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School socioeconomic status and student outcomes in reading and mathematics: A comparison of Australia and Canada

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Abstract

Previous research has established that student outcomes are strongly associated with the socioeconomic composition of a school, also known as school socioeconomic status. Less is known, however, about the ways in which the relationship varies for different students, schools and national education systems. Here, we conduct a secondary analysis of an international dataset to examine the strength of the relationship between school socioeconomic status and achievement in math and reading for Canada and Australia. The history, economy and culture of these two countries are similar, as are many aspects of their education systems. One important difference, however, is the degree to which their education systems are marketised. Our findings show that in both countries, school socioeconomic status is strongly associated with academic achievement for all students, regardless of their individual socioeconomic status. Nevertheless, the relationship between school socioeconomic status and academic achievement is substantially stronger in Australia than in Canada. We conclude that student outcomes are more equitable in Canada than in Australia, and suggest that this may be due to differences in the ways in which the two education systems are funded and structured.

Keywords

Socioeconomic status, peer influence, school demography, academic achievement, comparative analysis

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Introduction

The relationship between social background and educational outcomes is well-established. Typically, the relationship is strong and positive, wherein higher socioeconomic status (SES) is associated with better educational outcomes. Students from privileged social backgrounds have on average higher test scores (Organisation for Economic Co-operation and Development [OECD], 2007a; Perie, Moran, & Lutkus, 2005), are more likely to complete secondary education (Renzulli & Park, 2000) and are more likely to attend university (Blossfeld & Shavit, 1993; Connor & Dewson, 2001; Lee, 1999; Terenzini, Cabrera, & Bernal, 2001) compared to their less-privileged peers. These relationships persist after controlling for students' prior ability. For example, data from the US Department of Education shows that 78% of high achieving/low SES students attended university in 1992 compared to 97% of high achieving/high SES students (Lee, 1999). The relationship between students' social backgrounds and their educational outcomes exists in all societies, although the strength of the relationship varies from very strong to moderate (OECD, 2004, 2007a). Nonetheless, on average, social background is a strong predictor of students' educational outcomes in all countries.

Additionally, the social background of school peers is also associated with students' educational outcomes. The overall socioeconomic composition of a school (mean school SES) is positively related to a range of educational outcomes beyond students' own social backgrounds (Palardy, 2008; Perry & McConney, 2010a, 2010b; Rumberger & Palardy, 2005; Southworth, 2010; Sui-Chu & Willms, 1996). On average, a student who attends a higher SES school enjoys higher educational outcomes compared to a student from a similar social background who attends a lower SES school. In many countries, academic performance is even more strongly associated with school SES than with a student's individual SES (OECD, 2004, 2007a; Sirin, 2005). While the reasons behind the association are varied, complex and not fully understood, it is likely that higher SES schools are better positioned to provide productive and stimulating learning environments compared to other schools (Willms, 2010).

While the research literature has shown conclusively that school SES is positively associated with student outcomes, a number of questions remain unanswered. For example, to what extent is the relationship different for lower SES students than for their more advantaged peers? Additionally, to what extent is the relationship between school SES and student outcomes uniform, wherein increases in school SES are consistently associated with increases in student achievement? Does the relationship weaken (or strengthen) as school SES increases? Do these relationships among school SES, student SES and academic performance vary cross-nationally, and if so, why?

In a recent series of studies, Perry and McConney have examined these finer-grained relationships for Australia (McConney & Perry, 2010; Perry & McConney, 2010a, 2010b). They have shown that in Australia, the relationship between school SES and student outcomes is strong for all students regardless of their own social backgrounds. They have also shown that the relationship between school SES and student achievement strengthens as the SES of the school increases. Put another way, achievement differences between students in low and middle SES schools tend to be smaller than achievement differences between students in middle and high SES schools. In this study, we extend those analyses to Canada, a country that is similar culturally and economically to Australia and whose educational system is considered both equitable and high

performing (OECD, 2007a). For the current study, our first two research questions, focused on Canada, are:

(1) To what extent is the association between school SES and student achievement consistent for all students, regardless of their individual SES?
(2) To what extent is the association between school SES and achievement similar for students in low SES schools as compared to their peers in high SES schools?

As this is a comparative study, we also compare our analyses for Canada with previous findings for Australia. Our third research question therefore is:

(3) How do the findings from research questions 1 and 2 differ between Canada and Australia?

Our purpose in this paper, therefore, is to examine the extent to which the finer-grained details of the relationship between school SES and student achievement vary between Canada and Australia. A comparison of the two educational systems is theoretically significant because they differ in an important regard – the degree to which they are marketised (more detail about this is provided later in the paper). Our method of analysis does not allow us to explain variations in the relationship across the two countries, nor does it allow us to examine how the relationship may be mediated by marketisation. We are nonetheless interested in offering some preliminary insight about how the relationship between school SES and academic achievement varies between educational systems with varying degrees of marketisation. Recent cross-national research by Alegre and Ferrer (2010) has suggested that educational marketisation increases socioeconomic segregation between schools, which has a negative impact on educational equity.

