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# Reading skills of young immigrants in Canada: the effects of duration of residency, home language exposure and schools

REPORT

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Strategic Policy and Research

June 2008





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***for:  
Learning Policy Directorate  
Strategic Policy and Research  
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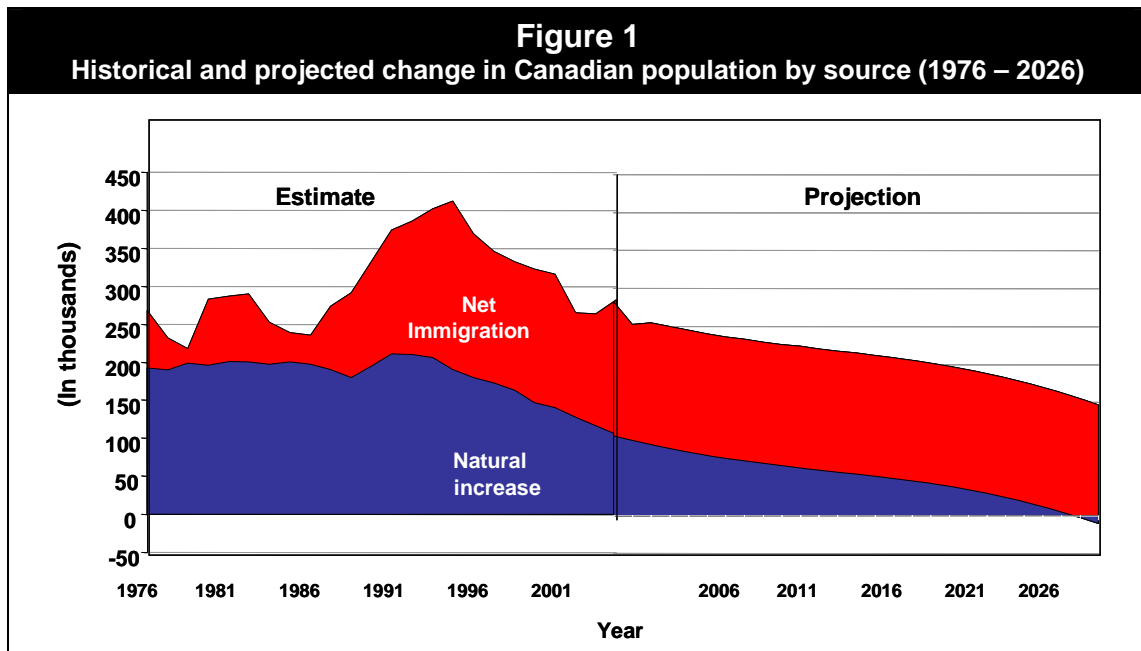
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# 1. Introduction

Ageing Canadian population, combined with declining fertility rates pose challenges for future population and labour market growth in Canada. Increasingly, immigration is seen as a panacea for Canada. As is shown in Figure 1, Canada's labour force growth is slowing and immigrants will constitute a growing part of population and labour force growth.



It is expected that immigrants will account for all net labour force growth by 2011 and for all net population growth by 2031 (Denton, Feaver and Spencer, 1999).

Canadian immigrants often arrive with children who will eventually enter the Canadian labour market. In 2002, over 220,000 immigrants arrived in Canada and a significantly large proportion of them (37%) were between the ages of 0 and 24. These young immigrants are an important addition to the current as well as the future labour force. Their successful integration in the Canadian economy (education and labour market participation) is, therefore, of utmost interest.

High reading skills lie at the basis of all learning. They empower effective learning and training, through which people develop into productive members of the workforce and the community. High reading skills should be developed early to benefit from ongoing advantages which start with formal education, continue through the working life and well into the retirement ages.

The main purpose of this paper is to examine the skill development of immigrant children (15 year olds) using data from the Program for International Student Assessment (PISA) and the Youth in Transition Survey (YITS) and to examine its implications for public policy. The research will focus on answering the following four questions of interest:

- Does the age at which immigrant children arrive in Canada have an impact on their academic performance in schools?
- Does exposure to different languages at home affect reading skills in English or French of immigrants?
- What are the relative influences of individual, family and school factors on the academic performance of 15 year old immigrants? How do they differ from their Canadian counterparts?
- Does reading performance by immigrants vary between schools?

The report is organized in the following way. Section two presents a brief literature review. Section three describes the data and methodology used throughout the analyses. Section four presents descriptive results of immigrant reading scores. Section five of the report focuses on multivariate analyses where reading scores are analysed with multiple control variables. The fifth section presents results from multilevel analyses where the reading scores were analyzed simultaneously at individual and school level. Finally, the report is concluded in section six.

## 2. *Literature Review*

Though there exists a vast literature on issues of labour market integration of immigrants, there are fewer studies that have examined the outcomes of immigrant children and youth. The literature review focuses on studies with assessed outcome measures over time in order to examine initial performance and the rate of progression among immigrant children and youth in Canada, which are key indicators of integration.

Sweetman (1998) compared the school performance in mathematics and science of immigrant children to native born children using data for Australia, Canada, Great Britain and the United States taken from the Third International Math and Science Survey 1995 (TIMSS). He found that immigrant children's test scores in mathematics and science were typically lower than those of native-born children in Canada and the United States but were higher than those of the native-born children in Australia. He also found evidence of a convergence towards the native-born mean performance with more years in the school system in the cases of Canada and the United States.

Worswick (2001) compared the school performance of the children of immigrant parents to that of the children of Canadian-born parents based on the National Longitudinal Survey of Children and Youth (NLSCY). The study employed test scores in reading and mathematics for children in grade 2 and higher as well as the Peabody Picture and Vocabulary Test (PPVT) test scores for vocabulary of children in kindergarten and grade one. The analysis also employed the qualitative measures of school performance provided by the Person-Most-Knowledgeable (PMK) about the child (the child's mother in roughly 90% of the cases) as well as the qualitative measures of school performance provided by the child's teacher. The children of immigrant parents whose first language was neither English nor French were found to be at a disadvantage in the early years at school in vocabulary and to a lesser extent reading in the grade 2 through grade 5 range. However, by age 14 these children's average performance was equal to or better than that of the children of Canadian-born parents and the children of immigrant parents whose first language is neither English nor French.

In a second paper, Worswick (2004) analyzed the entire test score distribution of the children of immigrants using the NLSCY. The goal of the study was to see whether the average performances found in Worswick (2001) hid important differences in the distribution of test score performance. Because the average test score of a particular demographic group of children may be close to an acceptable level while a significant percentage of the children may have very low test scores. Worswick (2004) found that the 10<sup>th</sup> percentile of the vocabulary (PPVT) distribution was lower for children of immigrant parents whose mother tongue was neither English nor French than for children of Canadian-born parents. However, this difference was present primarily in the kindergarten years and was not present at higher grades in terms of reading and mathematics test scores.

