0.0082]     | 0.0155*<br>[0.0082]    | 0.0088<br>[0.0091]     | -0.0028<br>[0.0094]   |
| Academic participation                                 |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       | -0.0235***<br>[0.0090] | 0.0957***<br>[0.0089]  | -0.0218**<br>[0.0092]  | 0.0877***<br>[0.0091] |
| Academic engagement                                    |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       |                        |                        |                        |                       |
| Social engagement                                      |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       | 0.0089<br>[0.0069]     | 0.0096<br>[0.0080]     | 0.0056<br>[0.0085]     | 0.0124<br>[0.0094]    |
| Overall engagement                                     |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                       |                        |                        |                        |                       |



**Table 3b: Effects of Student Background on Access to College and University, Females (continued)**

|  | Baseline            |                       | (1)                  |                    | (2)                 |                       | (3)                 |                    | (4)                 |                        | (5)                    |                       | (6)                    |                       | (7)                    |                       |                        |
|--|---------------------|-----------------------|----------------------|--------------------|---------------------|-----------------------|---------------------|--------------------|---------------------|------------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|
|  | College             | University            | College              | University         | College             | University            | College             | University         | College             | University             | College                | University            | College                | University            | College                | University            |                        |
| Self-perception:   |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        |                       |                        |
| Self-esteem  |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        | -0.0014<br>[0.0098]   | 0.0157<br>[0.0104]     |
| Self-efficacy  |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        | -0.0101<br>[0.0084]   | 0.0466***<br>[0.0087]  |
| Self-mastery   | -0.0038<br>[0.0073] | 0.0548***<br>[0.0083] |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        | -0.0102<br>[0.0095]   | 0.0025<br>[0.0102]     |
| Social Support:  |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        |                       |                        |
|  |                     |                       | 0.0170**<br>[0.0070] | 0.0126<br>[0.0085] |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        | 0.0189**<br>[0.0082]  | -0.0296***<br>[0.0091] |
| Parents' Behaviours:   |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        |                       |                        |
| Monitoring behaviour   |                     |                       |                      |                    | -0.0032<br>[0.0080] | 0.0383***<br>[0.0096] |                     |                    |                     |                        |                        |                       |                        |                       |                        | -0.0038<br>[0.0079]   | 0.0235***<br>[0.0088]  |
| Nurturance behaviour   |                     |                       |                      |                    |                     |                       | -0.0043<br>[0.0073] | 0.0047<br>[0.0083] |                     |                        |                        |                       |                        |                       |                        | -0.0054<br>[0.0076]   | -0.0096<br>[0.0082]    |
| Inconsistent discipline<br>(Rejection-oriented<br>behaviour) |                     |                       |                      |                    |                     |                       |                     |                    | -0.0044<br>[0.0068] | -0.0355***<br>[0.0076] |                        |                       |                        |                       |                        | -0.0047<br>[0.0069]   | -0.0161**<br>[0.0072]  |
| Reading Ability:   |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        |                        |                       |                        |                       |                        |                       |                        |
|  |                     |                       |                      |                    |                     |                       |                     |                    |                     |                        | -0.0003***<br>[0.0001] | 0.0023***<br>[0.0001] | -0.0003***<br>[0.0001] | 0.0021***<br>[0.0001] | -0.0003***<br>[0.0001] | 0.0019***<br>[0.0001] |                        |
| Observations   | 8151                |                       | 8254                 |                    | 8306                |                       | 8306                |                    | 8306                |                        | 8304                   |                       | 8302                   |                       | 8049                   |                       |                        |

Notes: Average marginal effects are shown. Omitted categories are in parenthesis. Controls include all those in Table 1. Standard errors are in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Full results are available upon request.