Background

The groundbreaking Coleman Report was one of the first studies to examine the influence of school peers on student achievement. The report found that academic achievement was more strongly associated with the ethnic and social composition of a school's student body than with its resources or facilities (Coleman et al., 1966). The report also found that attending a racially and socioeconomically desegregated school raised the achievement of working class African–American students without lowering the achievement of their white, middle-class peers. Later studies have confirmed that attending a socially segregated school that enrols primarily students from low socioeconomic backgrounds negatively impacts students' educational outcomes (Dronkers & Levels, 2006; McConney & Perry, 2010; Orfield & Yun, 1999; Perry & McConney, 2010a, 2010b; Robertson & Symons, 2003; Willms, 1999).

While the research literature strongly suggests that attending a low SES school is associated with lower educational outcomes for all students, much less is known about how the relationship between school SES and educational outcomes can vary for students depending on their own (family) social background. Some studies suggest that the association between academic achievement and school socioeconomic composition is stronger for lower SES students than their higher SES peers (Kahlenberg, 2001; McPherson & Willms, 1987; Robertson & Symons, 2003; Zimmer & Toma, 2000), while others suggest that the association is similar for all students (OECD, 2004, 2007a;

Perry & McConney, 2010a, 2010b; Rumberger & Palardy, 2005; Sui-Chu & Willms, 1996). However, only Perry and McConney within the last group of studies have explicitly compared the strength of the association for low and high SES students, leaving open some possibility that the relationship is in fact not equally strong for all students.

The series of studies by McConney and Perry does suggest that the relationship is similarly strong for students across all SES groups in Australia, but further research is needed to determine if this is true for other countries. Indeed, little is known about how the relationship between school SES and student outcomes varies cross-nationally. The OECD reports (2004, 2005, 2007a, 2007b) have been the first to systematically examine cross-national differences by comparing the amount of variation in student performance on the Programme for International Student Assessment (PISA) explained by the SES of the student, as well as the SES of the school. The reports have shown that school SES has a larger effect on student performance than does student SES in almost all participating countries (OECD, 2007a). In Australia and Canada, the effect size on student performance is twice as large for school SES as it is for student SES. For these two countries, one-half of a standard deviation in the economic, social and cultural status (ESCS, PISA's composite measure of SES) index at the school level is associated with a score difference of 23 (Canada) to 29 (Australia) points, while a similar difference at the student level is associated with a score difference of 15 points. The relationship between school SES and student performance on PISA is particularly strong in many continental European countries (e.g., Netherlands, Germany and Austria), moderately strong in English-speaking countries (including Canada and Australia) and weakest in the countries of northern Europe (e.g., Finland and Norway). For example, one-half of a standard deviation in school SES is associated with a difference of only 5 score points in Finland. In the Netherlands, by contrast, the comparable score point difference for school SES is 62 points.

While the OECD's PISA reports have been able to show for the first time how the relationship between school SES and student outcomes varies cross-nationally, they have done so in broad brush strokes. The reports show the strength of the relationship, on average, for all students in a particular country. They do not, however, examine cross-national differences in the relationship between school SES and student outcomes for different groups of students (e.g., low or high SES students). We do not know whether the relationship between school SES and student performance is stronger for low SES students in only some countries, for example. Second, little is known about how the strength of the relationship between school SES and student performance varies across school SES contexts in different countries. For example, Perry and McConney (2010b) found that the relationship between school SES and student performance in Australia is particularly strong in higher SES school contexts. The average achievement difference between low and middle SES schools in Australia is substantially smaller than the achievement difference between middle and high SES schools. In other countries, the relationship may be different; for example, the relationship may be equally strong in lower SES as it is in higher SES school contexts. Similarly, the relationship may be different for high SES students than for their less privileged peers in some countries. Understanding these finer-grained aspects of the relationship between school SES and student outcomes, particularly in cross-national analyses, may provide insights about sustainable and realistic ways to improve educational equity through reducing the influence of where students attend school and of their social backgrounds.

Australian and Canadian contexts

As previously noted, analyses of the relationship between school SES and student performance have previously been examined for Australia. In this paper, we chose to use the same PISA 2006 dataset to compare our findings for Australian students with those for students in Canada, a country whose educational system is considered by researchers and policymakers to be both high performing and highly equitable. Barry McGaw, one of the architects of the PISA and currently Chair of the Board of the Australian Curriculum, Assessment and Reporting Authority, has noted that Australia should look to Canada for insight about how to improve the performance and equity of its educational system (McGaw, 2010). This paper responds to McGaw's call by comparing the role of school SES, one of the strongest predictors of student achievement, across the two countries.

Comparing findings from Australia and Canada is meaningful because the two countries are similar in many ways. Both are very large geographically but have relatively small populations. Additionally, both have a history of British colonial rule, have similar resource-based economies, and are immigrant countries with similar demographic profiles. Both countries attract highly educated immigrants, and differences in educational outcomes between immigrant and non-immigrant students are often very small and sometimes even nonexistent (OECD, 2010). Both countries have similar levels of poverty and income inequality (CIA, 2011). In comparing the relationship between educational achievement and school SES in Australia and Canada, we are comparing "apples with apples," not "apples with oranges." Comparing "like" countries allows researchers to control, albeit crudely, contextual factors that can obscure conclusions about educational phenomena and relationships. For example, Finland and Korea both do well on PISA but have very different socio-cultural, historical and educational contexts in comparison to Australia. What works in Finland, a small and ethnically homogenous country, may not be replicable in Australia with its immense geography and ethnically diverse population.