Ma (2003), analysed the reading, mathematics and science outcomes of immigrant youth in Canada using data from the Programme for International Student Assessment (PISA). The research found that there were no differences between immigrant and non-immigrant students in mathematics, but there were performance differences in favour of non-immigrant students in reading and science. This study analyzed only one type of immigrants – those born outside of Canada – and did not analyze the performance of first generation students (born in Canada to parents who were born outside of the country).



### 3. *Data and Methodology*

The analyses in this report are based on the Programme for International Student Assessment (PISA) data. This project was carried out under the auspices of the Organization for Economic Co-operation and Development (OECD) and was intended to measure students' skills in three domains: reading, mathematics and science. In 2000, over 30,000 Canadian 15-year olds, drawn from 1,200 schools participated in PISA, in addition to 15-year olds in 32 other countries.

The outcome of interest is the reading proficiency of a 15 year old, irrespective of their grade in school. Thus, the PISA reading test scores not a curriculum based test. The survey also measured proficiencies in Mathematics and Scientific literacy, however, these two were the minor domains and not all students completed an assessment in these two areas. In PISA, reading literacy is defined as – understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society (OECD, 2001).

In this paper, following the international literature on the definition of immigrants, we subdivide student population into three groups: native born student, first generation student and immigrant student.

- *Native born* student are those who are born in Canada, with at least one parent also born in Canada.
- A *first generation* student is defined as someone who is born in Canada but both parents are born outside of Canada.
- An *immigrant* student is someone who is born outside of Canada.

Accordingly, the sample consists of 80.7% (276,823) native born students, 10.2% (35,091) of first generation students and 9% (30,971) immigrant students.

PISA sampling frame is hierarchical by design as schools are sampled first across Canada and then students within schools are randomly selected. Therefore, the data allows for students to be nested within schools and to partition this variance at the within and between schools, we use the hierarchical linear modelling (HLM).

In addition, the PISA 2000 survey in Canada collected background information from three different sources – student questionnaire, parent questionnaire and the school questionnaire. Therefore, the survey provides a rich set of variables drawn from different levels allowing it to examine individual, family and school level characteristics to be used in the HLM analysis.

The first set of multivariate analysis that examines the differences in reading skills between the three groups is done using ordinary least squares method, using appropriate statistical methods to account for the sampling as well as the measurement error in collecting such data. This allows us to answer the first two questions outlined in the introduction section.

To analyze variation at the individual and school level, the HLM method is used. The following set of equations explain the basic two level structure of the model:

$$\text{Level 1:} \quad Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + r_{ij} \quad \dots[1.1]$$

$$\text{Level 2:} \quad \beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j} \quad \dots[1.2]$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}W_j + u_{1j} \quad \dots[1.3]$$

$$E(\beta_{0j}) = \gamma_0 \quad \text{average school mean}$$

$$E(\beta_{1j}) = \gamma_1$$

$$Var(\beta_{0j}) = \tau_{00} \quad \text{population variance among the school means}$$

$$Var(\beta_{1j}) = \tau_{11}$$

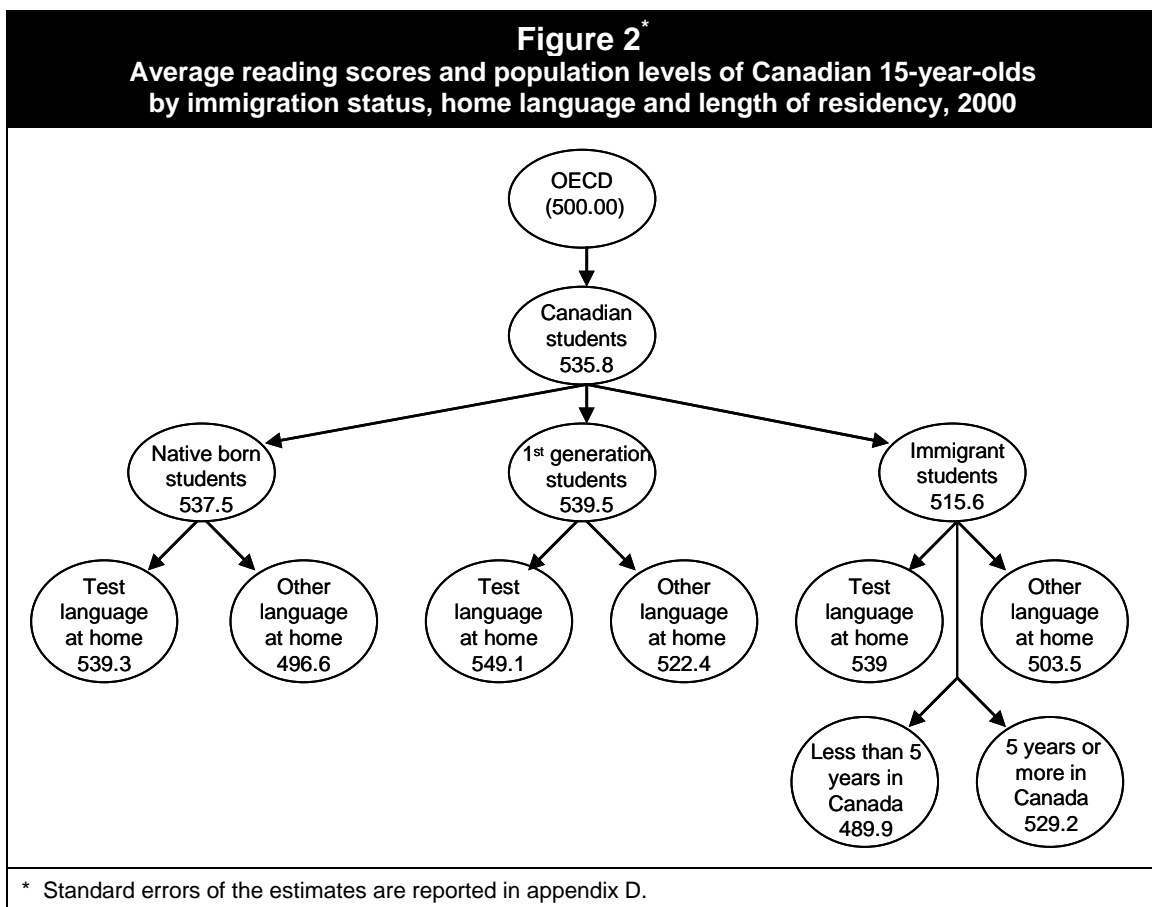
$$Cov(\beta_{0j}, \beta_{1j}) = \tau_{01} \quad \text{population covariance between slopes and intercepts}$$

In this paper, level 1 is the student and level 2 is the school. Equation 1.1 shows that the student level regression is a function of student specific regressors included in vector X. Equations 1.2 and 1.3 show that the intercept and slope coefficients estimated for students within schools are allowed to randomly vary across schools and can also be functions of school level variables as indicated by vector W. In this paper, we estimate five different specifications of the HLM model which are explained in detail in section VI.