**Table A1: Sample Selection**

|   | Male                             |                                      |                | Female                           |                                      |                |
|---|----------------------------------|--------------------------------------|----------------|----------------------------------|--------------------------------------|----------------|
|   | % of obs. in the starting sample | % of lost in each stage of exclusion | # of obs. left | % of obs. in the starting sample | % of lost in each stage of exclusion | # of obs. left |
| Starting sample (YITS-A participants over all 3 cycles)   |                                  |                                      | 10,226         |                                  |                                      | 10,521         |
| QC, Territories or Outside Canada                         |                                  |                                      |                |                                  |                                      |                |
| PS institution in QC                                      | 13.79                            |                                      |                | 17.19                            |                                      |                |
| Last year of high school in QC                            | 23.36                            |                                      |                | 22.53                            |                                      |                |
| HS attended at cycle1 is in QC                            | 23.56                            |                                      |                | 22.70                            |                                      |                |
| Ever resident in QC                                       | 23.74                            |                                      |                | 22.99                            |                                      |                |
| Ever resident, taken HS or PSE in QC                      | 24.13                            |                                      |                | 23.72                            |                                      |                |
| PS institution in Territories or outside Canada           | 0.66                             |                                      |                | 0.89                             |                                      |                |
| Last year of high school in Territories or outside Canada | 0.39                             |                                      |                | 0.57                             |                                      |                |
| Ever resident in Territories or outside Canada            | 0.24                             |                                      |                | 0.52                             |                                      |                |
| Any of the above  | 25.00                            | 25.00                                | 8,415          | 25.03                            | 25.03                                | 8,713          |
| HS continuer or status unknown                            | 6.54                             | 6.05                                 | 7,961          | 4.01                             | 3.39                                 | 8,458          |
| Non-Canadian citizen / immigrant status unknown           | 0.75                             | 0.70                                 | 7,931          | 0.99                             | 0.93                                 | 8,422          |
| Missing values  |                                  |                                      |                |                                  |                                      |                |
| Unknown visible minority status                           | 0.34                             | 0.32                                 | 7,909          | 0.40                             | 0.51                                 | 8,395          |
| PSE   |                                  |                                      |                |                                  |                                      |                |
| Unknown level of PSE program                              | 0.49                             |                                      |                | 0.93                             |                                      |                |
| Unknown type of PSE institution                           | 0.19                             |                                      |                | 0.48                             |                                      |                |
| Unknown PSE   | 0.64                             | 0.69                                 | 7,852          | 1.15                             | 1.03                                 | 8,311          |
| Missing values in scale variables                         |                                  |                                      |                |                                  |                                      |                |
| HS Engagement   |                                  |                                      |                |                                  |                                      |                |
| Academic identification                                   | -                                |                                      |                |                                  |                                      |                |
| Academic participation                                    | -                                |                                      |                | -                                |                                      |                |
| Academic engagement                                       | -                                |                                      |                | -                                |                                      |                |
| Social engagement   | -                                |                                      |                | -                                |                                      |                |
| Overall engagement  | -                                |                                      |                | -                                |                                      |                |
| Self-perception   |                                  |                                      |                |                                  |                                      |                |
| Self-esteem   | 3.47                             |                                      |                | 2.20                             |                                      |                |
| Self-efficacy   | 1.32                             |                                      |                | 0.77                             |                                      |                |
| Self-mastery  | 3.96                             |                                      |                | 2.40                             |                                      |                |
| Social Support  | 1.14                             |                                      |                | 0.89                             |                                      |                |
| Parents' Behaviour  |                                  |                                      |                |                                  |                                      |                |
| Monitoring behaviour                                      | -                                |                                      |                | -                                |                                      |                |
| Nurturance behaviour                                      | -                                |                                      |                | -                                |                                      |                |
| Inconsistent discipline (Rejection-oriented behaviour)    | -                                |                                      |                | -                                |                                      |                |
| Reading Ability   | 0.14                             |                                      |                | 0.19                             |                                      |                |
| Missing value of any scale variable                       | 5.64                             | 4.91                                 | 7,426          | 3.76                             | 3.70                                 | 8,049          |