The educational systems of Australia and Canada, however, are very similar. Both countries have a comprehensive system of secondary education wherein the great majority of students attend the same type of secondary school, such as "high school" or "senior high school." Common among many English-speaking countries in the OECD, the educational philosophy of both the Australian and Canadian systems is based predominantly on the pedagogical paradigms of progressivism and constructivism. The states and provinces of each country have the main control over educational funding and decision making, although Australia has adopted national standardised assessment since 2009 and is in the process of implementing a national curriculum.

One important difference between the two educational systems is the level of marketisation – i.e., privatisation and school choice – evident in the two systems. Marketisation is the process by which educational systems are organised around the market principals of choice and competition. This typically results in the following features: devolution of decision making, autonomy and accountability to individual schools; increased diversity of education providers, particularly non-governmental schools and increased school choice (Whitty & Power, 2000). For our purposes here, the two main features of marketisation that differentiate the Australian and Canadian systems of education are school choice and privatisation. Australia has a large private education sector with about one-third of all school-aged students and 38% of secondary students attending private schools (Australian Bureau of Statistics, 2006). While private schooling has historically played a large role in Australia, the proportion of students attending private

schools has been growing over the last 30 years. The growth of the private sector has been attributed to federal funding policies that have made private schooling more attractive for many families (Ryan & Watson, 2004). By contrast, the private sector in Canada is much smaller, with approximately 6% of students attending a non-government school (Phillips, Raham, & Wagner, 2004). In terms of school choice, a much larger proportion of Canadian students attend a school where local residence is the main criterion for admittance, in comparison to Australia. In the international dataset that we use for this analysis, approximately 78% of students in Canada attend a school where local residence is the main criterion for admittance, compared to 42% in Australia. While school choice is not uncommon in Canada, it is much less prevalent than in Australia.

Method

To answer our research questions, we conducted retrospective, secondary analyses of the Canadian and Australian datasets from the 2006 round of the PISA. PISA is an international standardised assessment of the literacy performance of 15-year-old students in reading, mathematics and science developed by the OECD and administered on a 3-year cycle beginning in 2000. Each assessment round includes all three subject domains and also assesses one of these in greater detail; for example, the focus area for 2006 was science. All OECD member countries participate in PISA, as well as many non-member partner countries. Member countries comprise the most economically developed nations, including Australia and Canada. In the 2006 assessment round, nearly 400,000 students from 30 member countries and 27 non-member countries participated (OECD, 2007a).

Different from other large-scale assessments, PISA is based on holistic characterisations of discipline-specific literacies – skills and knowledge deemed necessary for personal and working life in industrialised countries in a 21st century global economy (OECD, 2004). In other words, PISA assesses students' performance in solving everyday problems (*literacies* in reading, mathematics and science) rather than achievement related to a particular curriculum. Students' literacy scores are aggregated to allow the reporting of national averages, and proportions of students achieving at each proficiency level are also reported for each country.

In addition to assessing students' literacy across three domains, PISA asks students and school principals a large number of questions on issues potentially related to student performance. These include student characteristics such as gender, immigrant background, ethnicity and, most importantly for this study, a rich measure of SES that PISA terms *economic, social and cultural status* (ESCS). ESCS reflects information from students along three dimensions: parental educational attainment, parental occupation and cultural and financial resources available to the student's family. This last dimension is particularly comprehensive, including questions about the number of books and computers in the home, whether the family owns original artworks or a piano as well as the frequency of visiting museums and art galleries, among others. For PISA 2006, the Australian sample had a mean ESCS of 0.19 (standard deviation [SD] = 0.78) and ranged from a low of −3.90 to a high of 2.54. The equivalent measures for the Canadian sample were a mean ESCS of 0.29 (SD = 0.81) ranging from a low of −4.37 to a high of 2.75.

In PISA, each country's sample is drawn to be statistically representative of the total number of students enrolled in different types of schools (e.g., private or public, college preparatory or vocational schools, etc.) and locations (e.g., urban or rural). For 2006, the

Australian sample included 356 schools and over 14,000 students; the Canadian dataset comprised 896 schools and just over 22,000 students. Participating schools use equal probability sampling to select 35 students (the so-called "target cluster size"). However, all 15-year-old students are sampled in small schools (defined as having between 17 and 35 15-year-old students) and very small schools (less than 17 15-year-old students). Small and very small schools are included to help ensure that country samples are demonstrably representative (OECD, 2009). The sample statistics generated from this dataset are therefore reflective of the two populations of 15-year-old students, and subgroups within those populations.

It should also be noted, however, that PISA employs a two-stage sampling frame by which schools are first sampled and then students sampled within participating schools. This approach means that sampling weights are associated with each student in the dataset because students and schools may not have the same probability of selection within any given country, and some within-country strata are over-sampled to meet national reporting priorities (OECD, 2009). Such a sampling design has the potential to increase the standard errors of population estimates. In the current study, therefore, all findings generated through secondary analysis of PISA data for Canada and Australia have taken account of the final student weights included in the datasets.