## 4. Descriptive Results

The purpose of this section is to explore the relationship of some of the key immigrant and first generation characteristics, including the length of residency in Canada, the language spoken at home and gender, with their reading proficiency in PISA 2000.

Figure 2 provides a simple descriptive summary of the population of 15-year olds in Canada in 2000. As described before, three separate groups of students were identified: native born, first generation and immigrant born students (see definition in section III). Each bubble in Figure 2 provides information on the average reading scores by immigrant status. The OECD average was set at 500 points.





In Canada, the mean reading scores of native and first generation students were not statistically different (537.5 and 539.5 respectively), but immigrant students scored lower on average (515.6). This 24 point difference was equivalent to roughly half a year of schooling (Willms, 2004). However, all three groups scored well above the OECD average of 500.

Figure 2 further illustrates the distribution of reading scores among the three groups by the language spoken at home and the length of time spent by immigrant youth in Canada. It is clear from the figure that whether or not a student speaks the test language at home is an important factor determining their reading scores. Among the native born students, a difference of 42 points was observed, similar to the one observed among immigrant students. The difference was much smaller among the first generation immigrants (26.7 points).

Secondly, among immigrant students who were born outside Canada, the age at which they immigrated to Canada is of importance. Those who have been in Canada for 5 years or more (arriving before age 10) scored 39.3 points higher than those who had been in Canada for 5 years or less (arriving after reaching age 10).

Figure 3 presents a breakdown of only immigrant students and their reading scores by both home language exposure and length of residency in Canada. Four quadrants were created, each representing a group of students with different lengths of residency and home language.

<b>Figure 3</b> <b>Average reading scores of 15-year-old Immigrants their length of residency in Canada and home language exposure</b>		
<b>Language</b> 		
<b>Residency</b> 	<b>Speak English or French at home</b>	<b>Speak other than English or French at home</b>
Less than 5 years in Canada	522.4	478.3
5 or more years in Canada	545.8	521.4

As expected, increased length of residency in Canada was associated with higher reading scores irrespective of the language spoken at home. Similarly, irrespective of the length of residency, speaking the test language at home was associated with higher reading scores among immigrant students. Therefore, a student born outside of Canada, who had been in Canada for less than 5 years and spoke a language other than the test language at home faced a double disadvantage, scoring 21.7 points below the OECD average of 500.

The 2000 PISA results revealed that in all 32 participating countries, 15-year-old girls outperformed their male counterparts in reading literacy. In Canada, 32 score points separated boys and girls (OECD, 2001). Table 1 provides a breakdown of results among the three groups by gender. Among the first generation and native born groups, girls obtained the highest reading scores (555.2 and 554.3 respectively), and for boys there also were no differences between these two groups (521.7 and 521.0).

**Table 1**  
**Average reading scores of 15-year-olds in Canada, by gender and residency status in 2000**

	Average Reading Score	Std. Error
Native boys	521.0	2.04
Native girls	554.3	1.91
First generation boys	521.7	5.29
First generation girls	555.2	4.42
Immigrant boys	499.7	5.75
Immigrant girls	531.2	6.67
Canadian Average	537.0	1.6
<b>OECD Average</b>	<b>500.0</b>	

Males and females not born in Canada scored lower than their same gender counterparts; however, immigrant girls obtained higher mean reading scores than did the native born and first generation boys. Interestingly, the gender gap was almost identical between the three groups of students – roughly 34 score points. It is worth noting, that all six groups of students obtained reading scores at or above the overall OECD average of 500.



## 5. *Multivariate analyses*

Multivariate analyses were conducted to examine the relative importance of variables already shown to be significant through bivariate analyses. Table 2 presents results from a series of multivariate analyses. A multivariate analysis is more appropriate in studying differences between the three groups of students, as it allows for comparisons between specific groups with similar characteristics. In total, five multivariate models were created to analyse a range of issues related to the reading performance of immigrants. Each model contained the same set of 17 control variables. These ranged from province of residence, parental education aspirations for the students to student's socio-economic status (for a complete list of variables see appendix A). All models were estimated by the Ordinary Least Squares (OLS) methodology.

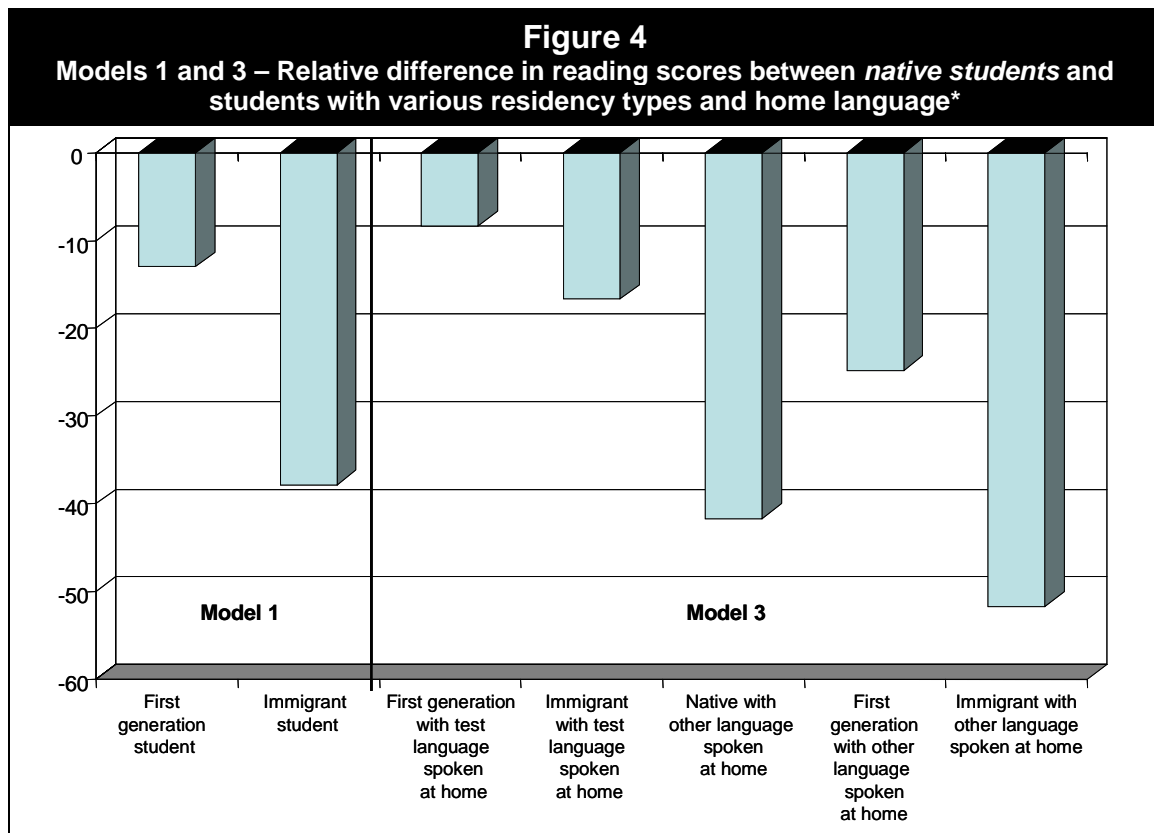
The Programme for International Student Assessment (PISA) provided 5 plausible values as well as 1,000 balanced replicate weights (for more information on plausible values and balanced replicate weights see appendix B). All of these were used in the estimations.