**Table A1: Sample Selection (continued)**

|                                       | Male                             |                                      |                | Female                           |                                      |                |
|---------------------------------------|----------------------------------|--------------------------------------|----------------|----------------------------------|--------------------------------------|----------------|
|                                       | % of obs. in the starting sample | % of lost in each stage of exclusion | # of obs. left | % of obs. in the starting sample | % of lost in each stage of exclusion | # of obs. left |
| Missing values in last year HS grades |                                  |                                      |                |                                  |                                      |                |
| Overall grade in last year HS         | 2.77                             |                                      |                | 1.97                             |                                      |                |
| Math grade in last year HS            | 2.87                             |                                      |                | 2.42                             |                                      |                |
| Main language grade in last year HS   | 2.80                             |                                      |                | 2.10                             |                                      |                |
| Science grade in HS at cycle 1        | 8.79                             |                                      |                | 6.39                             |                                      |                |
| Missing value of any HS grade         | 12.82                            | 9.42                                 | 6,685          | 9.46                             | 6.62                                 | 7,486          |

**Table A2: Distribution of Various High School Grades, Males and Females**

|                        | Categorical Grades (%) |            |            |            |            |            |               | Total | Mean of Numerical Grades |
|------------------------|------------------------|------------|------------|------------|------------|------------|---------------|-------|--------------------------|
|                        | 90% to 100%            | 80% to 89% | 70% to 79% | 60% to 69% | 55% to 59% | 50% to 54% | Less than 50% |       |                          |
|                        | Males                  |            |            |            |            |            |               |       |                          |
| HS Overall Grade       | 5.9                    | 26.2       | 41.8       | 21.4       | 3.3        | 0.9        | 0.6           | 100.0 | 75.58                    |
| HS Math Grade          | 9.6                    | 22.2       | 30.3       | 25.9       | 7.3        | 4.1        | 0.6           | 100.0 | 73.99                    |
| HS Main Language Grade | 5.8                    | 27.7       | 36.2       | 23.1       | 4.4        | 2.5        | 0.2           | 100.0 | 75.14                    |
| HS Science Grade       | 11.4                   | 25.7       | 26.9       | 19.2       | 8.0        | 5.2        | 3.5           | 100.0 | 73.54                    |
|                        | Females                |            |            |            |            |            |               |       |                          |
| HS Overall Grade       | 9.0                    | 38.6       | 37.9       | 12.1       | 1.7        | 0.5        | 0.3           | 100.0 | 78.90                    |
| HS Math Grade          | 10.3                   | 23.7       | 31.0       | 22.7       | 6.0        | 5.8        | 0.6           | 100.0 | 74.46                    |
| HS Main Language Grade | 13.3                   | 39.4       | 31.4       | 13.2       | 1.6        | 1.1        | 0.1           | 100.0 | 79.71                    |
| HS Science Grade       | 13.3                   | 30.5       | 26.8       | 16.3       | 6.2        | 4.2        | 2.6           | 100.0 | 75.67                    |

Note: To calculate means, categorical grades are converted to numerical grades as follows: 90% to 100% = 95; 80% to 89% = 85; 70% to 79% = 75; 60% to 69% = 65; 55% to 59% = 57; 50% to 54% = 52; and less than 50% = 25.