In this secondary analysis, we computed mean literacy performance scores in reading and mathematics for students across various individual and school SES backgrounds. To calculate an aggregated *school SES* for each student, we averaged the ESCS scores associated with every student who participated in PISA from a given school. We emphasise, however, that in only a few cases (small and very small schools) did we have the individual ESCS for *every 15-year-old student* in a given Canadian or Australian school participating in PISA 2006. For the 356 schools that comprised the 2006 Australian data, the size of the student group ranged from a low of 3 students to a high of 58 students, and the distribution of these 356 schools according to the size of the student group shows that 26 (7%) of the school groups comprised fewer than 20 students. Conversely, 330 schools (93%) comprised student groups of 20 or more, with the average group being about 39 students. For Canada, the size of the school groups ranged from a low of 1 to a high of 221 students; 254 (28%) of the school groups comprised fewer than 20 students. Conversely, 642 schools (72%) comprised student groups of 20 or more, and of these, 7 schools had groups of more than 100. The average group in the Canadian dataset comprised about 25 students. Following the OECD's example, we did not exclude very large or very small school groups from our secondary analysis. First, the choice of a cut-point above or below which to exclude seemed arbitrary; and second, the exclusion of large or small groups did not substantially change the statistics associated with the distribution of school group SES. For example, using the Canadian data with all schools included, the mean school SES equalled 0.26 with a standard error of 0.014. When very small school groups (<10 students) and large school groups (>100 students) are excluded, mean school SES equalled 0.29 with a standard error of 0.014.

The approach we used for this secondary analysis is similar to that used to compare the effectiveness of private and public schooling across student SES groups in the US and Chile (Lubienski & Lubienski, 2005; Matear, 2006) and to examine the association between school SES and performance in Australia (Perry & McConney, 2010a, 2010b). Initially, five subgroups of students were formed for Canada and Australia separately, based on students' *individual SES*; each of these subgroups was further subdivided into five parts

based on the *average SES of the school group* to which they belonged. In this way, we compared the literacy performance of high SES students across five bands (quintiles) of schools representing low to high mean school SES. We repeated this procedure for students with high-middle, middle, low-middle and low individual SES backgrounds. In total, we calculated 25 means representing literacy in reading and mathematics, for Australia and Canada, respectively. As shown in Tables 1 and 2, the smallest subgroup in our analysis comprised 93 students (low SES Australian students attending high SES schools) and the largest group contained 1982 students (high SES Canadian students attending high SES schools).

Table 1. Reading literacy means by student SES and school group SES for Canada and Australia as measured by PISA 2006.

	School group SES					
Student SES (ESCS)	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	All quintiles
Reading literacy: PISA 2006—Canada						
1st quintile	$n = 1825$ 460.8	$n = 1130$ 478.3	$n = 807$ 497.9	$n = 518$ 504.5	$n = 158$ 511.8	$n = 4438$ 478.9
2nd quintile	$n = 1093$ 495.8	$n = 1148$ 498.8	$n = 995$ 515.5	$n = 763$ 517.5	$n = 422$ 542.3	$n = 4421$ 509.2
3rd quintile	$n = 789$ 488.1	$n = 985$ 513.2	$n = 973$ 523.4	$n = 1024$ 535.9	$n = 683$ 552.7	$n = 4454$ 522.3
4th quintile	$n = 483$ 519.9	$n = 733$ 528.2	$n = 938$ 535.7	$n = 1096$ 545.2	$n = 1149$ 559.6	$n = 4399$ 541.3
5th quintile	$n = 245$ 524.2	$n = 463$ 537.5	$n = 670$ 550.2	$n = 1064$ 561.3	$n = 1982$ 581.7	$n = 4424$ 564.2
All quintiles	$n = 4435$ 484.2	$n = 4459$ 505.6	$n = 4383$ 523.6	$n = 4465$ 537.4	$n = 4394$ 565.1	$n = 22136$ 523.1
Reading literacy: PISA 2006—Australia						
1st quintile	$n = 1158$ 458.3	$n = 792$ 463.7	$n = 505$ 472.0	$n = 252$ 494.4	$n = 93$ 535.3	$n = 2800$ 468.10
2nd quintile	$n = 734$ 482.1	$n = 697$ 489.0	$n = 642$ 497.1	$n = 492$ 511.9	$n = 234$ 523.5	$n = 2799$ 495.96
3rd quintile	$n = 452$ 491.7	$n = 609$ 499.6	$n = 657$ 510.1	$n = 678$ 526.6	$n = 427$ 546.4	$n = 2823$ 514.34
4th quintile	$n = 287$ 499.4	$n = 437$ 503.3	$n = 569$ 525.8	$n = 737$ 536.6	$n = 757$ 560.9	$n = 2787$ 531.94
5th quintile	$n = 151$ 512.5	$n = 267$ 528.9	$n = 414$ 526.6	$n = 679$ 549.4	$n = 1275$ 583.7	$n = 2786$ 557.74
All quintiles	$n = 2782$ 477.19	$n = 2802$ 490.18	$n = 2787$ 505.86	$n = 2838$ 529.24	$n = 2786$ 565.12	$n = 13995$ 513.56

SES: socioeconomic status; PISA: Programme for International Student Assessment.

