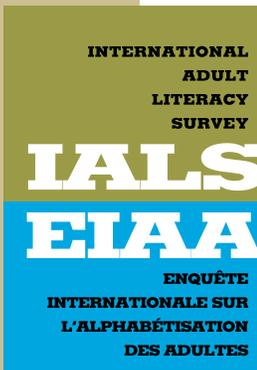


Inequalities in Literacy Skills Among Youth in Canada and the United States

J. Douglas Willms



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International Adult Literacy Survey

Inequalities in Literacy Skills Among Youth in Canada and the United States

J. Douglas Willms

Atlantic Centre for Policy Research, University of New Brunswick

The International Adult Literacy Survey (IALS) was a seven-country initiative conducted in the fall of 1994. The Canadian component of the IALS study was primarily funded by the Applied Research Branch and the National Literacy Secretariat of Human Resources Development Canada.

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Introduction

The recent report *Literacy Skills for the Knowledge Society* published by Human Resources Development Canada (HRDC), the Organisation for Economic Co-operation and Development (OECD) and Statistics Canada (1997) suggests that youth in North America do not fare as well in their literacy skills as their European counterparts. The findings were based on data from the International Adult Literacy Survey (IALS) which was conducted in seven countries in 1994, and later extended to include 24 countries. Detailed analyses of the IALS data for Canada revealed that the literacy skills of youth in Quebec and the Prairie provinces were somewhat higher than those of youth in the other six provinces (Willms, Statistics Canada and HRDC 1997). An important aspect of the findings was that inequalities along social-class lines were less pronounced in the provinces with higher levels of literacy skills; that is, youth from higher socio-economic backgrounds tended to perform well on the IALS tests in every province, whereas youth from disadvantaged backgrounds varied considerably in their skills across provinces.

This study examines whether this general finding also applies to states within the United States, not only with respect to the socio-economic background of American youth, but also with respect to their ethnicity. The study also estimates the variation in levels of literacy skills among states and provinces before and after taking into account gender, ethnicity and immigration status, and determines whether some of this variation is attributable to the geographical location of the state or province, or the extent to which youth are regularly engaged in literacy activities.

This monograph begins with a brief outline of the background and theoretical framework of the study. The next chapter briefly describes the data and methods used in this study and is followed by a results chapter that has five parts, one for each of five research questions. The findings are then discussed in the context of relevant literature. The study concludes with a summary of the research and a discussion of its policy implications.

Chapter 1

Background and theoretical framework

The literacy level of a society is a key economic and social indicator. It embodies the skills and cumulative learning—the “human capital”—essential to economic growth (Becker 1964; Romer 1993; Schultz 1963). It is related to higher earnings and tax revenue, reduced crime rates, less unemployment and dependence on social welfare, and lower health care costs (HRDC, OECD and Statistics Canada 1997). The term “literacy” means more than the ability to read and write—it refers to a person’s ability to “us[e] printed and written information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential” (OECD and Statistics Canada 1995). Therefore, literacy also embraces concepts of “cultural capital” which pertains to certain values, forms of communication, and organizational patterns (Bourdieu 1977), as well as the “social capital” associated with the use of language in social relations (Coleman 1988). Literacy is an instrument of economic and social power.

The distribution of literacy skills in a society along social-class lines, and among ethnic groups and between the sexes, is therefore associated with economic and social inequalities. Studies of occupational attainment in the United States have shown that not only are disparities in income and employment attributable to structural inequalities and prejudice in the workplace, they are also determined by the amount of schooling and the levels of literacy attained by low- and high-status groups (Carnoy 1995; Raudenbush, Kasim, Eamsukkawat, Liu, and Miyazaki 1996). People with low levels of literacy are restricted in their access to certain labour markets, while those with high levels of literacy are more likely to attain high-paying jobs and be rewarded for their skills. Moreover, the industries that have been expanding over the past decade have higher literacy-skill requirements than declining industries (OECD and Statistics Canada 1995). Employment projections for the next two decades predict a weaker demand for low-skilled workers, and an increased demand for moderately skilled technical and administrative workers as well as highly skilled professionals (OECD 1995). Reducing inequalities in literacy skills is therefore of paramount importance to initiatives aimed at achieving greater equality of income and opportunity. Also, because literacy is so fundamental to social relations and participation in a modern society, reducing inequalities is likely to increase tolerance and foster social cohesion.

The theoretical framework sociologists use to examine inequalities presumes that academic attainment, and ultimately occupational attainment, are largely determined by family origins and educational experiences (see, for example, Bielby 1981; Sewell, Hauser and Featherman 1976; Kerckhoff 1996). Family origins are assumed to have a direct effect on attainment through a wide variety of mechanisms that begin at birth or even prenatally, and an indirect effect on attainment through education. For example, children from more advantaged backgrounds are more likely to have better access to quality education and to greater financial and cultural capital to support educational activities during the elementary and secondary school years. Children with these

resources are then more likely to have the high school grades and financial resources needed to pursue further education. These experiences contribute cumulatively to their level of literacy. Literacy is also considered to be affected by people's experiences at work, and by other experiences related to their economic, cultural, and social capital. These relationships are complicated, however, because levels of literacy affect the type of job and income an individual acquires, and these in turn affect levels of literacy (Rivera-Batiz 1992; Raudenbush and Kasim 1998).

This study examines literacy skill levels and inequalities in literacy skills among youth aged 16 to 25. Indicators of the literacy attainment of youth are especially important because they serve as markers of how the investment of material, social, and cultural resources made by the previous generation have been converted into economic, cultural and social capital. They act both as *post*-measures of the success of our schooling systems in developing literacy skills and reducing inequalities in literacy attainment, and *pre*-measures of the future success and well-being of our youth (Willms, Statistics Canada and HRDC 1997).

This study uses data that describe large, nationally representative samples of youth in Canada and the United States to examine five questions:

1. How do literacy levels and inequalities in literacy skills by social class in Canada and the United States compare with other OECD countries? To address this question, the analysis estimates the “gradients” that describe the relationship between literacy scores and parental education for each country. Although parental education does not capture all of the relevant parental background factors that affect youth literacy attainment, socio-economic status serves as a proxy to demonstrate many of the important relationships.
2. How large are the inequalities in literacy attainment among groups in Canada and the United States? Inequalities are assessed with respect to differences among social classes, between males and females, between immigrants and non-immigrants, and among ethnic groups. The analysis also examines the effect of being tested in a language other than the language spoken since birth, and the “learning curve” associated with the number of years speaking the language of the test.
3. To what extent do these indicators vary among jurisdictions—that is, among provinces and states—within Canada and the United States? Is the observed variation of statistical and substantive importance? Does the extent of inequalities associated with parental background, sex, or ethnicity vary among states and provinces? If both levels of literacy and inequalities in literacy attainment vary among states and provinces, is there a relationship between the two? If this relationship is negative, it would indicate that the states and provinces that have relatively high average levels of literacy are those that have been successful in reducing inequalities among advantaged and disadvantaged groups.
4. If the indicators do vary among states and provinces, is some of this variation attributable to *location*—that is, is there a north–south or east–west gradient in literacy skills that is not attributable to individuals' family background, ethnicity, or immigrant status? Generally, when inter-state or inter-provincial differences in literacy skills are evident, we quickly infer that they are attributable to differences in the ethnic and socio-economic background of the populations studied, or the quality of school provision. But there may be more pervasive cultural factors that transcend ethnicity and socio-economic status, such that there is a “culture of literacy” that is historically and socially embedded in the day-to-day practices of families and organizations. There is, of course, no logical reason to presume that the state and province is the correct level of analysis; it is plausible that literacy cultures vary among cities, townships, and neighbourhoods within these jurisdictions, and among communities that are not geographically bounded, such as those formed through religious affiliation or membership in particular organizations. Nevertheless,

if there are broader cultural effects, we would expect to observe a relationship between the literacy levels of a state or province, and that of its neighbouring jurisdictions. We would also expect there to be differences in levels of engagement in literacy activities that could explain some of the geographical variation. This analysis provides only the basis for a more thorough investigation of literacy cultures stemming from wider historical and social features of the communities in which people live and work.

5. Finally, if there is significant interjurisdiction variation in literacy skills, can it be partially explained by the extent to which youth are engaged in literacy practices at home—such as reading newspapers and books, and writing letters—rather than watching television? To some extent, these practices reflect the culture of literacy in these jurisdictions.

Chapter 2

Data and methods

The data for this study are derived from the U.S. National Adult Literacy Survey (NALS)¹ and the International Adult Literacy Survey (IALS). These studies, which were conducted in 1989 and 1994, respectively, aimed to determine the level and distribution of literacy skills among the adult population and to investigate and compare factors relevant to the development of literacy skills. In 1995, the OECD and Statistics Canada published their first international report, *Economy, Literacy and Society*, which included data for seven countries. Their second international report, *Literacy Skills for the Knowledge Society* (HRDC, OECD and Statistics Canada 1997), was based on data for 12 countries.

These studies entailed intensive tests and interviews of a representative sample of adults in each country. The items for the literacy tests of the NALS and IALS were linked at the item level, so that test scores for both studies are on the same metric. The literacy tests covered three domains of literacy—prose, document, and quantitative. Prose literacy required participants to read, understand, and use information from written texts such as stories and editorials. Document literacy required participants to locate and use information from texts such as job applications, transportation schedules, and maps. Quantitative literacy required the ability to find, understand, and use mathematical operations embedded in texts—weather charts found in the newspaper, for instance, or loans and interest calculation charts. The interview schedules used in the two studies included a number of questions about the respondents’ early linguistic experiences, experiences in the labour force, participation in adult education, and personal and family backgrounds (National Center for Education Statistics 1998).