*Do the differences in the reading performance between native, first generation and immigrant students persist after controlling for various key socio-demographic factors?*

The results of multivariate regressions are reported in Table A1 in Appendix A. Consistent with the previous literature, the specification controlled for gender, family characteristics, socio economic status (hereafter referred to as SES), parental aspirations and province. Since the objective of the paper is to examine what happens to differences in performance for three groups, the intent was to control for some of the key socio-demographic variables only. Overall, the model fitted was able to explain roughly 23% variation in reading scores across students in Canada. There were no significant differences found between the three groups of students in terms of their socio-demographic characteristics. Hence none of the models report any interaction effects.

The following discussion explores the differences in the reading performance of the three groups of students by gender, length of residency and language spoken at home. Based on coefficient estimates from the five models presented in Table A1, the information is summarized in Figures 4, 5 and 6.

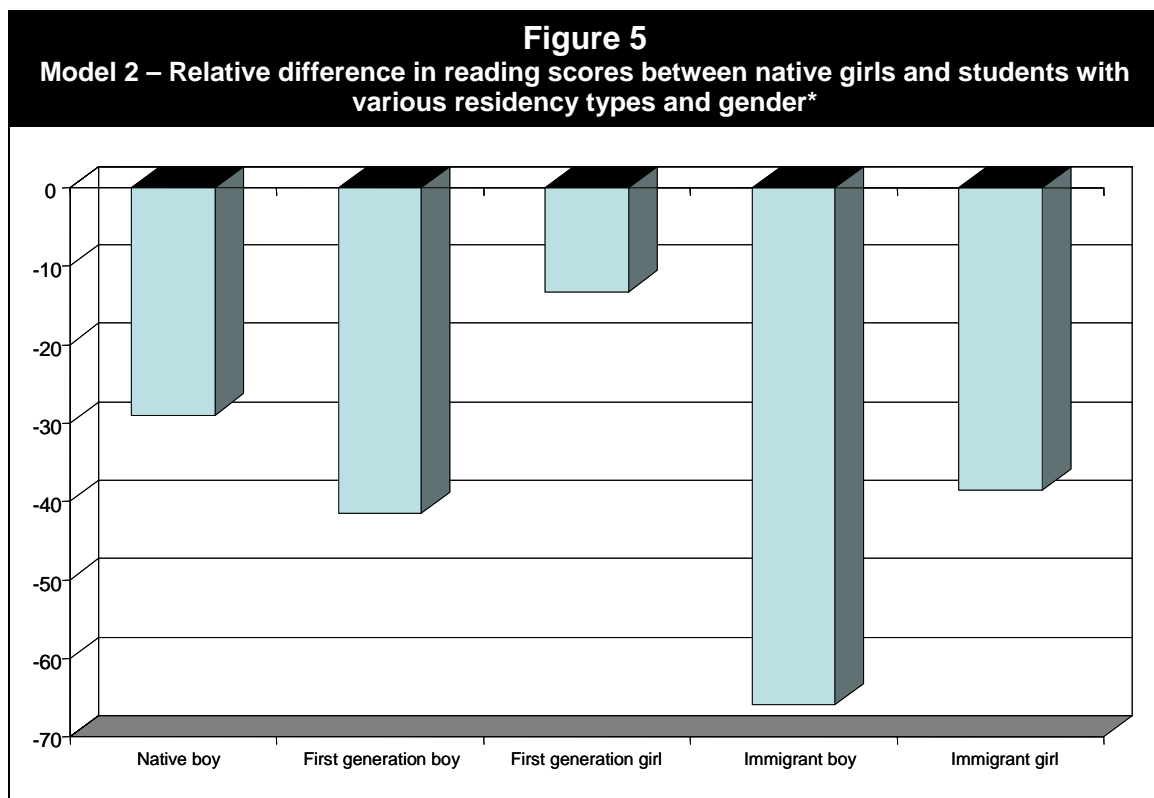
Overall, immigrant students perform significantly below Canadian born and first generation students even after controlling for various socio-economic characteristics including SES (Figure 4 – model 1)



Before controlling for various characteristics, there was no apparent difference in the reading performance of Canadian born and first generation students in Canada. However, after controlling for other factors, there appears to be a difference of roughly 13 points which is statistically significant. Similarly, the reading performance of immigrant students falls roughly 38 points (22 points without controlling for other factors) below that of Canadian born students.



**The differences in reading performance are even larger in magnitude among immigrant and first generation males (Figure 5 – model 2)**



Relative to Canadian born females, every other group performs significantly lower in reading literacy. Canadian born males perform roughly 30 points below Canadian born females, even after controlling for other characteristics. This is consistent with previous work in this area. In comparisons, first generation females perform 13 points below their Canadian born counterparts, the lowest of all differences in reading performance. However, immigrant females score significantly lower than the Canadian born females, by about 39 points.

First generation male students also score below the average score of Canadian born females (41 points). However the gender difference between female and male student is not statistically different for the two groups – Canadian born and first generation students (close to 30 points). A similar difference exists between female and male immigrant students.

Overall, both male and female immigrant students perform significantly below their Canadian counterparts. Relative to Canadian born females, the difference is close to 66 points for male immigrants and 39 points for female immigrants. These are very large differences especially after controlling for various socio-economic characteristics of students.