**Table A3: Explanation of Scale Variables**

|  |  |
|--|--|
| <b>General description:</b>                | All of the various scales used in the YITS 15-year-old cohort, and in the YITS 18-20 year-old cohort are modeled after the Likert Scale (Likert, 1932). Scores released for YITS scales were based on an item response theory (IRT) approach. The IRT scores and their respective standard errors were estimated using weighted maximum likelihood (see Warm, 1989) and applying a generalized partial credit model. The generalized partial credit model is an extension of the two parameter logistic distribution to polytomous (categorical) data (Muraki, 1997). For estimating IRT scores, the population distribution of the scores was specified to have a mean of zero and a standard deviation of one. Once standardized, the respondent's estimated score, in this case, can be interpreted as the number of standard deviations of the population of interest above (if positive) or below (if negative) the mean. |
| <b><u>High School Engagement Scale</u></b> |  |
| <b><u>Overall school engagement</u></b>    |  |
| Description:                               | Measures a respondent's overall engagement for the student's present school year, focusing upon examining behavioural factors.   |
| Related Questions:                         | Derived by a simple average of the variables "academic engagement" and "social engagement".  |
| <b><u>Social engagement</u></b>            |  |
| Description:                               | Defined as the identification with and behavioural involvement in the social aspects of school (the school social life). It involves both a feeling of belonging to the school's social environment and a sense of fit between the individual and the school. This connection reflects the extent to which students feel personally accepted, respected, included and supported by others in the school's social environment.  |
| Related Questions:                         |  |
| YSA9K                                      | People at school are interested in what I have to say;   |
| YSA9O                                      | I have friends at school whom I can talk to about personal things;   |
| YSA9P                                      | I have friends at school who can help me with school work, if needed;  |
| ST31Q01                                    | My school is a place where I feel like an outsider;  |
| ST31Q02                                    | My school is a place where I make friends easily;  |
| ST31Q03                                    | My school is a place where I feel like I belong;   |
| ST31Q04                                    | My school is a place where I feel awkward and out of place;  |
| ST31Q05                                    | My school is a place where other students seem to like me;   |
| ST31Q06                                    | My school is a place where I feel lonely.  |
| <b><u>Academic engagement</u></b>          |  |
| Description:                               | Defined as the identification with and behavioural involvement (participation) in the academic aspects of school. Academic aspects of school include the students' dealings with teachers, curricula, and the school governance.   |
| Related Questions:                         | Derived by a simple average of the variables "academic participation" and "academic identification".   |
| <b><u>Academic participation</u></b>       |  |
| Description:                               | Focusing on the first three levels of taxonomy to academic participation: the acquiescence to the need to attend school, to be prepared and to respond to directions and questions; students demonstrating initiative-taking behaviours; and participation in the social, extracurricular, and athletic aspects of school life in addition to or as a substitute for extensive participation in academic work.   |
| Related Questions:                         |  |
| YSA6                                       | hours on homework outside of class during free periods and at home;  |
| YSA7                                       | number of time I cut or skipped a class without permission;  |
| YSA8B                                      | I completed my assignments;  |
| ST32Q01                                    | I completed homework on time;  |

ST33Q01 On average, time spent each week on homework and study in these subject areas:  
ST33Q02 test language, mathematics and science, respectively.  
ST33Q03

**Academic identification**

Description: Measures a respondent's academic identification with high school, the focus of attention is on two components of identification, valuing and belonging. A student who fails to identify with school is expected to have a lack of valuing for the school and a lack of feelings of belonging to the school.

Related Questions:

YSA8I I get along well with teachers;  
YSA8J I am interested in what I am learning in class;  
YSA9E School is one of the most important things in my life;  
YSA9F Many of the things we learn in class are useless;  
YSA9G Most of my teachers don't really care about me  
YSA9H Most of the time, I would like to be any place other than in school;  
YSA9J Most of what I learn in school will be useful when I get a job;  
YSA9L School is often a waste of time;  
YSA9M School is more important than most people think;  
YSA9N Most of my teachers do a good job of teaching;  
ST30Q03 Most of my teachers really listen to what I have to say;  
ST30Q04 If I need extra help, I will receive it from my teachers;  
ST30Q05 Most of my teachers treat me fairly;  
ST31Q07 My school is a place where I do not want to go;  
ST32Q06 I am giving interesting homework.

**Self-perception:**

**Self-esteem**

Description: The self-esteem scale that was chosen for YITS is Morris Rosenberg's 22 self-esteem scale (RSE) (Rosenberg, 1965, p.17). Rosenberg defines self-esteem as favourable or unfavourable attitudes towards self and proposes a series of ten questions to measure it. Within the context of YITS, RSE attempts to measure adolescents' global feelings of self-worth or self-acceptance.