Each participant’s test achievement was expressed as a scaled score for each of the three domains. These scaled scores were grouped into five literacy levels ranging from simple tasks at Level 1 to complex literacy tasks at Level 5. The analyses used the scaled scores, rather than the categorical “levels.” However, the scaled scores were expressed as standardized scores, such that they had a mean of 0 and a standard deviation of 1 for the full international population of youth. This enables differences among groups or jurisdictions to be expressed as “effect sizes”—that is, as fractions of a standard deviation. In discussing the findings, a “years-of-schooling metric” is also used to lend meaning to the magnitude of observed differences. For the full international youth cohort, an effect size of 0.15 of a standard deviation is roughly equivalent to one additional year of schooling. This was determined by regressing the standardized literacy scores on the “years of education” reported by the respondent, and by examining the relationship between respondents’ standardized literacy scores and their level of education (for example, completed secondary school, some college or university, university graduate).²

The model used to address the first question—how literacy levels and inequalities in literacy skills by social class in Canada and the United States compare with other OECD countries—is a simple linear regression of literacy scores on the level of parents' education. Although a simple analysis, the results reveal dramatic differences among countries in their literacy-skill levels and in the extent of inequalities along social-class lines. The simple linear regression model is extended in the second analysis to estimate separately, for Canada and the United States, the effects on literacy of sex, parents' education, immigrant status, and whether the respondent spoke the language of the test since birth (English for the United States, and either English or French for Canada). The models for the United States also include variables denoting ethnicity.

The models pertaining to differences among states and provinces are necessarily more complex. They are hierarchical linear models (HLM) that depict the relationships between literacy scores and demographic characteristics (sex, parents' education, immigrant status, and ethnicity) *within* and *between* each province and state. An HLM assumes that the scores of individuals within groups (in this case, provinces and states) are correlated. For example, we would expect that two youths who had received their secondary education within the same state would have test scores that were relatively more similar than two youths who received their education in different states. An HLM can be used to provide estimates of levels of literacy scores and of inequalities among high- and low-status groups, for each state and province, and to discern whether variation in these estimates are statistically significant (see Raudenbush and Willms 1995; Willms and Kerckhoff 1995).

The hierarchical analysis also allows one to make comparisons among states and provinces of their *adjusted* levels of literacy scores. In this study, for example, the analysis examines how well youth with particular characteristics (for example, parents with a Grade 12 education, non-minority, non-immigrant) fared on the literacy tests in each state and province. An important feature of this statistical technique is that the estimates take into account the sample size for each state and province, and make appropriate adjustments for measurement and sampling error. After examining differences among jurisdictions, the hierarchical models are extended to include measures of engagement in literacy activities at home, and the location of the province. The HLM provides a means to estimate the effects of group-level variables—in this case, the two variables describing the location of the state or province—on both levels of literacy skills and inequalities in literacy skills. It also provides accurate estimates of the relationship between levels of skills and inequalities.

Chapter 3

Results

I. International comparisons

Figure A shows the relationship between literacy scores and parents' education for youth aged 16 to 25 in seven OECD countries, based on data from the IALS. The literacy scores for the prose, document, and quantitative tests have been presented separately. The scores for each test were standardized on the full IALS/NALS sample of youth aged 16 to 25 (see endnote 1). Parents' education is the average of the number of years of education completed by the mother and father of the respondents. The lines for each country are drawn such that approximately 90% of a country's respondents had average parental education within the range covered by the line.

Two findings revealed by the analysis are particularly striking. First, countries vary substantially in their literacy scores, even after parents' levels of education are taken into account. Canadian youth attained literacy scores on the prose and document tests that were comparable to the scores of youth in Germany and Switzerland, but considerably lower than those of Netherlands and Sweden. On the quantitative test Canadian youth scored lower than youth in four of the European countries. Youth in the United States, whose parents had on average completed 12 years of education, on average scored only slightly higher than comparable youth in Poland, and about 30% to 40% of a standard deviation lower than comparable Canadian youth. This is particularly worrisome with respect to economic development, because many of the jobs in the high-technology sector require an understanding of sophisticated mathematical models, computerized data analyses, and elaborate accounting systems (National Council of Teachers of Mathematics, Commission on Teaching Standards for School Mathematics 1991).

Youth in Canada and the United States do not fare well in their quantitative skills compared with their European counterparts. A typical Canadian youth, whose parents had completed secondary school, scored about two years of schooling below that of European youth whose parents had a similar level of education. The skill deficit is even greater for youth in the U.S.; the gap is equivalent to about three to four years of formal schooling.

The findings show that in every country there are inequalities in the literacy skills of youth associated with the educational background of their parents. Moreover, these inequalities are considerably greater in some countries than in others. The large differences among countries, particularly for youth from less advantaged backgrounds, suggest that there are important differences in the quality of schooling afforded youth in each country. The differences are probably also attributable to other factors, such as the extent to which youth are engaged in literacy activities in their daily life.

The second striking feature of these findings is that countries with high scores tend to have shallow gradients. The correlations between levels and gradients in these analyses were -0.82 for prose literacy, -0.76 for document literacy, and -0.74 for quantitative literacy. In Sweden, for example, youth whose parents had completed only Grade 8, scored on average about 40% of a standard deviation above the international average on the prose test. However, in the United States and Poland, the two countries with the steepest gradients, youth with similar family backgrounds scored 70% of a standard deviation below the international mean. In contrast, the variation among countries in their literacy skills is relatively small for youth whose parents were both highly educated (that is, parents who had completed 16 years of formal education or more).

Shallow gradients indicate that literacy skills are more equitably distributed among youth with differing family backgrounds, whereas steep gradients indicate less equitable distributions. The countries with the highest levels of attainment are those with shallow gradients. The findings provide dramatic evidence that the success of the European countries in literacy is largely attributable to their ability to achieve high literacy scores for their least advantaged youth.

II. Inequalities in literacy skills in Canada and the United States

Table 3.1 provides comparisons in the literacy attainment of Canadian and United States youth. The first line displays the mean scores for each country. The remainder of the table presents regression analyses that estimate the extent of inequalities along social-class lines, between males and females, between immigrants and non-immigrants, and among ethnic groups. Model A includes a dummy variable denoting sex (coded -0.5 for males, 0.5 for females), a continuous variable denoting parents' education (the same variable used to compute the international gradients, centred on 12 years of education), and a set of three dummy variables denoting immigrant status, with "non-immigrant" as the reference category. With this scaling, the "adjusted mean" intercepts are the expected scores for a youth (the average for a male and female) whose parents had 12 years of education, and who was a non-immigrant.

Model B includes the same set of variables, except that the immigrant status variables are replaced with a dummy variable denoting whether the youth had spoken the language of the test since birth, and three continuous variables denoting the number of years that the youth had spoken the language of the test, including the linear, quadratic, and cubic components. Problems associated with multicollinearity prevented the estimation of a model that included both immigrant status and years speaking a language other than the language of the test.

Table 3.1 Effects of demographic characteristics on youth literacy scores in Canada and the United States

	Canada			United States		
	Prose	Document	Quantitative	Prose	Document	Quantitative
Unadjusted mean	0.149	0.235	0.103	-0.006	-0.036	-0.052
Model A (R-squared)	(0.325)	(0.273)	(0.239)	(0.285)	(0.271)	(0.233)
Adjusted mean	0.384	0.471	0.288	0.005	-0.027	-0.046
Female	0.158	-0.040	-0.172	0.151	0.096	0.015
Parents' education	0.116	0.147	0.122	0.138	0.129	0.124
Immigrant - Less than 5 years	-1.937	-1.768	-1.220	-1.118	-1.055	-1.055
- 5 to 9 years	-1.052	-1.079	-0.871	-0.878	-0.747	-0.660
- 10 or more years	-0.023	0.018	-0.036	-0.041	-0.099	-0.038
Model B (R-squared)	(0.348)	(0.463)	(0.288)	(0.331)	(0.315)	(0.278)
Adjusted mean	0.357	0.443	0.276	0.044	0.006	-0.005
Female	0.159	-0.043	-0.156	0.131	0.077	-0.005
Parents' education	0.102	0.136	0.108	0.113	0.107	0.101
Speaks other language	-2.278	-3.373	-2.481	-2.489	-2.392	-2.436
Years speaking other language	0.304	0.592	0.531	0.398	0.440	0.458
Years - squared	-4.830	-36.051	-40.691	-23.608	-29.527	-31.515
Years - cubed	-176.935	809.832	1037.041	483.546	662.603	720.456
Model C (R-squared)				(0.374)	(0.368)	(0.348)
Adjusted mean				0.159	0.131	0.142
Female				0.158	0.105	0.029
Parents' education				0.104	0.097	0.088
Speaks other language				-2.440	-2.302	-2.324
Years speaking other language				0.393	0.435	0.442
Years - squared				-22.971	-28.967	-29.916
Years - cubed				460.226	640.982	671.365
Ethnicity - African-American				-0.646	-0.682	-0.803
- Hispanic				-0.218	-0.275	-0.332
- Asian or Pacific Islander				-0.060	-0.112	0.0003*

* All coefficients were statistically significant ($p < 0.001$) except Asian/Pacific Islander for quantitative literacy.