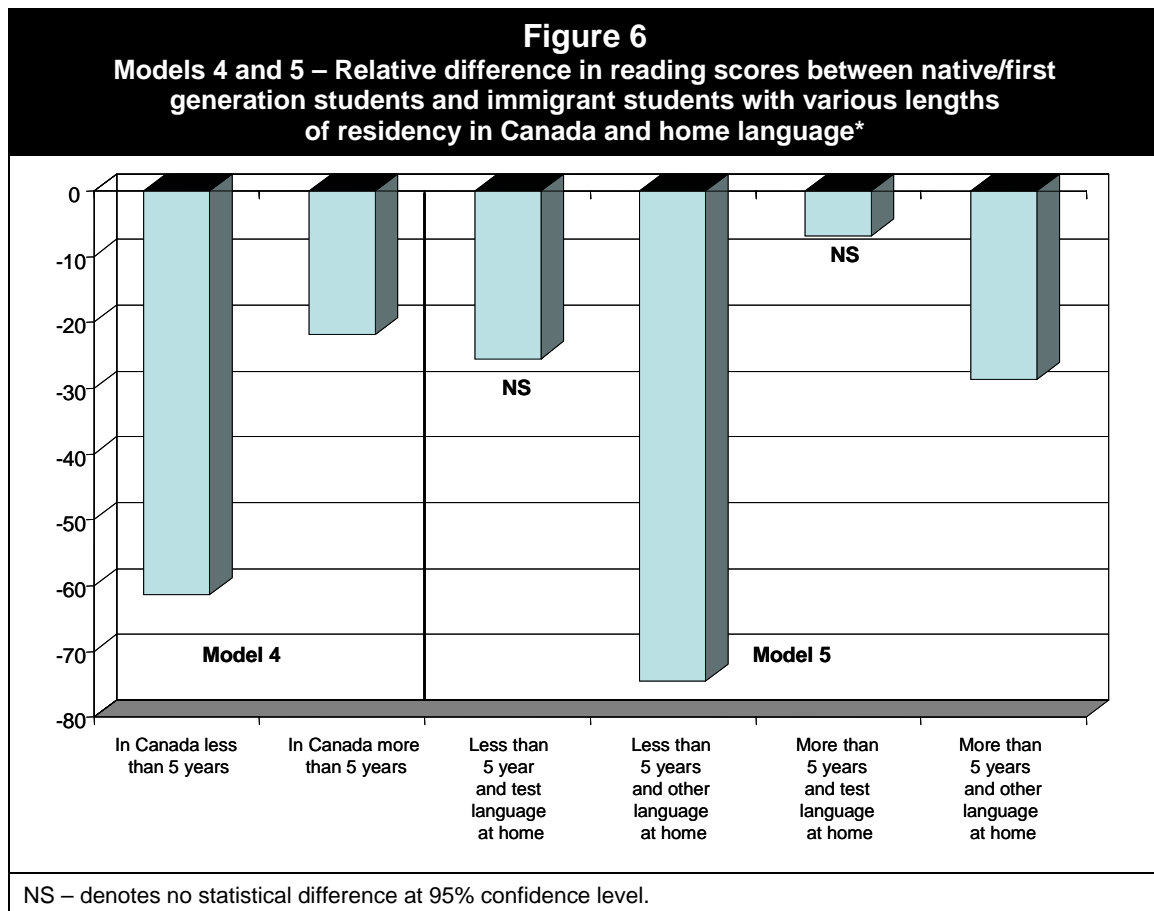
### **Exposure to English or French at home tends to mediate a big part of the disadvantage in reading performance of first generation and immigrant students (Figure 4 – model 3)**

Since the gender difference is similar across the three groups, the remaining analysis focuses on the groups of students irrespective of gender. The comparison group is Canadian born students who speak the language of PISA test at home. The test was administered in Canada's two official languages, English and French. Canadian born students who spoke a different language at home than in which the test was taken (this also includes French minority language students) performed 41 points lower than those who were exposed to the test language at home. Since a distinction is made between these two groups, the differences are magnified partly due to the higher performance of the reference group.

First generation and immigrants who are exposed to one of the two official languages (which was also the language of the test) at home tend to have much improved reading outcomes compared to their Canadian born counterparts. The disadvantage is reduced to 8 for the first generation students and 17 points for immigrant students, representing a big drop among the immigrants in particular.

The first generation and immigrant students who are not exposed to either English or French at home performed significantly lower compared to their Canadian born counterparts, by roughly 25 and 52 points respectively. These are much larger differences in magnitude compared to the ones reported earlier for the overall groups.

With increased residency in Canada, the reading performance of immigrant students tends to improve (Figure 6 – model 4)



Immigrant students with Canadian residency of less than 5 years tend to have significantly lower reading performance relative to their Canadian born peers, over 60 points on the reading scale. These students are more likely to have arrived in Canada in their teens and are likely to have lesser number of years of exposure to the Canadian education system and language. Immigrant students who have been in Canada for a duration of 5 or more years have 20 points disadvantage in reading performance compared to their Canadian born counterparts not controlling for their exposure to the language of PISA test at home.

**When exposure to test language at home is accounted for, the difference in reading performance of recent and established immigrant students is no longer statistically different (Figure 5 – model 5)**

Controlling for exposure to test language at home for immigrants has a significant impact on reading differences between immigrants and Canadian born students. Among the recent immigrants and those with longer residency in Canada, the differences are no longer statistically significant. In the case of the recent immigrants, although the coefficient is -25.5, but the result is not statistically robust due to a small sample size. Despite so, the coefficient is much smaller than the overall disadvantage of 60 points for recent immigrants. The differences in reading performance for those who are not exposed to the test language at home persist and are larger in magnitude – close to 75 points for recent immigrants and 29 points for those who have been in Canada 5 years or more.

## ***6. School level variation using HLM***

Schools play a crucial role in developing the skills of young people. Additionally for immigrants they are mechanisms for integration into the Canadian society. Reading skills in English and French are often developed in schools, and since many immigrants speak other languages at home, schools may be their only source of language training. Therefore, the choice of school and its characteristics could affect reading scores of not only immigrants, but also all other students.

The following analysis was aimed at investigating the school effects on reading skills of 15-year olds. A Hierarchical Linear Modeling (HLM) methodology was employed to study the reading score variation between schools with similar characteristics controlling for students' characteristics. The HLM methodology can estimate simultaneously the effects of student-level and school-level variables on an outcome measure (see Bryk and Raudenbush, 1992).

The students who participated in the PISA study came from 1,200 schools across Canada. However, since not all schools had students who were either immigrants or first generation, the sample of schools used in the estimation is lower. The following results measure the level of variation between schools simultaneously controlling for some key student level characteristics. Five separate models were estimated and the results are provided in Table 2.