In summary, our purpose in this paper is to unpack previously demonstrated relationships among student and school SES and students' literacy performance to better describe and understand how each varied in the context of variations in the other, and to compare these variations across two similar countries, namely Canada and Australia. In other words, our research questions in this secondary analysis are primarily descriptive (e.g., what does the patterning of literacy performance in reading and mathematics look like across varying levels of individual and school SES, for Canada and Australia?). Thus, our approach is also descriptive, by providing tabular and graphical descriptions of how student performance varies as measured by PISA, in the context of differing levels of individual student and school SES. We believe that such descriptions are accessible and meaningful to

Table 2. Mathematics literacy means by student SES and school group SES for Canada and Australia as measured by PISA 2006.

	School group SES					
Student SES (ESCS)	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile	All quintiles
Mathematics literacy: PISA 2006—Canada						
1st quintile	$n = 1825$ 474.5	$n = 1130$ 490.9	$n = 807$ 498.2	$n = 518$ 513.9	$n = 158$ 511.8	$n = 4438$ 488.9
2nd quintile	$n = 1093$ 505.7	$n = 1148$ 509.5	$n = 995$ 513.0	$n = 763$ 520.7	$n = 422$ 531.5	$n = 4421$ 513.4
3rd quintile	$n = 789$ 490.8	$n = 985$ 522.8	$n = 973$ 518.5	$n = 1024$ 532.6	$n = 683$ 537.6	$n = 4454$ 520.7
4th quintile	$n = 483$ 524.9	$n = 733$ 535.0	$n = 938$ 529.0	$n = 1096$ 545.1	$n = 1149$ 548.4	$n = 4399$ 538.6
5th quintile	$n = 245$ 536.1	$n = 463$ 546.5	$n = 670$ 546.0	$n = 1064$ 560.8	$n = 1982$ 570.0	$n = 4424$ 559.8
All quintiles	$n = 4435$ 494	$n = 4459$ 515.8	$n = 4383$ 520	$n = 4465$ 538.2	$n = 4394$ 553.5	$N = 22136$ 524.3
Mathematics literacy: PISA 2006—Australia						
1st quintile	$n = 1158$ 472.5	$n = 792$ 475.6	$n = 505$ 481.1	$n = 252$ 500.1	$n = 93$ 551.2	$n = 2800$ 480.0
2nd quintile	$n = 734$ 489.5	$n = 697$ 492.2	$n = 642$ 500.3	$n = 492$ 520.0	$n = 234$ 535.1	$n = 2799$ 501.8
3rd quintile	$n = 452$ 498.4	$n = 609$ 504.3	$n = 657$ 515.3	$n = 678$ 531.8	$n = 427$ 555.9	$n = 2823$ 520.3
4th quintile	$n = 287$ 506.9	$n = 437$ 510.1	$n = 569$ 532.2	$n = 737$ 539.5	$n = 757$ 568.4	$n = 2787$ 537.9
5th quintile	$n = 151$ 526.7	$n = 267$ 531.1	$n = 414$ 531.7	$n = 679$ 554.9	$n = 1275$ 588.0	$n = 2786$ 562.8
All quintiles	$n = 2782$ 487.7	$n = 2802$ 496.6	$n = 2787$ 511.5	$n = 2838$ 534.5	$n = 2786$ 572.1	$N = 13995$ 520.5

SES: socioeconomic status; PISA: Programme for International Student Assessment.

practitioners, policy makers and researchers – and hence add value to the primary analyses already done (OECD, 2004, 2007a, 2007b). We believe that our methods represent a powerful and broadly accessible approach to understanding at a finer grain the interrelationships between individual and school-level SES and their association with academic performance for 15-year-old students in Canada and Australia.

Findings

Our primary purpose in this secondary analysis is to examine the associations between individual student SES, school group SES and students' performance in reading and mathematics, as measured in PISA 2006. Tables 1 and 2 show the interplay of these associations when both student SES and school SES are disaggregated. Organised by subject, the two tables reveal consistent patterns of improved literacy performance associated with increases in student and school SES, for both Canada and Australia.

For Canadian students, the reading literacy difference between low and high SES students (1st and 5th student SES quintiles), *both* attending high SES schools, is 69.9 score points (0.76 SD), on average. Similarly, the observed reading literacy gap between low and high SES Canadian students both attending middle SES schools is 52.3 points (0.57 SD), and the difference on average between students with low and high SES backgrounds, both attending low SES schools, is 63.4 (0.69 SD). By comparison, for Australian 15-year-olds, the equivalent gaps between low and high SES students are 48.4 (0.54 SD) with both attending high SES schools; 54.6 (0.61 SD) with both attending middle SES schools and 54.2 (0.61 SD) with both attending low SES schools, respectively.