Model C extends Model B for the United States only, to include variables denoting ethnicity. These were coded with three dummy variables: African-American (coded 1 for African-Americans; 0 otherwise), Hispanic (coded 1 for Hispanics; 0 otherwise), and Asian or Pacific Islander (coded 1 for Asians and Pacific Islanders; 0 otherwise). With this coding the reference group is non-minority youth; to facilitate discussion, this group is referred to as white.

Mean levels adjusted for demographic characteristics. The adjusted means for Canada were about 19% to 24% of a standard deviation higher than the unadjusted means. Thus, non-immigrants, whose parents had completed Grade 12, scored somewhat higher on average than the average Canadian youth. For the United States, however, the adjustment for parents' education and immigrant status had little effect on the average scores: the adjusted scores were only about 1% of a standard deviation higher than the unadjusted scores. The effects of statistical adjustment were similar in the second model, where the adjusted mean indicates the average score for a youth who had been speaking the language of the test since birth, and whose parents had completed Grade 12.

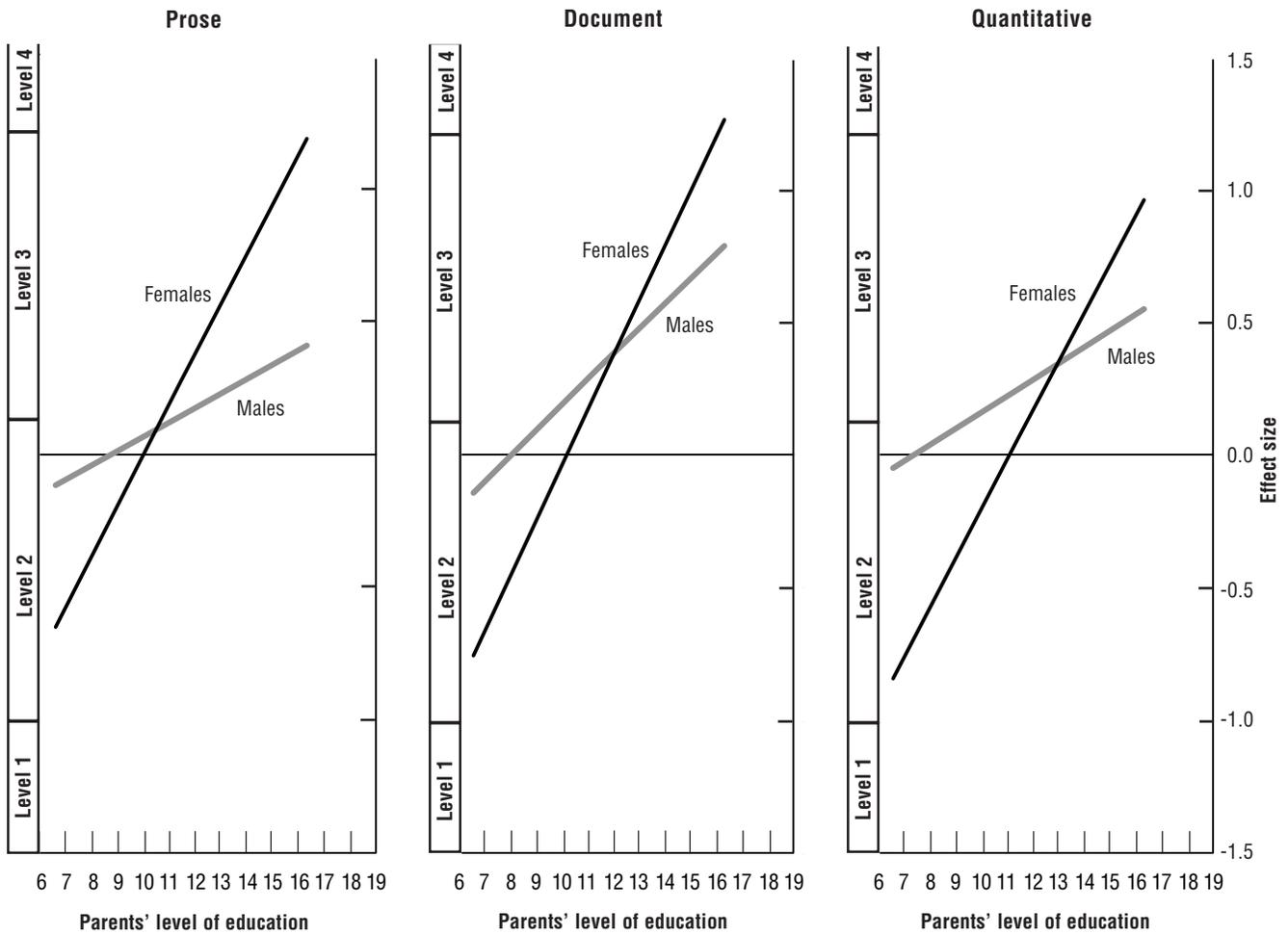
On average, Canadian youth scored the equivalent of about one year of schooling higher than American youth. However, the two countries differ in the levels of education attained by the youth's parents and in the percentage of immigrants. When these factors are taken into account, the gap is equivalent to about two years of schooling.

In the United States, female youth had higher scores on the prose and document literacy tests than males, but similar scores on the quantitative test. In Canada, the differences between female and male youth depended on the educational background of their parents. For youth whose parents were highly educated, females outperformed males on all three tests, whereas there was a male advantage for youth whose parents had less than a high school education. Overall, females scored about one year of schooling higher than males on the prose test, and one year of schooling lower on the quantitative test. Results from earlier research indicate that the pattern of inequalities between the sexes also varies across the Canadian provinces (Willms 1997). It is likely that these complex interactions are attributable to differences in course-taking patterns and in the number of years of formal schooling attained by males and females in each province.

Sex differences. In the United States, females outperformed males by about 15% of a standard deviation on the prose test, and by about 10% of a standard deviation on the document test. Their scores on the quantitative test were similar to that of males. The differences in test scores between the sexes in Canada vary, depending on the level of parental education. Among youth whose parents had completed high school, females scored considerably higher than males, but the reverse was the case for youth whose parents had not completed high school. These sex-by-parental education interactions are displayed in Figure 3.1. Model 3 estimates the sex effect for youth whose parents had completed 12 years of schooling on average. For such youth, the female advantage on the prose test was 16% of a standard deviation, similar to that of the United States. On the document test however, females lagged slightly behind males, and on the quantitative test they were about 17% of a standard deviation lower.

Despite these differences in the gender gap for the two countries, Canadian females outperformed females in the United States by nearly one-quarter of a standard deviation $[(.228 + 0.5*-.172) - (-.046 + 0.5*.015)]$. Canadian males outperformed their United States peers by over 40% of a standard deviation.

Figure 3.1 Literacy scores for Canadian youth aged 16 to 25 by sex



Parents' education. The gradient associated with the level of parents' education was somewhat shallower for the prose test in Canada than in the United States (0.116 compared to 0.138), while the Canadian gradient was steeper than the United States gradient for the document test (0.147 compared to 0.129). The gradient for the two countries was similar for the quantitative test.

Although Canadian youth scored higher than American youth on all three tests, the inequalities associated with family background are about the same in the two countries. For both countries, these inequalities are considerably greater than in Sweden or the Netherlands.

Immigrant status. Immigrants scored considerably lower on these tests than their non-immigrant peers. The results follow a pattern one would expect: the effect of being an immigrant declines as the number of years in the country increases. For those youth who had been in the country longer than 10 years, the differences were minimal—on average only about 1% of a standard deviation in Canada, and about 6% of a standard deviation in the United States. The effect of being an immigrant is somewhat greater in Canada than in the United States, but this comparison is not too meaningful, given the markedly different immigration patterns.