**Table 2**  
Results from HLM multilevel analyses<sup>1</sup>

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
<b>Within school</b>										
Intercept	526.4	0.00	528.4	0.00	548.3	0.00	548.3	0.00	548.2	0.00
First generation			-0.6	0.85	0.1	0.96				
Immigrant			-19.4	0.00	-19.4	0.00				
Number of siblings					-2.9	0.00	-3.0	0.00	2-.9	0.00
Single parent family					0.5	0.83	0.5	0.00	0.7	0.91
Mixed family					-12.1	0.00	-12.1	0.00	-12.3	0.00
Other family type					-32.4	0.00	-32.3	0.00	-32.4	0.00
SES					29.6	0.00	29.6	0.00	29.2	0.00
Boys					-33.6	0.00	-33.7	0.00	-33.6	0.00
<b>Between schools</b>										
<b>First generation</b>										
<b>(Ontario)</b>									<b>-6.2</b>	<b>0.15</b>
Atlantic									-38.4	0.01
Quebec									-4.2	0.62
Prairies									11.6	0.13
British Columbia									16.4	0.03
School SES										40.5
<b>Immigrant</b>										
<b>(Ontario)</b>									<b>19.2</b>	<b>0.00</b>
Atlantic									3.7	0.82
Quebec									-5.53	0.60
Prairies									-0.5	0.96
British Columbia									1.03	0.90
School SES										50.0

<sup>1</sup> For a complete list of variables used in the multilevel analyses see appendix C.

Model 1 is the null model which does not include any explanatory variables at either the student or school level and is designed to partition the total variance in the dependent variable, reading scores, into a between and a within-school component. Consistent with previous research using PISA data in Canada, the majority of variation is at the student level (82%) and only 18% of the variation in PISA reading scores is between schools (see Table 3).

<b>Table 3</b>						
<b>Analyses of variance of HLM models</b>						
		<b>Null Model</b>	<b>Model 2 (random effects)</b>	<b>Model 3 (Level 1 model)</b>	<b>Model 4 (province)</b>	<b>Model 5 (province, SES)</b>
Between school	Intercept (Native)	1,603 (18%)	1,632	1,058	1,056	1,056
	First generation difference		1,120	1,131	1,095	1,026
	Immigrant difference		2,583	2,321	2,335	2,418
	SES			219	219	218
	BOYS			556	558	561
Within School	Level 1	7,400 (82%)	7,131	6,123	6,123	6,124

Model 2 is designed to examine if the differences in reading scores between first generation and immigrants vary at the student as well as the school level. The dummy variables are allowed to randomly vary across schools, with variance all statistically significant. The results indicate that though the difference between first generation and Canadian born students is not significantly different from zero at the student level, however, there are significant variations across schools. Similarly, the immigrant differential of 20 points also statistically varies between schools. It should be noted that these are differences when no controls are introduced at either of the two levels of analysis. Overall, the results indicate that these differences randomly vary across schools and therefore can be specified as a function of independent variables. Model 2 is also run with a different set of dummy variables to understand the differences between the three groups. The results indicate that the average scores of first generation and immigrants tend to have a higher level of variation between schools compared to the scores of Canadian born.

Model 3 introduces key individual characteristics associated with reading at the student level, including family characteristics, socioeconomic status (SES) and gender, some of which are also treated as randomly varying at the school level. Even after controlling for student specific characteristics, the reading differences for the two groups remain the same and vary significantly across schools in Canada.

Model 4 attempts to model the average differences in first generation and immigrants at the school level by including the regional dummy variables in the school level equation. All the comparisons are relative to Ontario which is set as the default group. First, the difference in reading scores between immigrants and Canadian born (-20 points) does vary across schools but is not significantly different across regions in Canada. Second, the same is not true for the first generation group. Though the difference in reading scores between first generation and Canadian born is statistically insignificant in Ontario, but it does

vary across regions in Canada. The results indicate that first generation students perform better than their Canadian born counterparts in British Columbia and Eastern Canada relative to Ontario. These results are statistically significant. A similar trend is apparent for Western Canada (Alberta, Saskatchewan and Manitoba) but it is not statistically significant at 10% level of significance (only at 13% level).

Model 5 extends the model further by including a control for the average socio economic status of the school in explaining the reading differences at the school level. As found in previous work done by Doug Willms (2003), average school SES is statistically significant in explaining variation in differences in reading scores between schools. In addition, the difference between first generation and Canadian born is 24 points and is statistically significant for Ontario. All the previous results hold including the difference for the Western Canada is now statistically significant.

To understand this further, the comprehensive model (model 5) was run with a different specification of dummy variables for the first generation and immigrant groups. Instead of modeling the differences, this model focused on estimating the intercepts for all three groups at the school level. Therefore, the variation explained by the model is still the same but now the interpretation of the reading scores of all three groups can be made separately.

The effect of average SES of school on reading scores of the three groups is large, and much higher for the first generation and immigrant groups (60 points versus 45 points for Canadian born).

All three intercepts (one for each Canadian born, first generation and immigrants) significantly vary between schools and differ significantly across provinces. Among Canadian born, the average reading scores is significantly higher in BC, Western Canada and Quebec relative to Ontario. For the first generation immigrants, the average scores are higher in all provinces/regions compared to Ontario. Students in the Atlantic region, perform significantly higher than first generation students in schools in Ontario. However, among immigrant students, region does not play a similar significant role. There are indications that immigrant students in Quebec do better than students in Ontario, but none of the other regional coefficients are statistically significant.

The overall results can also be discerned by examining the pattern of changes in the variance and its components as the intercepts are allowed to randomly vary between schools. The following discussion is based on the analyses of variance presented in Table 3. The total variation in the reading scores of 15 year old students in Canada is 9,000, and it is largely (82%) within schools compared to between schools. With the addition of variables at the student level that can account for some of the variation in reading scores at this level, it is expected that the within school variation will decrease. In model 2, the introduction of variables to control for the country of origin of students, the variation declines from 7,400 to 7,131. In model 3, with the introduction of SES, gender, family characteristics, the variation is further reduced to 6,123. This indicates that these variables account for significant variation at the student level. This does not change in model 4 or 5 as there is no further addition of explanatory variable at the student level.



Secondly, as is evident from Table 3, the variation between schools is largest for immigrant differences (2,583 in model 2). The introduction of province/region and average school SES does help to explain the variation in average reading scores between schools and to some extent the differences between first generation and Canadian born students. This is evidenced by the decline in variation between model 2 and model 5 for the reading scores and difference dummies. However, the model does not help explain differences for immigrants between schools, with not significant reduction noticed for the immigrant difference dummy.

Within schools, first generation students had reading scores similar to their native-born counterparts. The immigrant students' reading performance was almost 19 points below that of the reference group. The attempt to model between school differences did not yield many significant results. Only two regions were found to be statistically significant; Atlantic and British Columbia for the first generation students. On average within the school, first generation students attending schools in the Atlantic region and in British Columbia obtained reading scores 38 and 15 points higher than their peers from Ontario. No such differences were found for the immigrant students, indicating that regional factors do not affect the accumulation of reading skills of young immigrants within the school. In addition, even with the presence of control variables at the school level, the amount of variation in reading due to the choice of school was still much lower than the variation caused by individual characteristics of the students. For first generation immigrants, almost six times more variation was related to the students themselves as opposed to their school; for the immigrant born students it differed by a factor of almost three.