Related Questions:

YSI1A I feel I am a person of worth, at least on an equal basis with others;  
YSI1B I feel that I have a number of good qualities;  
YSI1C All in all, I tend to feel that I am a failure;  
YSI1D I am able to do things as well as most other people;  
YSI1E I feel I do not have much to be proud of;  
YSI1F I have a positive attitude toward myself;  
YSI1G On the whole, I am satisfied with myself;  
YSI1H I wish I could like myself more;  
YSI1I I certainly feel useless at times;  
YSI1J At times I think I am no good at all.

**Self-efficacy**

Description: Defines academic self-efficacy as the student's competence and confidence in performance of class work as perceived by the student. This concept should be distinguished from global self-efficacy or mastery which is the belief that one has control over one's own destiny.

Related Questions:

YSA8K I am certain I can understand the most difficult material presented in texts;  
YSA8L I am confident I can understand the most complex material presented by teacher;  
YSA8M I am confident I can do an excellent job on assignments and tests;  
YSA8N I am certain I can master the skills being taught

**Self-mastery**

Description: The powerlessness scale chosen by YITS is based upon the work of Pearlin and Schooler (1978). This scale, referred to as the Mastery scale<sup>25</sup>, assesses a feeling of powerlessness without reference to concrete life situations. Mastery can be defined as a measure that assesses “the extent to which one regards one’s life chances as being under one’s own control in contrast to being fatalistically ruled” (Pearlin and Schooler, 1978). Hence, if one scores high on the mastery scale, one does not feel powerless.

Related Questions:

YSI2A Sometimes I feel I’m being pushed around in life;  
YSI2B What happens to me in the future mostly depends on me;  
YSI2C There is really no way I can solve some of the problems I have;  
YSI2D There is little I can do to change many of the important things in my life;  
YSI2E I often feel helpless in dealing with the problems of life;  
YSI2F I have little control over the things happen to me;  
YSI2G I can do just about anything I really set my mind to.

**Social Support:**

Description: Measures the availability of social supports, via friends, family and other sources for the youth. Three aspects are included: reliable alliance (the assurance that others can be counted upon for practical help), attachment (emotional closeness) and guidance (advice or information). These aspects are most directly related to problem-solving within the context of stress. Two items were proposed to measure each of these aspects for a total of six items.

Related Questions:

YSD1A If something went wrong, no one would help me;  
YSD1B I have family and friends who help me feel safe, secure and happy;  
YSD1C There is someone I trust whom I would turn to for advice if I were having problems;  
YSD1D There is no one I feel comfortable talking about problems with;  
YSD1E There is no one I feel close to;  
YSD1F There are people I can count on in times of trouble

**Parents' Behaviours:**

Parents who are supportive of their youth’s education, who are involved in their youth’s school and who have a firm but responsive parenting style have a positive influence on their youth’s achievement and educational attainment. The parenting practices scales are designed to measure three facets of parenting: nurturance, inconsistent rejection-oriented discipline (rejection) and monitoring. An overall parenting scale was not formed from the three subscales.

**Monitoring behaviour**

Description: Measures parents’ monitoring behaviour. A monitoring parent is defined as one who believes that he or she is knowledgeable about his or her child's activities, whereabouts and friends.

Related Questions:

PB17A Know where child goes at night;  
PB17D Know what child is doing when he/she goes out;  
PB17G Know who child spends time with when he/she goes out.

**Nurturance behaviour**

Description: Measures parents’ nurturing behaviours. Nurturance represents child-centered effective parenting practices such as nurturance, involvement, and positive reinforcement.