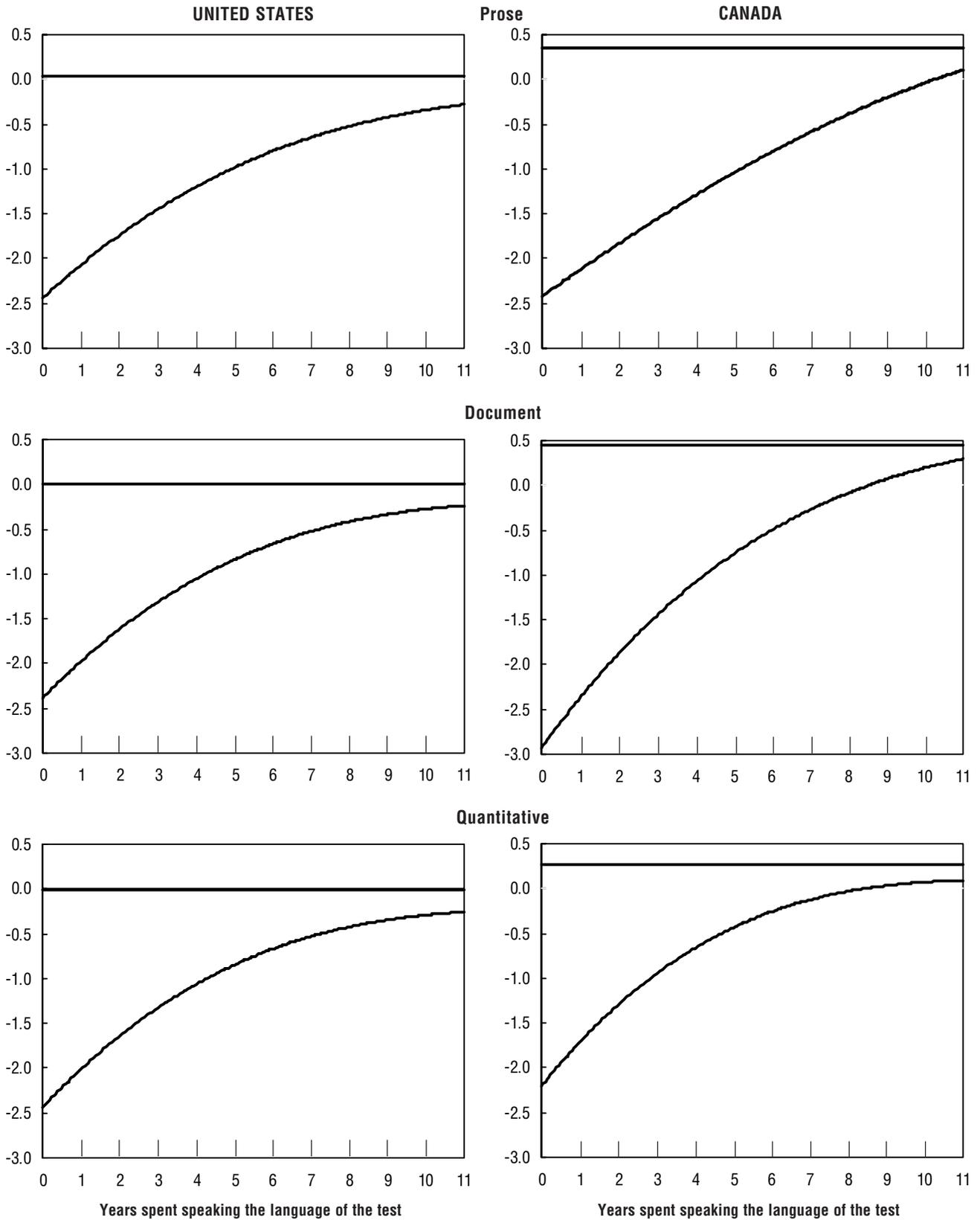
Years speaking the language of the test. The second model provides estimates of the effects on literacy skills of how long a youth had been speaking the language of the test. Because the relationships are non-linear, the estimates are difficult to interpret directly from the table; thus, they are shown graphically in Figure 3.2. The pattern is similar for Canada and the United States across all three tests, which is quite remarkable given the differences between the two countries in the origins and demographic make-up of their immigrant populations. The “learning curve” rises fairly linearly for the first six or seven years, and then begins to level off. After 10 years, the gap is still about 20% to 40% of a standard deviation between native speakers and those who spoke some other language as their first language.

The literacy-skill deficit of immigrants in their non-native language diminishes fairly quickly during the first five years they are in the country. After ten years, the gap is equivalent to about two years of formal schooling. This pattern is evident in both Canada and the United States, and is consistent across the three domains of literacy skills.

Ethnicity. The third model extends the second model, for the United States only, to include the set of dummy variables denoting ethnicity. African-Americans scored about 65% to 80% of a standard deviation lower than whites on the three tests. This gap is somewhat larger than what is typically observed in achievement tests in reading and mathematics at the middle or secondary school level. In the recent U.S. National Educational Longitudinal Survey (NELS), for example, the estimated gap at the end of Grade 8 was about 0.44 in reading, and 0.38 in mathematics (see Sui-Chu and Willms 1995).

The gap for Hispanics ranged from 22% to 33% of a standard deviation on the three tests of literacy skills used in this study. This is similar to estimates based on the NELS, but somewhat lower than those observed by Rumberger and Willms (1992) for Grade 12 students in California. However, the model in this study includes adjustment for the length of time the respondents had spoken the language of the test, and 27.7% of the Hispanics in the sample were immigrants who had been in the United States for less than 10 years. When the set of language variables is removed from the model, the Hispanic–white gap is considerably larger, ranging from 63% to 70% of a standard deviation. (Results for this reduced model are not displayed in the table.) These findings suggest, then, that about one-half to two-thirds of the Hispanic–white achievement gap is attributable to the length of time Hispanics have spoken English.

Figure 3.2 Effect of years spent speaking the language of the test



Asians and Pacific Islanders scored slightly lower than whites on the prose and document tests, but had comparable scores on the quantitative test. Forty percent of the Asians and Pacific Islanders in the study had been in the United States for less than 10 years. The estimated gap in literacy skills for Asians and Pacific Islanders when the variables denoting experience with English were removed from the model ranged from 22% to 33% of a standard deviation.

The findings reveal that for youth in the United States there are large disparities in literacy skills among ethnic groups. The differences appear to be even greater than those derived from studies of Grade 10 or Grade 12 students. This suggests that inequalities associated with the *quality* of schooling available to minority youth may be exacerbated by the *amount* of schooling they undertake.

III. Variation among provinces and states

Unadjusted results (Model I). The analysis presented in Table 3.2 is based on an hierarchical analysis of the IALS and NALS data, with youth nested within states and provinces. The first model, presented in the first column for each test, simply partitions the test scores into within- and between-jurisdiction components. This analysis yields estimates of the “unadjusted” average results for each state and province. In estimating these average results, the analysis differentially “shrinks” each jurisdiction’s mean score toward the grand mean, according to how reliably it was estimated. The table displays these estimates for each province, and for those states that had oversampled their population in the NALS. The other states were included in the analysis, but are not displayed in the table. The analysis also provides an unbiased estimate of the extent of variation among states and provinces. (For details on the Bayesian theory associated with “shrinkage,” see Bryk and Raudenbush 1992.)

Table 3.2 Hierarchical linear models of within-jurisdiction demographic effects and inter-jurisdiction variation

	Prose		Document		Quantitative	
	Model I (unadjusted)	Model II (adjusted)	Model I (unadjusted)	Model II (adjusted)	Model I (unadjusted)	Model II (adjusted)
Average within-jurisdiction coefficients						
Mean	0.065	0.171	0.052	0.169	0.017	0.144
Female		0.167		0.095		0.011
Parents' education		0.116		0.112		0.102
Immigrant - Less than 5 years		-1.110		-1.046		-0.962
- 5 to 9 years		-0.795		-0.722		-0.568
- 10 or more years		(0.025)		(-0.011)		0.038
Black		-0.623		-0.670		-0.781
Hispanic		-0.454		-0.459		-0.527
Asian or Pacific Islander		(0.032)		(0.006)		0.072
Variance components						
Between jurisdictions						
Means	0.073	0.034	0.080	0.042	0.082	0.035
Female		(0.002)		0.028		0.017
Parents' education		0.002		0.003		0.003
Within jurisdictions	1.000	0.674	0.939	0.638	0.971	0.677
Jurisdiction residuals						
California	-0.270	0.030	-0.310	-0.030	-0.290	-0.010
Illinois	-0.080	-0.020	-0.080	-0.010	-0.050	0.020
Indiana	0.130	0.030	0.110	-0.010	0.110	0.010
Iowa	0.230	0.090	0.220	0.080	0.260	0.110
Louisiana	-0.130	-0.070	-0.150	-0.070	-0.180	-0.080
New Jersey	-0.110	-0.060	-0.080	-0.030	-0.100	-0.020
New York	-0.250	-0.040	-0.200	0.000	-0.200	0.000
Ohio	0.170	0.080	0.120	0.040	0.160	0.060
Pennsylvania	0.100	0.010	0.110	0.010	0.160	0.060
Texas	-0.260	-0.030	-0.290	-0.060	-0.300	-0.060
Washington	0.180	0.040	0.170	0.020	0.120	-0.030
Newfoundland	0.020	0.050	-0.040	0.010	-0.050	-0.010
Prince Edward Island	-0.020	0.000	-0.030	0.000	-0.040	-0.010
Nova Scotia	0.100	0.070	0.150	0.120	0.060	0.020
New Brunswick	-0.020	0.020	-0.040	-0.030	-0.020	-0.010
Quebec	0.090	0.070	0.140	0.120	0.110	0.070
Ontario	-0.030	0.050	0.130	0.190	0.000	0.030
Manitoba	0.310	0.270	0.410	0.390	0.310	0.240
Saskatchewan	0.240	0.190	0.260	0.220	0.210	0.150
Alberta	0.240	0.220	0.320	0.290	0.250	0.200
British Columbia	0.200	0.210	0.270	0.270	0.140	0.100

Note: Estimates in parentheses were not statistically significant at the 0.01 level.

The estimates of the between-jurisdiction variance components are 0.073 for prose, 0.080 for document, and 0.082 for quantitative literacy. The hierarchical analysis provides a chi-square test of whether one can reject the null hypothesis that a variance component is equal to 0, and in each case these were rejected. Thus, for the prose test, the model indicates that 6.8% [$0.073 / (1.000 + 0.073)$] of the total variance in test scores was between jurisdictions, and 93.2% was between youth within jurisdictions. The variation between jurisdictions is statistically significant; that is, the variation is not simply attributable to sampling or measurement error. Similarly, 7.9% of the variation in the document scores was between jurisdictions, and 7.8% of the quantitative test scores was between jurisdictions.

The estimates of unadjusted means are provided in the bottom portion of the table. The average levels of prose test scores, for example, were lowest in California, New York, and Texas, where the average youth scored approximately one-quarter of a standard deviation below the mean. Youth in Iowa, Manitoba, Saskatchewan, and Alberta scored about one-quarter of a standard deviation above the mean on this test.