As detailed in Table 2, the situation is much the same for mathematics literacy in the two countries. On average, for example, the mathematics literacy difference between low and high SES Canadian students (1st and 5th student SES quintiles), *both* attending high SES schools, is 58.3 points (0.72 SD), on average. Similarly, the gap in mathematics literacy between low and high SES Canadian students both attending middle SES schools is 47.8 points (0.59 SD), and the difference on average between Canadian students with low and high SES backgrounds, both attending low SES schools, is 61.6 (0.76 SD). By comparison for Australian 15-year-olds, the equivalent gaps between low and high SES students are 36.9 (0.44 SD) with both attending high SES schools; 50.6 (0.60 SD) with both attending middle SES schools and 54.2 (0.64 SD) with both attending low SES schools, respectively.

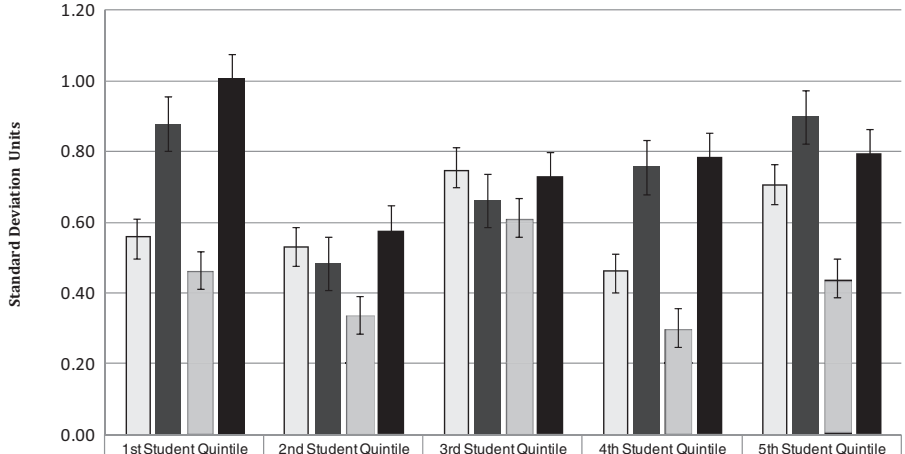
Most importantly for this secondary analysis, school-group SES also plays a non-trivial role in literacy performance for both countries. In Canada, for example, the average student with a low SES background and attending a low SES school lags his/her typical peer attending a high SES school by 51.0 points (0.55 SD) in reading. Similarly, the typical student with a high SES background and attending a low SES school lags his/her typical peer attending a high SES school by 57.5 score points (0.71 SD). For Australian 15-year-olds, equivalent comparisons show that for students with low SES backgrounds, the average gap in reading literacy associated with attending low versus high SES schools is 77.0 points (0.88 SD); and, for students with high SES backgrounds, the average gap is 71.2 (0.90 SD).

As in the case of reading, school-group SES also plays a significant role in mathematics literacy for both countries. In Canada for example, as shown in Table 2, the typical student with a low SES background and attending a low SES school lags his/her typical peer attending a high SES school by 37.3 points (0.46 SD). Similarly, the typical student with a high SES background and attending a low SES school lags his/her typical peer in

mathematics literacy attending a high SES school by 33.9 points (0.44 SD). For Australian 15-year-olds, equivalent comparisons show that for students with low SES backgrounds, the average gap in mathematics associated with attending low versus high SES schools is 78.7 (1.01 SD); and, for students with high SES backgrounds, the average gap in mathematics literacy performance is 61.4 points (0.80 SD).

For the two countries, the gaps in reading literacy associated with differences between high and low SES school groups are portrayed in Figure 1. This comparative depiction shows that although both countries experience differences in reading literacy associated with the SES of the school – across the entire range of individual student SES – the gaps evident at the two ends of the student-level SES continuum are considerably more pronounced in Australia than in Canada. Specifically, while low SES students in Canada experience a reading literacy gap between low and high SES school groups of 0.55 SD, the equivalent difference is 0.88 SD for Australia. Similarly, while high-middle SES students in Canada experience a reading literacy gap between low and high SES school groups of 0.46 SD, the equivalent difference is 0.76 SD for Australia. If one has either a low or a mid to high SES family background, where one attends school (in terms of the school's aggregated SES) is more important in Australia than it is in Canada.

As with reading literacy for the two countries, the average differences in mathematics literacy associated with differences between high and low SES school groups are also portrayed in Figure 1. This portrayal shows that although both countries experience differences in mathematics literacy associated with the SES of the school – across the entire range of individual student SES – the differences at the ends of the student-level SES continuum are again more evident in Australia than in Canada. Specifically, while



	1st Student Quintile	2nd Student Quintile	3rd Student Quintile	4th Student Quintile	5th Student Quintile
Canada-Reading	0.55	0.53	0.76	0.46	0.71
Australia-Reading	0.88	0.48	0.66	0.76	0.90
Canada-Mathematics	0.46	0.34	0.61	0.30	0.44
Australia-Mathematics	1.01	0.58	0.73	0.78	0.80

Figure 1. Gaps in performance in reading and mathematics between students in low socioeconomic status (SES) and high SES school groups, expressed in standard deviation units, across student SES quintiles for Australia and Canada.

low SES students in Canada experience a mathematics literacy gap between low and high SES schools groups of 0.46 SD, the equivalent difference is fully 1.01 SD for Australia. Similarly, while high SES students in Canada experience a reading literacy gap between low and high SES schools groups of 0.44 SD, the equivalent difference is 0.80 SD in Australia. Similar to the case for reading, but more dramatically in mathematics, if one has either a low or a high SES family background, the aggregated SES of the school one attends appears considerably more important in Australia than in Canada.