Related Questions:

Derived from the frequency with which parents:

|       |  |
|-------|--|
| PB17C | Praise child;                                    |
| PB17F | Listen to child's ideas and options;             |
| PB17J | Make sure child knows that they are appreciated; |
| PB17M | Speak of good things those children does;        |
| PB17O | Seem proud of the things child does.             |

**Inconsistent discipline (Rejection-oriented behaviour)**

Description: measures parents' inconsistent discipline or rejection-oriented behaviours,

Related Questions:

|       |   |
|-------|---|
| PB17B | Soon forget a rule that they have made;                 |
| PB17E | Nag child about little things;                          |
| PB17H | Keep rules only when it suits themselves;               |
| PB17I | Get angry and yell at child;                            |
| PB17L | Threaten punishment more often than using it;           |
| PB17N | Enforce or do not enforce rules depending on their mood |

**Student's performance score in reading**

Description: Weighted likelihood estimate in reading ability, which is provided for all students who answered at least one reading question. It was transformed to a scale with a mean of 500 and a standard deviation of 100 by using the data for the participating OECD countries only (except the Netherlands).



**Table A4: Summary Statistics, Scale Variables, Males and Females**

|                                | Males   |        |        |       |
|--------------------------------|---------|--------|--------|-------|
|                                | Min.    | Max    | Mean   | S.D.  |
| HS Engagement                  |         |        |        |       |
| <i>Academic identification</i> | -4.57   | 4.35   | -0.08  | 0.98  |
| <i>Academic participation</i>  | -4.84   | 2.83   | -0.09  | 1.00  |
| Academic engagement            | -5.37   | 3.66   | -0.10  | 0.99  |
| Social engagement              | -3.84   | 2.74   | -0.13  | 1.03  |
| Overall engagement             | -5.55   | 3.22   | -0.14  | 0.99  |
| Self-perception                |         |        |        |       |
| Self-esteem                    | -3.52   | 2.86   | 0.03   | 1.00  |
| Self-efficacy                  | -2.55   | 2.21   | 0.09   | 1.03  |
| Self-mastery                   | -3.71   | 2.92   | 0.00   | 0.99  |
| Social Support                 | -3.11   | 1.77   | -0.26  | 0.99  |
| Parents' Behaviour             |         |        |        |       |
| Monitoring behaviour           | -7.96   | 1.26   | 0.03   | 0.94  |
| Nurturance behaviour           | -5.08   | 1.78   | -0.04  | 1.01  |
| Inconsistent discipline        | -3.93   | 3.54   | 0.11   | 0.96  |
| Reading Ability                | 166.01  | 887.31 | 519.29 | 97.04 |
|                                | Females |        |        |       |
|                                | Min.    | Max    | Mean   | S.D.  |
| HS Engagement                  |         |        |        |       |
| <i>Academic identification</i> | -5.04   | 3.97   | 0.12   | 0.96  |
| <i>Academic participation</i>  | -4.84   | 2.85   | 0.28   | 0.90  |
| Academic engagement            | -4.74   | 3.62   | 0.24   | 0.93  |
| Social engagement              | -3.84   | 2.74   | 0.06   | 1.01  |
| Overall engagement             | -4.14   | 3.60   | 0.17   | 0.96  |
| Self-perception                |         |        |        |       |
| Self-esteem                    | -3.67   | 2.04   | -0.07  | 0.96  |
| Self-efficacy                  | -2.55   | 2.31   | -0.14  | 0.98  |
| Self-mastery                   | -3.70   | 2.89   | -0.07  | 0.95  |
| Social Support                 | -2.85   | 1.77   | 0.20   | 0.95  |
| Parents' Behaviour             |         |        |        |       |
| Monitoring behaviour           | -7.96   | 1.26   | 0.11   | 0.84  |
| Nurturance behaviour           | -5.47   | 1.78   | 0.09   | 0.98  |
| Inconsistent discipline        | -3.93   | 4.56   | 0.00   | 0.98  |
| Reading Ability                | 120.56  | 909.52 | 550.01 | 88.54 |

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