The level of literacy skills attained by youth varies considerably among the states and provinces. The difference between the three best and three worst performing jurisdictions is equivalent to about three years of schooling.

Results adjusted for demographic characteristics (Model II). The second model provides estimates of the adjusted results, controlling for sex, parental education, immigrant status and ethnicity. The top portion of the table displays the average within-jurisdiction results. The estimates of the overall adjusted mean (top line) are the estimated scores of a youth (the average of a male and female) who was non-minority, was not an immigrant, and whose parents had completed 12 years of schooling. Such youth, on average, scored about 15% of a standard deviation above the average for all youth. The coefficients reported for the demographic characteristics indicate the gradients associated with parental education, and the achievement gaps associated with immigrant status and ethnicity. These are interpreted in the same manner as described in Section I above.

The hierarchical analysis also tests whether the jurisdictions vary in their average scores, after taking account of these demographic characteristics. For the prose test, the variance among jurisdictions was reduced from 0.073 (Model I) to 0.034. Thus, over one-half of the variation among jurisdictions in average prose literacy scores was attributable to the demographic characteristics of their populations. The variation remaining after adjustment is statistically significant, however, and represents important variation among jurisdictions in substantive terms. The bottom portion of the table displays the estimates of the adjusted means for each jurisdiction. The estimate for California—0.03—indicates that our hypothetical youth (non-immigrant, non-minority, average parents' education) scored about 3% of a standard deviation above the overall average (0.171) for such youth.

The hierarchical model also examines whether the jurisdictions varied significantly in their sex differences, or in their gradients for parental education. The variance in sex differences was relatively small for the prose test (0.002) and was not statistically significant at the 0.01 level. However, there were statistically significant differences among jurisdictions in how well male and female youth fared on the other two tests. On the document test males scored about 10% of a standard deviation higher than females. In some jurisdictions there were small but significant differences favouring females, whereas in other jurisdictions, males performed considerably better than females. These differences among jurisdictions were statistically significant, and not attributable to sampling or measurement error.

The jurisdictions also varied significantly in their gradients. On the prose test, for example, the average gradient associated with parental education was 0.116, but some jurisdictions had gradients that were either steeper or shallower than 0.116. Figure B displays the gradients for the 11 states with sufficient data and for the 10 provinces for the quantitative literacy test scores. As with the international gradients, the results here indicate that youth from advantaged backgrounds fare about the same across all states and provinces; it is the scores of less advantaged youth that vary considerably among jurisdictions and have the biggest effect on the overall scores for the jurisdiction.

About one-half of the variation among states and provinces in their literacy scores is attributable to demographic characteristics. However, even after demographic characteristics are taken into account, there are significant differences among jurisdictions in their average levels of literacy and in their socio-economic gradients.

The relationship between levels of performance and inequality. The convergence of the gradient lines in Figure B at higher levels of parental education indicates that there is a negative correlation between levels of performance and gradients. The hierarchical analysis provides unbiased estimates of the correlations between levels and gradients. The correlations between levels and gradients from Model II were negative for all three tests: -0.285 for prose, -0.095 for document, and -0.364 for quantitative. Thus, states and provinces with high levels of performance tended to have shallow gradients. The model also provides estimates of the correlations between adjusted levels of performance and the gender gap. These were also negative for all three tests: -0.166 for prose, -0.566 for document, and -0.202 for quantitative. This implies that jurisdictions with high levels of performance also had relatively small gender differences.

Table 3.3 Jurisdiction-level correlations between random components for 27 U.S. states

	Level	Gradient	AA/W	H/W	M/F
Prose					
Adjusted level of literacy (level)	1.000				
Parental education (gradient)	-0.290	1.000			
African-American/white gap (AA/W)	-0.928	0.414	1.000		
Hispanic/white gap (H/W)	-0.628	0.365	0.734	1.000	
Document					
Adjusted level of literacy (level)	1.000				
Parental education (gradient)	-0.332	1.000			
African-American/white gap (AA/W)	-0.690	0.432	1.000		
Hispanic/White gap (H/W)	-0.368	0.843	0.270	1.000	
Gender gap (M/F)	-0.362	-0.039	-0.294	0.423	1.000
Quantitative					
Adjusted level of literacy (level)	1.000				
Parental education (gradient)	-0.366	1.000			
African-American/white gap (AA/W)	-0.671	0.350	1.000		
Hispanic/white gap (H/W)	-0.221	0.539	0.513	1.000	

In fitting the data to Model II, the effects associated with immigrant status and ethnicity were constrained to be similar across jurisdictions because too few immigrant and minority youth were sampled in most of the jurisdictions to achieve reliable estimates.³ The analysis was repeated with these constraints removed for the ethnicity variables. It provided estimates for the 27 states with sufficient data, and indicated that there was significant variation among states in their attainment gaps between African-Americans and whites, and between Hispanics and whites, but not between Asians and whites. Variation among these states in their gender gap was significant only for the document test. The correlations between these random effects are presented in Table 3.3.

The correlations in the first column of Table 3.3 are all negative, indicating that levels of performance are not only correlated negatively with gradients, but also with inequalities associated with ethnicity (and in the case of document literacy, also with gender inequalities). This is a very important finding: it means that the states that have been successful in achieving high average levels of literacy are generally those that have reduced inequalities between African-Americans and whites, and between Hispanics and whites. Another way of viewing this finding is that the performance of white youth with high levels of parental education does not vary much among the

states. The performance of minority youth, especially those whose parents were less educated, varies considerably, depending on the state in which they resided.

States and provinces with shallow socio-economic gradients tend to have high average literacy skills. Youth from relatively advantaged backgrounds tend to attain high levels of literacy skills in all jurisdictions, but youth from less advantaged backgrounds do well in some jurisdictions but not in others. Similarly, within the United States, the literacy skills of Hispanic and African-American youth vary substantially among states. Together these findings provide compelling evidence that the states and provinces with high levels of literacy skills are those that have been able to raise the skill levels of minority youth and youth from less advantaged backgrounds.

IV. Geographical effects

The second model was extended by including the geographical co-ordinates (latitude and longitude) of the geographical centre of each jurisdiction. The results are displayed in the columns headed Model III in Table 3.4. The effects of longitude were not significant for any of the three tests. If the model is re-estimated without this variable, the other coefficients do not change appreciably. There were, however, fairly strong effects associated with latitude, which were statistically significant ($p < 0.01$) for the prose and document literacy tests, but not for the quantitative test ($p = 0.051$). The estimated effects are positive, indicating that levels of performance tend to be higher for jurisdictions that are further north. The magnitude of the effect, on average, across the three tests, is about .012. The difference in latitude between the most southerly states and the Canadian border is about 20 degrees, suggesting that a white youth in the south, with average background characteristics, scored on average about one-quarter of a standard deviation lower than a comparable youth in the north. This is a large effect, since it is found even when parental education, sex, immigrant status, and ethnicity are held constant.

The observed effect of latitude is partially attributable to the superior performance of Canadian youth. If a dummy variable denoting country (i.e., United States=0; Canada=1) is added to Model III, the latitude effect is reduced by 52% to 58% across the three tests, and is not statistically significant. Canadian youth, on average, scored about 20% of a standard deviation higher than their United States counterparts on the prose and document tests, even after ethnicity, immigrant status, parental education and latitude are taken into account. On the quantitative test, Canadian youth scored only about 10% of a standard deviation higher than their counterparts south of the border.

Table 3.4 Hierarchical linear models of the effects of location and engagement in literacy activities

	Prose		Document		Quantitative	
	Model III	Model IV	Model III	Model IV	Model III	Model IV
Average within-jurisdiction coefficients						
Mean	0.162	0.154	0.175	0.155	0.147	0.125
Location						
Longitude	(-0.001)	(-0.001)	(-0.002)	(-0.002)	(-0.001)	(-0.001)
Latitude	0.012	-0.007	0.015	0.011	-0.008	-0.003
Female	0.167	0.137	0.100	0.071	0.013	-0.011
Parents' education	0.117	0.087	0.113	0.089	0.103	0.076
Immigrant - Less than 5 years	-1.113	-0.881	-1.048	-0.842	-0.965	-0.759
- 5 to 9 years	-0.799	-0.690	-0.725	-0.632	-0.571	-0.481
- 10 or more years	(0.019)	(0.024)	(-0.014)	(-0.014)	(0.034)	(0.036)
Black	-0.614	-0.537	-0.659	-0.600	-0.775	-0.692
Hispanic	-0.449	-0.364	-0.452	-0.382	-0.524	-0.448
Asian or Pacific Islander	(0.034)	(-0.035)	(0.013)	(-0.046)	(0.076)	(0.019)
Engagement in literacy activities						
Read books - Never		-0.384		-0.314		-0.287
Write letters - Never		-0.288		-0.248		-0.261
Read newspapers - Daily		(0.070)		(0.056)		(0.049)
Read newspapers - Never		-0.613		-0.575		-0.612
Hours of TV per day		-0.072		-0.053		-0.076
Variance components						
Within jurisdiction	0.674	0.602	0.637	0.677	0.586	0.616
Between jurisdiction						
Mean	0.029	0.016	0.031	0.021	0.034	0.022
Female	0.001	0.007	0.027	0.026	0.017	0.015
Parents' education	0.002	0.002	0.003	0.002	0.003	0.003

However, this model examines the effect of latitude on the performance of white, non-immigrant youth whose parents had completed Grade 12. When the ethnicity variables are removed from the model, the latitude effects are significant and of about the same magnitude as those reported in Table 3.4. The latitude effect for quantitative literacy is slightly larger, but not statistically significant. In the previous section, we noted that the scores of African-Americans and Hispanics varied considerably more among states than did the scores of whites or Asians and Pacific Islanders.