Discussion

Our secondary analysis of the relationships between school SES and academic achievement of 15-year-old students in Canada and Australia found the following:

(1) The relationship between school SES and academic achievement is evident for all students in both countries; regardless of their own individual SES, students' academic performance in reading and mathematics improves as the SES of the school group increases;
(2) The relationship between school SES and academic achievement is generally weaker in Canada than in Australia; in other words, where one goes to school typically matters less in Canada than in Australia;
(3) Nevertheless, the relationship between school SES and academic performance is strong in both countries, with differences between the lowest and highest school SES contexts ranging between 0.3 and 1.0 standard deviation units;
(4) In Canada, increases in school SES are associated with increases in student achievement that are relatively consistent in size; in Australia, however, increases in achievement associated with increased school SES are considerably more pronounced between middle and high SES schools than between low and middle SES schools. When plotted (see Figures 2 and 3), relationships between school SES and student achievement in Australia look like the end of an ice hockey stick. In Australia, high SES schools seem able to provide a much stronger performance advantage than other schools. Compared to their counterparts in Australia, high SES schools in Canada do not appear to possess such a relative advantage, except in the case of mathematics performance for high SES students.

As these findings indicate, where one goes to school (in terms of the collective or average SES of the school) seems less important in Canada than in Australia. Achievement gaps between low and high SES students and schools are generally smaller in Canada than in Australia. And attending a high SES school does not provide as much of an educational advantage in Canada as it seems to do in Australia. Figure 2 plots the average mathematics literacy performance for the lowest and highest SES student quintiles, across five school SES contexts for each country, and Figure 3 reproduces this for reading. As can be seen in both figures, the lines representing average student performance tend to be flatter for Canada than for Australia, especially for low SES students. Moreover, the slopes of the lines representing mathematics and reading performance in Australia become particularly steep between middle and high SES school contexts. This is what we refer to as the (ice) "hockey stick" effect.

Compared to Canada, the Australian system appears to be more suited to reproducing educational advantage rather than ameliorating it. The more equitable nature of the

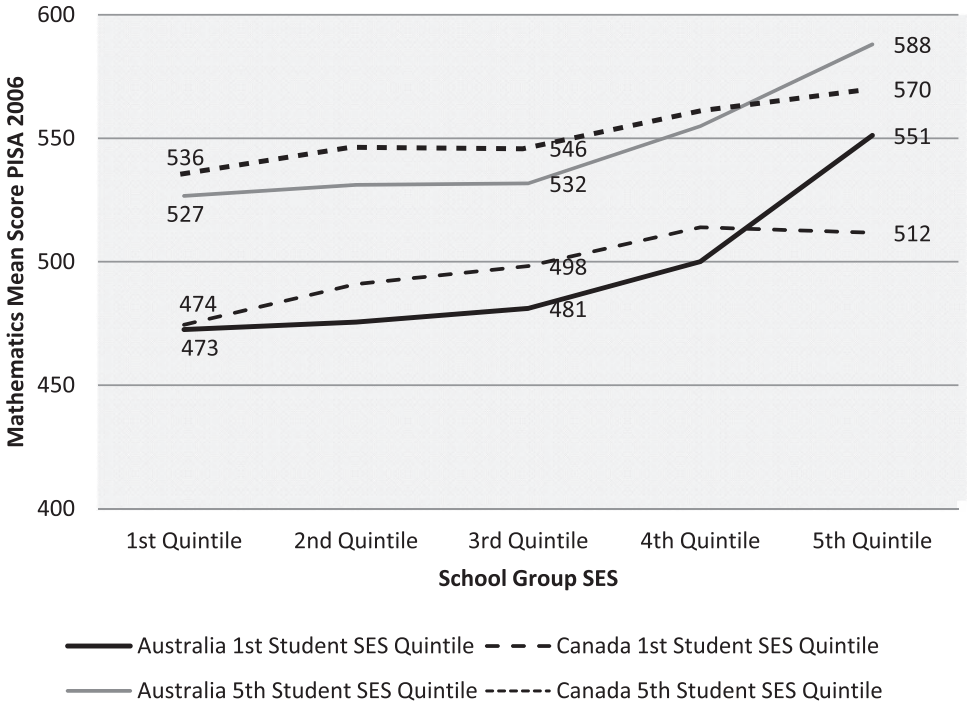


Figure 2. Programme for International Student Assessment (PISA) 2006 mean mathematics performance for low (1st quintile) and high (5th quintile) socioeconomic status (SES) students in Australia and Canada, across school group SES quintiles.

Canadian system, however, is not associated with lower quality. For example, the PISA 2006 report (OECD, 2007b) shows that both countries have essentially the same proportion of students who achieve within the two highest proficiency bands (14.6% for Australia and 14.4% for Canada; the OECD average is 9.0%). Moreover, educational equity in Canada does not come at the expense of privileged students: high SES students perform the same in both countries, while low SES students generally perform higher in Canada than in Australia (Perry & McConney, 2011).