Finally, since average socio-economic status of the school could have an independent effect, it was introduced in model five. Within schools, immigrant born students as well as their first generation peers performed significantly lower than the reference group. At the school level, for both first-generation and immigrant born students, mean SES of the school was highly correlated with reading scores. The correlation was higher for immigrant born students than for first generation students (-40 vs. -23.6). In addition, for first generation students, their average school level reading performance in the regions of Atlantic, British Columbia and Quebec were higher than that of their Ontario peers attending schools with similar socio-economic characteristics (43, 19 and 18 score points, respectively). There were no significant regional differences in reading performance at the school level for immigrant born students. Individual level variations in reading scores were still higher than variations caused by schools.



## *7. Conclusion and Implications for Policy*

The main purpose of this paper was to examine the skill development of immigrant children (15 year olds) using the Program for International Student Assessment (PISA) and the Youth in Transition Survey (YITS) data and to determine its implications for public policy. The research focused on answering the following four of questions:

- Does the age at which immigrant children arrive in Canada have an impact on their academic integration in schools?
- Does exposure to different languages at home influence reading skills of immigrants?
- What are the relative influences of individual, family and school factors on the academic performance of 15 year old immigrants? How do they differ from their Canadian counterparts?
- Does immigrant reading performance vary between schools?

At age 16, youth in most Canadian provinces can decide to either stay on to graduate with an intention to pursue post-secondary education, graduate and join the labour market, or dropout from formal education. For recent immigrants (1-5 years in Canada) the timing of these decisions is very crucial, as their reading skills might not yet be developed enough to ensure the best possible outcomes of their decisions. This issue is even more pronounced for immigrants whose home language is not English and French. However, most immigrants appeared to have caught up in five years through integration.

In 2000, across all participating countries including Canada, girls outperformed their male peers in reading scores. In Canada the reading gap between boys and girls stood at 32 score points. The analysis of scores of the two immigrant groups revealed similar disadvantages for boys. Immigrant born boys were the most disadvantaged students in terms of reading scores. However, the gender gap was virtually identical for all the immigrant groups and the same as the gender gap for native-born students. This suggests that more intense interventions should be aimed at improving scores of boys in order to reduce the gender reading gap for native, first generation and immigrant born students.

Although not as evident from bivariate analyses, both immigrant and first generations students performed on average at lower levels in reading compared to their native born peers. The reading skill disadvantage was especially significant for immigrant boys, students whose home language was other than the test language and those with Canadian residency of less than 5 years. On the positive note, the length of residency in Canada tended to mitigate these differences indicating rapid integration. On average, five-year duration of Canadian residency was able to reduce the reading skill gap by more than 60%. In addition, those exposed to a home language matching that of the test language experienced no reading skill disadvantages, irrespectively of the length of residency in Canada.

Finally, multilevel analyses were trying to identify the effects of schools on the reading skills of immigrant students. On average, and this being true for all analyzed groups, there was a positive association between the school's average socio-economic status and the school's average performance in reading. The choice of schools across different Canadian regions did not matter for immigrant born students. For first generation students, there was a significant average advantage for schools in the Atlantic region, the Prairies and British Columbia. However, between school differences were found to have caused less variation in scores than did differences within schools. This suggested that for reading skills, the choice of school was not as important as one's individual characteristics.

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**Table A1**  
Results from multivariate estimation from section V

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	520.0	3.20	520.1	3.20	521.3	3.25	517.6	3.16	517.4	3.17
Newfoundland and Labrador	-13.4	3.73	-13.4	3.73	-14.8	3.74	-11.0	3.71	-11.0	3.72
Prince Edward Island	-8.5	3.67	-8.5	3.67	-9.1	3.70	-6.4	3.56	-6.5	3.56
Nova Scotia	-8.3	3.68	-8.3	3.68	-9.3	3.73	-6.5	3.62	-6.6	3.62
New Brunswick	-22.6	3.35	-22.6	3.35	-22.3	3.40	-20.3	3.33	-20.4	3.33
Quebec	15.7	3.64	15.7	3.64	16.5	3.60	16.9	3.68	16.9	3.67
Manitoba	10.1	3.80	10.1	3.81	11.3	3.79	10.8	3.79	10.9	3.79
Saskatchewan	4.5 <sup>NS</sup>	3.96	4.5 <sup>NS</sup>	3.96	4.1 <sup>NS</sup>	3.98	6.5 <sup>NS</sup>	3.97	6.4 <sup>NS</sup>	3.97
Alberta	18.4	3.69	18.4	3.69	18.3	3.68	19.3	3.68	19.4	3.67
British Columbia	9.9	3.70	9.8	3.69	9.8	3.71	10.4	3.74	10.6	3.76
Number of siblings	-3.6	0.86	-3.6	0.86	-3.6	0.87	-3.9	0.85	-3.9	0.86
Single parent family	0.4 <sup>NS</sup>	2.10	0.4 <sup>NS</sup>	2.10	-0.4 <sup>NS</sup>	2.14	0.4 <sup>NS</sup>	2.08	0.1 <sup>NS</sup>	2.06
Nuclear family	-11.4	2.49	-11.4	2.49	-11.8	2.48	-10.2	2.51	-10.3	2.49
Other family type	-29.5	6.24	-29.5	6.24	-28.9	6.28	-29.0	6.06	-29.3	6.09
SES	27.5	1.28	27.5	1.28	27.0	1.31	27.7	1.25	27.6	1.26
Parent - high school aspiration	-41.8	6.12	-41.8	6.12	-41.5	6.25	-42.0	6.08	-41.9	6.09
Parent - university aspiration	48.5	2.07	48.5	2.07	49.2	2.09	48.0	2.13	48.3	2.12
Boy	-28.7	1.63			-28.7	1.63	-28.8	1.61	-28.6	1.60
First generation student	-13.0	3.38								
Immigrant student	-37.8	4.66								
Native boy			-29.0	1.69						

**Table A1 (suite)**  
**Results from multivariate estimation from section V**

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
First generation boy			-41.5	4.75						
First generation girl			-13.3	4.23						
Immigrant boy			-65.9	5.25						
Immigrant girl			-38.6	6.01						
1st gen. test language @ home					-8.3	3.80				
Immigrant test language @ home					-16.7	6.32				
Native other language @ home					-41.7	5.60				
1st gen. other language @ home					-24.8	5.92				
Immigrant other language @ home					-51.7	5.86				
In Canada less than 5 years							-61.4	7.40		
In Canada more than 5 years							-21.9	4.93		
Less than 5 years & test @ home									-25.5 <sup>NS</sup>	14.31
Less than 5 years & other @ home									-74.5	8.77
More than 5 years & test @ home									-6.9 <sup>NS</sup>	7.02
More than 5 years & other @ home									-28.7	6.39
<b>Adjusted R square</b>	<b>0.231</b>		<b>0.231</b>		<b>0.237</b>		<b>0.235</b>		<b>0.233</b>	

NS – denotes no statistical difference at 95% confidence level.