The findings suggest that ethnic inequalities vary with latitude, with the gap being less for more northerly states.

V. Effects of location and engagement in literacy activities

Model IV adds a set of five variables associated with daily literacy activities. In a fairly general sense, these variables reflect individuals' choices pertaining to the richness of their literacy culture at home and in their personal lives. They do not, however, relate to the demand for literacy skills in the labour force. Although participation in these activities was measured with multi-category scales in both the IALS and NALS, it was necessary to collapse them in order to maintain comparability between the two studies. As one would expect, there are negative effects associated with not reading books or writing letters on a regular basis (the dummy variables are coded with 1=never, and 0 for all of the other levels of participation.) Similarly, reading the newspaper every day has positive effects on literacy scores, and never reading the paper has negative effects. Hours of watching television was coded as a continuous variable in hours per day. The negative effects reported indicate that those who watch more television have considerably weaker literacy skills. This effect is especially large, as the coefficients, which range from 5.3% to 7.6% of a standard deviation, are the decreases associated with each additional hour per day of watching television.

The variables describing youths’ engagement in literacy activities have a considerable moderating effect on inequalities, and explain some of the variation among jurisdictions. The percentage reduction (that is, the mediating effect) of engagement is displayed in Table 3.5. Generally, across the three tests, the coefficients associated with inequalities between the sexes and between advantaged and disadvantaged groups were reduced by 10% to 25% with the inclusion of the literacy engagement variables. The largest mediating effects were for parents’ education and for immigrants who had spent less than five years in the country.

Table 3.5 Percentage reduction in coefficients and variance components

	Prose		Document		Quantitative	
	Coefficient	Reduction %	Coefficient	Reduction %	Coefficient	Reduction %
Gender (female advantage)						
Base (II)	0.167		0.095		0.011	
Engagement (IV)	0.137	18.0	0.070	26.3	-0.011	
Parents’ education						
Base (II)	0.116		0.112		0.102	
Engagement (IV)	0.087	25.0	0.089	20.5	0.076	25.5
Immigrant - Less than 5 years						
Base (II)	-1.110		-1.046		-0.962	
Engagement (IV)	0.087	25.0	0.089	20.5	0.076	25.5
Immigrant - 5 to 9 years						
Base (II)	-0.795		-0.722		-0.568	
Engagement (IV)	-0.690	13.2	-0.633	12.3	-0.481	15.3
Black						
Base (II)	-0.623		-0.670		-0.781	
Engagement (IV)	-0.537	13.8	-0.600	10.5	-0.692	11.4
Hispanic						
Base (II)	-0.454		-0.459		-0.527	
Engagement (IV)	-0.364	19.8	-0.382	16.8	-0.448	14.9
Variance among jurisdictions						
Base (I)	0.073		0.080		0.082	
Demographic (II)	0.034	53.4	0.042	52.5	0.035	57.3
Geography (III)	0.030	58.9	0.031	61.3	0.034	58.5
Engagement (IV)	0.016	78.1	0.021	73.8	0.022	73.2

Also, the variance among jurisdictions was substantially reduced by inclusion of the engagement variables. The bottom part of Table 3.5 displays the percentage reduction in variance associated with each of the models. These can be interpreted in a fashion similar to the “R-squared” of ordinary least squares regression. The inclusion of the basic demographic variables (sex, parents’ education, immigrant status and ethnicity) explained more than half of the variation among states and provinces. Geography accounted for another 1% to 9%. With the inclusion of engagement, about three-quarters of the variance among jurisdictions was accounted for.

Youth from less advantaged backgrounds, minority youth and immigrant youth tend to be less engaged in literacy activities in their daily life, and the effects associated with parental background, ethnicity and immigrant status were reduced by about 10% to 25% when engagement was taken into account. Differences among states and provinces in youth’s engagement in literacy activities also accounted for an additional 15% of the variation among jurisdictions. People’s engagement in literacy activities is arguably affected by their formal schooling experiences, but is probably also shaped by social, economic and cultural features of their society and local community.

Conclusion

This study examines inequalities in the literacy skills of youth aged 16 to 25 in Canada and the United States based on large nationally representative samples derived from the National Adult Literacy Survey (NALS) and the International Adult Literacy Survey (IALS). These studies entailed the administration of a lengthy test of literacy skills that measured adults' abilities in the areas of prose, document and quantitative literacy. The analyses in this study are concerned with inequalities associated with family background, sex, immigrant status and ethnicity, and whether overall levels of literacy skills and inequalities among groups vary among jurisdictions (states and provinces). The analyses were conducted separately for each of the three types of literacy skills. The results are expressed as effect sizes; that is, as fractions of a standard deviation for the full international (seven-country) sample. On these tests, an effect size of 15% of a standard deviation is roughly equivalent to one full year of schooling. To facilitate interpretation, the results are discussed below using a years-of-schooling metric. The results reveal large variations in literacy skills among jurisdictions which are related to family background and respondents' demographic characteristics, the geographical location of the jurisdiction and the extent to which youth are engaged in literacy activities on a daily basis.

Across the three tests, Canadian youth scored about one year of schooling higher on average than the mean score for the countries that participated in the 1994 IALS. However, the scores of Canada's youth on the prose and document tests were considerably lower than those of youth in the Netherlands and Sweden, and lower than the youth in all of the European countries, except Poland on the quantitative test. The skill deficit was equivalent to about two years of schooling. Youth in the United States scored below the international mean on all three tests. After account was taken of the parental background of the youth, the average American youth scored only slightly higher than youth in Poland, and about four years of schooling below youth in the other European countries.

An examination of the relationship between literacy skills and family background for the seven participating countries revealed that countries with higher literacy skills tend to have shallower gradients. For example, the skill gap between American and Swedish youth was relatively small for youth whose parents had completed 16 years of formal education, and considerably larger for youth whose parents had completed only 8 to 10 years of education. In general, countries with high literacy scores had fewer inequalities associated with family background.

In terms of inequalities between the sexes, United States females had an advantage over males that was equivalent to about one year of schooling in prose literacy skills, eight months of schooling in document literacy skills, and one month of schooling in quantitative literacy skills. Differences between the sexes in Canada varied, depending on the level of education of the youths' parents. Among youth whose parents had high levels of education, females scored substantially better than males on all three of the tests; among youth whose parents had low levels of education, males scored better than females. Canada is anomalous in this respect: interactions between sex

and parental background were small for the United States, and for the full IALS sample. If one considers Canadian youth whose parents had 12 years of education, females outperformed males on the prose test by about one year of schooling, and males outperformed females on the quantitative test by about the same amount. Males scored slightly better than females on the document test.

Although immigrants scored substantially lower than non-immigrants on all three of the literacy tests in both countries, differences between non-immigrants and immigrants who had been in the country for at least 10 years were very small—equivalent to about one month of schooling in Canada and five months of schooling in the United States. Similarly, youth whose first language differed from the language of the test scored substantially lower on the three tests, but this effect diminishes steadily with the length of time a person has been speaking the language of the test. After 7 to 10 years it levels off, with a gap remaining that is the equivalent of about two years of schooling.

There were large differences among ethnic groups in the United States, with African-Americans scoring four to five years of schooling lower on average than their white counterparts, after taking parental education and immigrant status into account. The gap between Hispanics and whites was equivalent to about one-and-a-half to two years of schooling. Asians and Pacific Islanders had comparable scores to whites on the quantitative test, but lagged slightly behind them on the other two tests.

Average levels of literacy skills differed considerably among the states and provinces on all three tests. Slightly more than half of the variation was attributable to parents' education, immigrant status and ethnicity. As was the case with the Canadian analysis reported earlier (Willms, Statistics Canada and HRDC 1997), and with the international analyses reported in this paper, the jurisdictions that had high literacy scores tended to be those with fewer inequalities among advantaged and disadvantaged youth, as indicated by their parents' level of education. The same was true for ethnicity in the United States: states with high overall literacy scores were those with less inequality between ethnic groups. There was also a geographical dimension to these findings. The analysis indicated that more northerly jurisdictions tended to have higher literacy scores, even after parents' education, immigrant status and ethnicity were taken into account.

Finally, the analysis found strong effects associated with engagement in literacy activities at home. Youth who read or wrote letters on a regular basis had considerably better literacy skills. Similarly, watching television was negatively associated with literacy skills. The effect was substantial: each additional hour of watching television had an effect equivalent to nearly a half a year of schooling. The extent to which youth were engaged in literacy activities accounted for an additional 15% of the variation among states and provinces. The full model, which controlled for parental education, immigrant status, ethnicity, geography (latitude) and engagement in literacy activities, explained over three-quarters of the variation among the states and provinces in literacy-skill levels.

Discussion

The success of societies is often gauged by elemental economic indicators, such as unemployment rates, average annual income or gross domestic product. Recently, countries have become increasingly concerned about the academic success of their youth and many have developed national testing programs to monitor the success of their educational systems. These programs usually provide indicators of drop-out rates and academic test scores. However, such indicators are insufficient because they fail to describe the extent of inequalities along social class lines, between ethnic groups and between the sexes. Also, they do not characterize the processes that generate social and economic outcomes, or portray the cultural aspects of social life associated with health and well-being (Land 1983; Murnane and Pauly 1988; Willms and Kerckhoff 1995). The findings of this study suggest that the success of a society, as gauged by these types of indicators, depends on the extent to which it is successful in reducing inequalities. The findings also intimate that there are social, economic and historical factors associated with the culture of a society that shape and constrain people's behaviour.