While our study does not provide direct evidence that explains these differences between the two systems of education, we offer the following possible explanations. First, the cross-national differences are unlikely to be due to differences in the student cohorts. The student-level ESCS indices are slightly higher in Canada than in Australia, but the ESCS range is similar for the two countries. Student variability in the distribution of PISA's ECSC is very similar and the inter-quartile range of the distribution is practically the same – 1.12 in Australia and 1.13 in Canada, compared to the OECD average of 1.28 (OECD, 2007b). Similarly, the range of school SES values is comparable between the two countries (OECD, 2007b). In other words, the overall ESCS values for students and schools are comparable between the countries. Second, it is unlikely that the Canadian education system has lower achievement gaps than Australia because the former has more effective teachers or principals. There is nothing in the research literature that would suggest qualitative

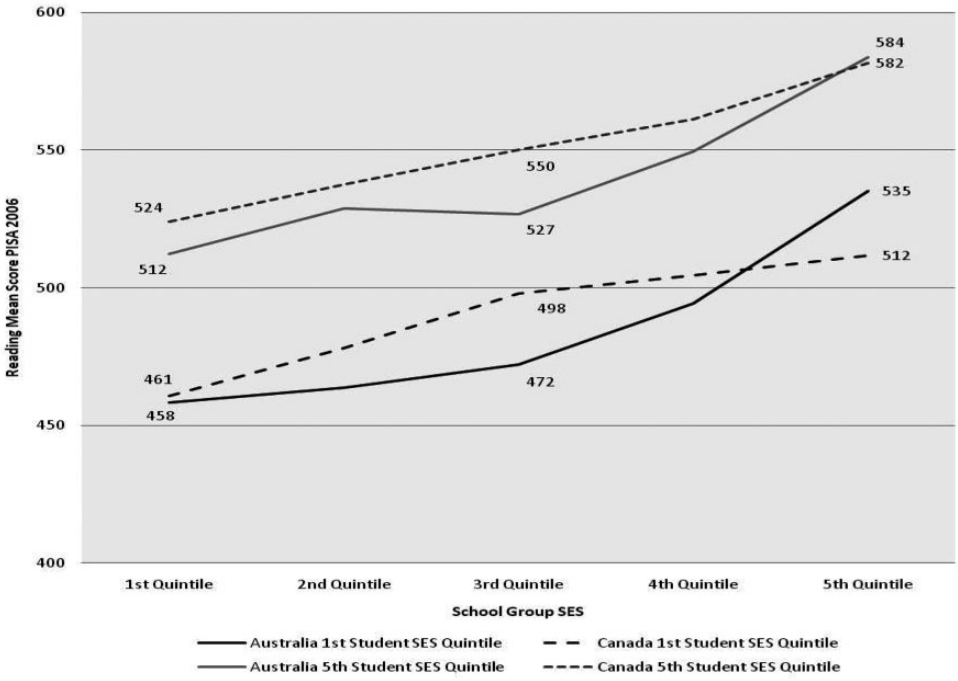


Figure 3. Programme for International Student Assessment (PISA) 2006 mean reading performance for low (1st quintile) and high (5th quintile) socioeconomic status (SES) students in Australia and Canada, across school group SES quintiles.

differences in the training, quality or effectiveness of practitioners across the two countries. This would remain a possibility, however, and would certainly be worthy of future study.

Rather than qualitative differences between students or practitioners, it is more likely that our findings are reflective of differences in the ways in which students are sorted across schools, and the resources that are available to students across different school contexts. School socioeconomic segregation is much less pronounced in Canada than in Australia. Approximately 60% of students attend a socially mixed school in Canada, a proportion which is second only to Finland and Norway (OECD, 2010). By contrast, only 35% of students in Australia attend a socially mixed school, one of the smallest proportions among OECD countries. Likewise, approximately 55% of advantaged students attend a socially advantaged school in Australia, compared to 40% in Canada. This higher level of Australian school segregation is accompanied by PISA analyses that show that advantaged schools in Australia are more likely to have better educational resources than other schools, and that this correlation is moderately strong (0.31) and statistically significant compared to the OECD average (OECD, 2010). This correlation is uncommon among OECD countries; indeed, only three (Australia, Chile and Mexico) of the 34 participating OECD countries showed such a correlation between advantaged schools and superior resources.

Conclusion

The relationship between school SES and student outcomes is generally stronger in Australia than in Canada. An important and visible difference between the Australian and Canadian educational systems is the degree to which they are marked by school choice, privatisation and social segregation. In Australia, these features of educational marketisation have provided unequal access to resources and "good" schools and have led to levels of social exclusion and segregation higher than in comparable, highly developed countries such as Canada. Our findings build on previous theoretical and empirical research suggesting that where one goes to school matters a great deal in education systems that have high levels of social segregation and differential resourcing. Our findings also suggest that such systems foster an educational "Matthew effect" that increases rather than decreases achievement gaps between advantaged and disadvantaged students and schools.

Declaration of conflicting interests

None declared.

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