## **Variables used in the multivariate analyses (Section IV)**

*Newfoundland and Labrador* – dummy variable representing the province of Newfoundland and Labrador

*Prince Edward Island* – dummy variable representing the province of Prince Edward Island

*Nova Scotia* – dummy variable representing the province of Nova Scotia

*New Brunswick* – dummy variable representing the province of New Brunswick

*Quebec* – dummy variable representing the province of Quebec

*Ontario* – dummy variable representing the province of Ontario

*Manitoba* – dummy variable representing the province of Manitoba

*Saskatchewan* – dummy variable representing the province of Saskatchewan

*Alberta* – dummy variable representing the province of Alberta

*British Columbia* – dummy variable representing the province of British Columbia

*Number of siblings* – variable representing the number of siblings at home as reported by student

*Single parent family* – dummy variable representing students from single parent families

*Nuclear family* – dummy variable representing students from nuclear families

*Mixed family* – dummy variable representing students from mixed families

*Other family type* – dummy representing students from other family types not covered by the other three categories

*SES* – socio-economic status measured by parental education

*Parent – high school aspirations* – dummy variable representing students whose parents expressed that they would like their children to gain no more than high school education, as reported by parents

*Parent – college* – dummy variable representing students whose parents expressed that they would like their children to gain college level education, as reported by parents

*Parent – university* – dummy variable representing students whose parents expressed that they would like their children to gain university level education or more, as reported by parents

*Boy* – dummy variable representing male students

*Girl* – dummy variable representing female students

*First generation student* – dummy variable representing students who were born in Canada but their parents were born outside of Canada

*Immigrant boy* – dummy variable representing students who were not born in Canada

*Native boy* – dummy variable representing male native born students

*First generation boy* – dummy variable representing male first generation students

*First generation girl* – dummy variable representing female first generation students

*Immigrant boy* – dummy variable representing male immigrant born students

*Immigrant girl* – dummy variable representing female immigrant born students

*1st gen. test language @ home* – dummy variable representing first generation students whose home language is that of the test

*Immigrant test language @ home* – dummy variable representing immigrant born students whose home language is that of the test

*Native other language @ home* – dummy variable representing native born students whose home language is different from the test language

*1st gen. other language @ home* – dummy variable representing first generation students whose home language is different from the test language

*Immigrant other language @ home* – dummy variable representing immigrant born students whose home language is different from the test language

*In Canada less than 5 years* – dummy variable representing immigrant born students with a length of residency in Canada of 5 years or less

*In Canada more than 5 years* – dummy variable representing immigrant born students with a length of residency in Canada of more than 5 years

*Less than five years @ test @ home* – dummy variable representing immigrant born students with residency of 5 years or less whose home language is that of the test

*Less than five years & other @ home* – dummy variable representing immigrant born students with residency of 5 years or less whose home language is different from the test language

*More than 5 years & test @ home* – dummy variable representing immigrant born students with residency of more than 5 years whose home language is that of the test

*More than 5 years & other @ home* – dummy variable representing immigrant born students with residency of more than 5 years whose home language is different from the test language

## *Appendix B*

Data collected under the Programme for International Student Assessment (PISA) used a complex sampling design (stratified, two-stages sampling). A balanced repeated replication methodology (BRR) was employed to estimate the sampling variances of PISA estimates. This resulted in a set of 1,000 BRR weights which were available in the data file and were used throughout this report.

The PISA data set contained plausible values. Plausible values are not test scores, they are random values that are drawn from distribution of scores that could be reasonably assigned to each individual. Plausible values are better suited to describing the performance of the population than a set of scores that are optimal at the individual level. In PISA, each performance outcome was measured by a set of five plausible values. The analyses performed in this report used the plausible values. For more information on PISA sampling methodology refer to the PISA 2000 Technical Report (OECD, 2002a and OECD, 2002b).



# Appendix C

## **Variables used in the multilevel analyses (Section V)**

*Number of siblings* – variable representing the number of siblings at home as reported by student

*Single parent family* – dummy variable representing students from single parent families

*Nuclear family* – dummy variable representing students from nuclear families

*Mixed family* – dummy variable representing students from mixed families

*Other family type* – dummy representing students from other family types not covered by the other three categories

*Boys* – dummy variable representing male students

*School SES* – variable representing mean SES of the school, measured by parental education

*Atlantic* – dummy variable representing provinces of Newfoundland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick

*Quebec* – dummy variable representing the province of Quebec

*Ontario* – dummy variable representing the province of Ontario

*Prairies* – dummy variable representing provinces of Manitoba, Saskatchewan and Alberta

*British Columbia* – dummy variable representing the province of British Columbia



## Appendix D

Mean reading scores		
	Mean score	Std. Error
Native born students	537.5	1.75
First generation students	539.5	3.73
Immigrant born students	515.6	5.33
Native students speaking test language at home	539.3	1.80
Native students speaking other language at home	496.6	6.31
First generation students speaking test language at home	549.1	4.13
First generation students speaking other language at home	522.4	6.51
Immigrant born students speaking test language at home	539.0	7.12
Immigrant born students speaking other language at home	503.5	6.29
Immigrant born students residing in Canada for less than 5 years	489.9	8.17
Immigrant born students residing in Canada for 5 years or more	529.2	5.76
Immigrant born students with short residency speaking test language at home	522.4	16.09
Immigrant born students with short residency speaking other language at home	478.3	9.51
Immigrant born students with long residency speaking test language at home	545.8	8.11
Immigrant born students with long residency speaking other language at home	521.4	6.73
Native born boys	521.0	2.04
Native born girls	554.3	1.91
First generation boys	521.7	5.29
First generation girls	555.2	4.42
Immigrant born boys	499.7	5.75
Immigrant born girls	531.2	6.67





## *Appendix E*

### **PISA reading proficiency levels were defined as follows:**

*Proficiency level 5* (above 625 point)

Capable of evaluating information and building hypothesis, drawing on specialized knowledge, accommodating concepts contrary to expectations.

*Proficiency level 4* (from 553 to 625 points)

Capable of difficult reading tasks, such as locating embedded information, constructing meaning from nuances of language and critically evaluating text.

*Proficiency level 3* (from 481 to 552 points)

Capable of reading tasks of moderate complexity, such as locating multiple pieces of information and relating it to familiar everyday knowledge.

*Proficiency level 2* (from 408 to 480 points)

Capable of basic reading tasks, such as locating straightforward information and using some outside knowledge to understand it.

*Proficiency level 1* (from 335 to 407 points)

Capable of recognizing main themes on a familiar topic as well as making simple connections.

*Proficiency below level 1* (less than 335 points)

Capable of reading, but have not acquired necessary skills to use reading for learning.

Source: OECD, 2001