Most of the attempts to account for variations in literacy skills have emphasized individual-level factors, such as family background, level of schooling and engagement in literacy activities at home and at work. The research conducted on the IALS by Statistics Canada and OECD provides convincing evidence of the importance of engagement in literacy activities at home and at work (OECD and Statistics Canada 1995; HRDC, OECD and Statistics Canada 1997). These findings have provoked local governments to strengthen the call for increases in workplace training and community literacy programs (for example, Willms 1997). The findings reported in this study also emphasize the importance of individual behaviours, but they also show that individual-level factors do not account for all of the variation in literacy skills among countries, or among jurisdictions within countries. Some of this variation is attributable to inequalities among social class groups, and between minority and non-minority groups.

Therefore, the findings emphasize the need for a better understanding of the structural and contextual features of societies and local communities that lead to greater equality, and for policies and interventions that will redress inequalities. One of the most important structural features of a society that affects inequalities is access to quality day-care and schools. Differential access is a plausible explanation for the variation in literacy skills observed in this study. Research on the quality of day-care programs has stressed the importance of three factors: the staff-to-child ratio, the training of care providers, and the quality of material resources. However, despite the importance of the formative years in developing literacy skills, there have not been any national studies of day-cares, in the United States or Canada that are comparable to the (Canadian) National Longitudinal Survey of Children and Youth or the (U.S.) National Educational Longitudinal Survey. Thus, we know relatively little about the quality of day-care programs, the effects of day-care on children's early literacy development, or the distribution of different forms of care across social class and ethnic groups, or across jurisdictions within each country.

Considerably more is known about effective elementary and secondary schools. The research on school effectiveness has emphasized the importance of organizational features and schooling processes that lead to higher achievement and more equitable outcomes (Lee, Bryk and Smith 1993; Raudenbush and Willms 1995). It stresses the importance of high “academic press”—successful schools tend to project the belief that all students can succeed. The high expectations of these schools are manifest in the content and pace of the curriculum, the type and amount of homework, and the way that time and resources are used in the classroom and school. Successful schools also maintain positive disciplinary climates through organizational structures that reinforce a commitment to a well-established set of norms and values. Successful schools usually have a high level of parental involvement, which not only leads to higher levels of achievement, but also reduces inequalities (Sui-Chu and Willms 1996). Finally, the literature on school effectiveness emphasizes the importance of the manner in which students are allocated to schools, classrooms and instructional groups. There is growing evidence that when students are segregated along ethnic or social-class lines, either between classes or tracks within schools, or between schools within a community, students from advantaged backgrounds do marginally better, while those from disadvantaged backgrounds do considerably worse.

Nearly all of this research, however, has been conducted at the level of the individual and school, and has treated schools as independent entities, without regard to their position within their local communities or larger jurisdictions. Thus, it has not examined how students are allocated to day-cares and schools within communities, or whether there is a geographical dimension to school effectiveness. This paper has used states and provinces as the second-level unit of analysis, but it is likely that some of the inequalities observed here are entrenched in processes that have to do with competition and conflict at a more local level, such as between neighbourhoods, schools, and communities.

An immediate question arising from this research is whether the pattern of inequalities observed in this study are evident at earlier ages. For example, do the literacy skills that children possess upon entry to elementary school vary among states and provinces? If so, is the variation in skills across jurisdictions greater for minority and lower social-class groups than it is for middle-class whites? Are these patterns evident at the end of elementary school, or during secondary school? We especially need better systems for tracking the progress of children during secondary school, so that we have a better understanding of when and why some students leave school before graduation. Data from studies such as the NLSCY, the NELS, and the (U.S.) National Longitudinal Survey of Youth (NLSY), and the international studies of reading, mathematics, and science conducted by the International Association for the Evaluation of Educational Achievement (IEA) could be analysed to address these questions. This year, the OECD funded the Programme of International Student Assessment (PISA), a major international study of 15-year-old students that will be conducted in most OECD countries. The emphasis of the study is on the relationship between schooling outcomes and socio-economic status, and the structural features of schools and schooling systems that contribute to social inequalities. This should help us to better understand the effects of factors such as streaming, school choice, private schooling and magnet schools, especially where it is possible to examine the data at the level of school districts and communities.

National and international studies such as the NALS, the IALS, and the PISA are rather blunt instruments. They cannot take us very far in answering questions about *why* inequalities persist or *why* some jurisdictions have better outcomes than others. However, they can provide the impetus to improve monitoring efforts at the local level. If we are to better understand why youth vary in their literacy skills among states and provinces, we need monitoring systems at these levels that are better in at least three respects:

1. Assessment procedures need to be extended beyond testing in reading and mathematics at the middle and secondary school levels. We need measures of children’s development upon entry to school, because these provide an indication of the success of early childhood programs and can serve as pre-measures for

assessing the quality of school programs. Assessment needs to cover a broad range of outcomes, including non-cognitive outcomes such as self esteem and physical health.

2. State and provincial monitoring efforts must collect information about aspects of schooling processes that may lead to inequalities. Within schools, these efforts can include measures of the disciplinary climate of the school, student–staff relations, homework practices and parental involvement. Such measures are sensitive to changes in school policy and practice, and are responsive to the efforts of school staff.
3. We require analyses that extend beyond simply comparing the average test scores of schools or districts. Analyses must portray the extent of inequalities along social-class lines, among ethnic groups and between the sexes. If comparisons are to be made for purposes of accountability, they should emphasize the progress of schools and communities towards fixed standards, rather than pitting schools against each other within local communities. Analyses need to tackle the most important *when* and *why* questions associated with inequalities:
 - When do the critical transitions occur for students as they progress through the schooling system?
 - How are students allocated to different types of programs?
 - What is the nature of the school and classroom learning climate in these programs? and,
 - What are the factors that lead to disaffection from school, rather than to a lifelong engagement in literacy activities?

Endnotes

1. The IALS sample of youth for the United States was relatively small and is probably biased because it did not adequately represent college-bound youth. However, the National Adult Literacy Survey (NALS) comprised a large nationally representative sample of American youth and used the same literacy tests as the IALS. Therefore, this study based its analyses on the NALS data for the United States, and on IALS data for Canada and five European countries.
2. The reader should bear in mind, though, that a policy that resulted in an increase of one additional year of schooling for a group would not necessarily bring about an increase in that group's literacy scores by 0.15 of a standard deviation. Several other factors affect people's scores on these tests, such as parents' education, background, reading habits and leisure activities.
3. For example, the analysis cannot determine whether there is an effect associated with ethnicity for a particular state or province if there are only a few minority youth represented in the sample. In the case of the Canadian provinces, there were no data available on ethnicity.

References

- Becker, G. (1964). *Human capital*. New York: Columbia University Press.
- Bielby, W. T. (1981). "Models of status attainment." In D.J. Treiman and R.V. Robinason, eds., *Research in Social Stratification and Mobility*, 1, 3-26. Greenwich, CT: JAI Press Inc.
- Bourdieu, P. (1977). "Cultural reproduction and social reproduction." In J. Karabel and A. H. Halsey, eds., *Power and ideology in education*. New York, NY: Oxford University Press.
- Bryk, A. S., and S. W. Raudenbush, (1992). *Hierarchical linear models for social and behavioral research: Applications and data analysis methods*. Newbury Park, CA: Sage.
- Carnoy, M. (1995). "Race earnings differentials." In M. Carnoy, ed., *International Encyclopedia of Economics of Education*, second edition. New York, NY: Elsevier Science, Ltd.
- Coleman, J. S. (1988). "Social capital in the creation of human capital." *American Journal of Sociology*, 94 (suppl.), 95-120.
- Human Resources and Development Canada, Organisation for Economic Co-operation and Development, and Statistics Canada. (1997). *Literacy skills for the knowledge of society: Further results from the International Adult Literacy Survey*. Paris: Organisation for Economic Co-operation and Development; Ottawa, ON: Human Resources and Development Canada and Statistics Canada.
- Kerckhoff, A. C., ed. (1996). *Generating social stratification*. Boulder, CO: Westview Press.
- Land, K. C. (1983). "Social indicators." In R. H. Turner and J. F. Short, Jr., eds., *Annual Review of Sociology*, 9, 1-26. Palo Alto, CA: Annual Reviews.
- Lee, V. E., A. S. Bryk, and J. B. Smith, eds. (1990). "The organization of effective secondary schools." *Review of Research in Education*. Washington, DC: American Educational Research Association.
- Murnane, R. J., and E. W. Pauly, (1988). "Lessons from comparing educational and economic indicators." *Phi Delta Kappan*, March, 509-513.
- Murray, T. S., I. S. Kirsch, and L. B. Jenkins, eds. National Center for Education Statistics (1998). *Adult literacy in OECD countries: Technical report on the first International Adult Literacy Survey*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- National Center for Education Statistics (1998). *Literacy in OECD countries: Technical report on the First International Adult Literacy Survey*. Washington, DC: U.S. Department of Education.

- National Council of Teachers of Mathematics. (1991). *Professional standards for teaching mathematics*. Reston, VA: National Council of Teachers of Mathematics, Inc.
- Organisation for Economic Co-Operation and Development. (1995). *Employment outlook*. Paris: OECD.
- Organisation for Economic Co-operation and Development, and Statistics Canada. (1995). *Literacy, economy, and society: Results of the first International Adult Literacy Survey*. Paris: Organisation for Economic Co-Operation and Development; and Ottawa, ON: Minister of Industry, Canada.
- Raudenbush, S., R. M. Kasim, S. Eamsukawat, X. Liu, and Y. Miyazaki. (1996). *Human capital, labor-market segmentation, and social inequality: Results from the U.S. National Adult Literacy Survey*. Research report for Statistics Canada and the U.S. National Center for Educational Statistics.
- Raudenbush, S. W., and R. Kasim. (1998). "Cognitive skill and economic inequality: Findings from the National Adult Literacy Survey." *Harvard Educational Review*, 68 (1), 33-79.
- Raudenbush, S. W., and J. D. Willms. (1995). "The estimation of school effects." *Journal of Educational and Behavioural Statistics*, 20 (4), 307-335.
- Rivera-Batiz, F. L. (1992). "Quantitative literacy and the likelihood of employment among young adults in the United States." *Journal of Human Resources*, 27 (2), 313-328.
- Romer, P. (1993, September 11-17). "Ideas and things." *The Economist*, 70-72.
- Rumberger, R. W., and J. D. Willms. (1992). "The impact of racial and ethnic segregation on the achievement gap in California high schools." *Educational Evaluation and Policy Analysis* 14 (4): 377-396.
- Schultz, T. W. (1963). *The economic value of education*. New York, NY: Columbia University Press.
- Sewell, W. H., R. M. Hauser, and D. Featherman, eds. (1976). *Schooling and achievement in American society*. New York, NY: Academic Press.
- Sui-Chu, E.H., and J. D. Willms, (1996). "The effects of parental involvement on eighth grade achievement." *Sociology of Education*, 69, 126-141.
- Willms, J. D., and A. C. Kerckhoff. (1995). "The challenge of developing new social indicators." *Educational Evaluation and Policy Analysis*, 17 (1), 113-131.
- Willms, J. D. (1997). "Literacy skills of Canadian youth." *International Adult Literacy Survey*. Ottawa, ON: Statistics Canada.
- Willms, J. D. (1998). *Renewing the commitment: Implications of the International Adult Literacy Survey for a provincial strategy to improve adult literacy in New Brunswick*. Fredericton, NB: Atlantic Centre for Policy Studies, University of New Brunswick.

Figure A Literacy scores for youth aged 16 to 25 by country

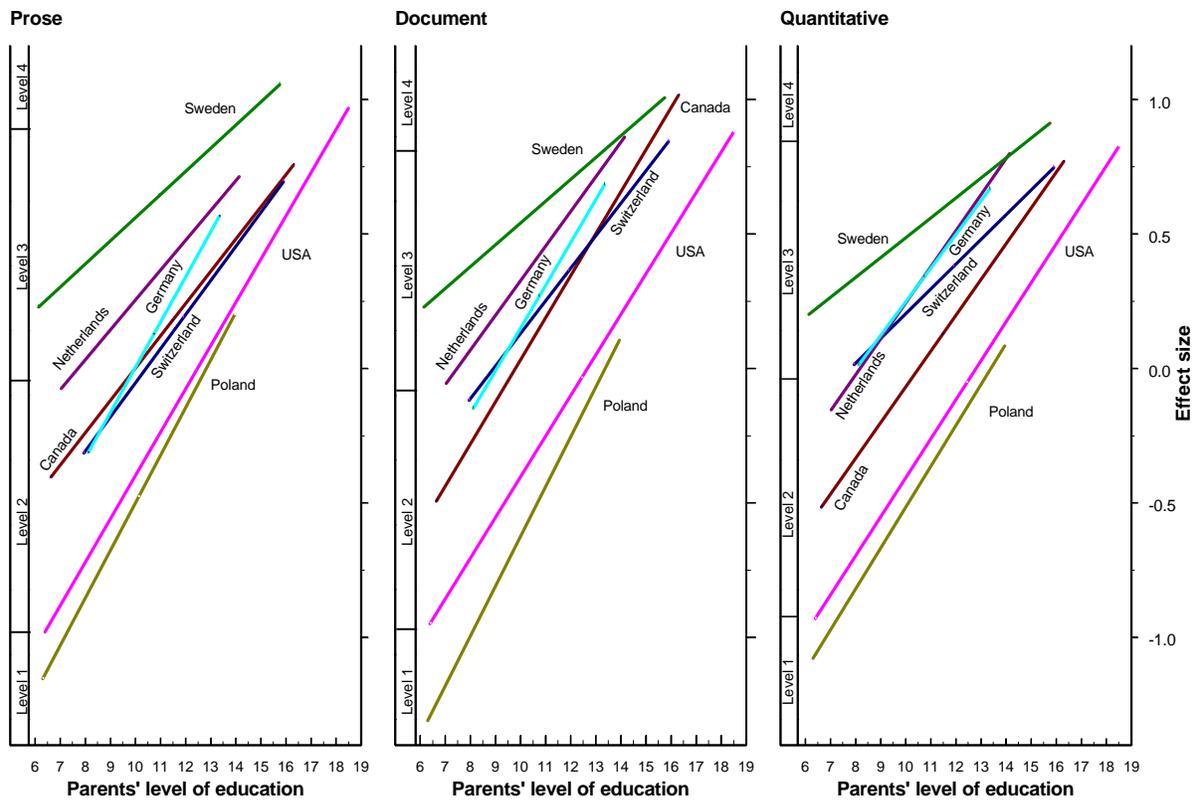
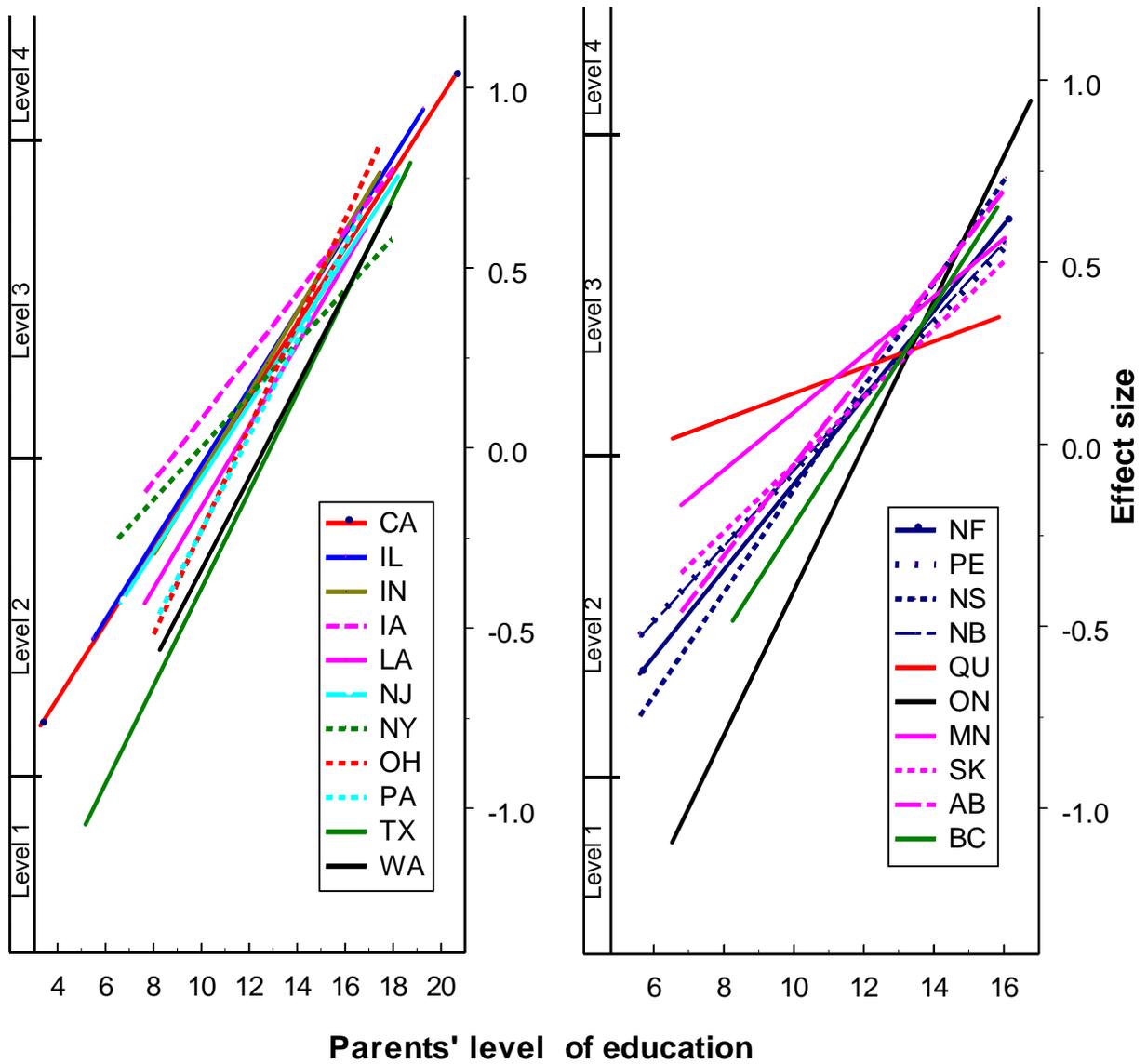


Figure B Relationship between quantitative literacy scores and parents' education (adjusted for sex, immigration status, and ethnicity)



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