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E-BRIEF

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SOCIAL POLICY

Are Middle Schools Good for Student Academic Achievement? Evidence from Ontario

by
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- Many Ontario students attend middle schools rather than staying in the same elementary school through Grade 8. Some students switch to an "extended middle school" for grades 6, 7, and 8. Most of the remaining students attend a "standard middle school" where grades 7 and 8 are taught.
- The probability of passing the province's Grade 9 mathematics assessment, after controlling for differences in student background, is 1.5 percentage points lower when a student attends an extended middle school and 1.7 percentage points lower when a student follows the standard middle school path.
- In regions with falling student populations, policymakers should place a priority on closing middle schools and, elsewhere, avoid opening new ones.

Students in Ontario typically follow one of three paths from Grade 5 to Grade 9. The majority of students remain in the same school until Grade 8 before moving on to secondary school. Others leave their elementary school after Grade 6, usually to complete grades 7 and 8 in a standard middle school, or junior high school. A smaller number of students attend an extended middle school for grades 6, 7 and 8.

In this E-Brief, I compare student achievement on the Education Quality and Accountability Office (EQAO) assessments in Grade 9 and Grade 10 by students who follow the three different paths. Specifically, I compare the results of students who stay in the same elementary school through Grade 8 (66.4 percent of students in Ontario in the 2005/2006 school year – see Table 1)

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to students who follow one of two middle school paths: those who leave their elementary school after Grade 6 (20.2 percent of students), usually to attend standard middle school, and those who leave after Grade 5 to attend an extended middle school (9.8 percent of students).[1] To further refine the analysis, I then screen out the socio-economic background of students based on the education levels of their parents, which is important for the analysis since middle schools are typically located in communities with higher-than-average parental education levels.

Does attending a middle school make a difference to student achievement compared to attending the same elementary school through Grade 8? Is the academic performance of students unaffected, enhanced or eroded? How do students from disadvantaged backgrounds fare? These are crucial questions for educators and parents.

My analysis shows that students who follow either middle school path have a 1.5 percentage point lower probability of passing, on average, the Grade 9 mathematics assessment than otherwise similar students who do not attend middle school. Middle school attendance is associated with about 600 additional Grade 9 mathematics exam failures per year. Further, I find that students on the standard middle school path have a 1 percentage point lower probability of passing on the Ontario Secondary School Literacy Test in Grade 10 (the OSSLT); this path is associated with roughly 300 additional OSSLT failures. As well, students who come from less advantaged backgrounds do worse than other students when they attend middle school.[2]

The policy implications for education in Ontario are clear. Regions with falling school-aged populations should make closing middle schools a priority. In regions where population growth is leading to new school openings, school boards should not open middle schools. The evidence shows it is better for students to remain in the same elementary school from kindergarten to Grade 8 than to switch to a middle school.

Measuring the Effect of Middle Schools on Student Performance

An Initial Setback: Middle Schools and Grade 6 Performance

Students who attend an extended middle school, spanning grades 6 to 8, write the Grade 6 assessment at the end of the first year in a new school. These students do worse than students who write the same Grade 6 assessment without changing schools. The reading and math pass rates – the percent of all students who meet or exceed provincial standards – in Grade 6 are between 6 and 7 percentage points lower for students who attend an extended middle school than for students who do not attend middle school (Table 1).[3]

1 I do not analyze the performance of the small percentage of students who take other paths from elementary to secondary school.

2 These results mirror a large number of similar results in the recent literature. Johnson and Brydon (2012) show that Grade 6 students in Ontario who make a transition from Grade 5 to Grade 6 across a new school perform considerably worse on the assessment in Grade 6 than equivalent students who did not switch schools. Dhuey (2012) shows that students who pass through middle schools in British Columbia show smaller gains in learning from Grade 4 to Grade 7 and, more importantly, middle school passage has large negative effects on English exams in Grade 10 and Grade 12. Johnson (2010a) shows a transition from Grade 6 to Grade 7 across British Columbia schools reduces Grade 7 scores. Schwerdt and West (2011) find the middle school path in Florida leads to lower academic results, higher drop-out rates and higher absence rates from high school. Finally, Rockoff and Lockwood (2010) find the middle school path for students in the New York City school system reduces performance as of Grade 8.

3 These results were also reported in Johnson and Brydon (2012).

Table 1: Student Performance on EQAO Assessments, by Path from Grade 5 to Secondary School

Student path from Grade 5 to secondary school	Grade 10 students in 2005/06 number (percent)	Grade 6 reading 2005/06 (percent passed)	Grade 6 math 2005/06 (percent passed)	Grade 6 math 2006/07 (percent passed)	Grade 10 OSSLT 2009/10 (percent passed in Gr. 10)	Grade 9 math 2008/09 (percent passed)	Grade 9 math 2009/10 (percent passed)	Percent of adults in Grade 6 school community with some university education
No middle school	93,874 (66.4)	67.8	67.3	65.1	81.2	68.3	72.0	26.6
Standard middle school path	28,620 (20.2)	71.0	71.1	68.5	81.8	69.2	72.8	33.9
Extended middle school path	13,868 (9.8)	62.6	62.1	58.9	79.6	65.7	71.7	34.5
Total	**141,171**	**67.9**	**67.6**	**65.2**	**81.2**	**68.2**	**72.2**	**28.8**

Sources: Author's calculations from EQAO, Ministry of Education and Statistics Canada data.

The After-Effects: Middle Schools and Grades 9 and 10 Performance

I directly compare the pass rates on assessments in Grade 9 and Grade 10 of students who attended middle school with those of students who did not. Initial results indicate that students who follow the standard middle-school path (grades 7 and 8) achieve higher pass rates on Grade 9 and Grade 10 tests than students who do not attend middle schools. Students who attended extended middle school (grades 6 to 8) do slightly worse than students who do not attend middle school (Table 1). Both performance gaps are small, less than one percentage point in both assessments.

At first glance, these results suggest that the standard middle school path improves Grade 9 and 10 performances while attending extended middle school lowers secondary school performance. Both conclusions would be false. The reason for this is that about half of the variation in pass rates on provincial assessments at Ontario schools is due to variation in the socio-economic background of students who attend.[4] Students who follow either middle school path come from communities where adults have, on average, higher education levels than in communities without middle schools. Students in Grade 6 classes on an extended middle school or a regular middle school path come from neighbourhoods where, on average, 34.5 and 33.9 percent of parents, respectively, have some university education. In contrast, students who attend elementary schools until Grade 8 come from neighbourhoods where, on average, 26.6 percent of adults have some university education. These socio-economic advantages mean that middle school students should otherwise have higher pass rates on the Grade 6, Grade 9 and Grade 10 assessments than students who do not attend middle school.

4 See Johnson (2005) and, more recently, Johnson and Brydon (2012).

Table 2: Changes in Student Pass Rate by Middle School Path

Percentage point change in pass rate on secondary school assessment				
Assessment	**Grade 9 Mathematics**		**Grade 10 Literacy (OSSLT)**	
Path through middle school:	Extended	Standard	Extended	Standard
Change in average pass rate relative to students who do not attend middle school	-1.5**	-1.7**	-0.1	-0.9**
Pass rate relative to students who do not attend middle school, by socio-economic background percentile. (percent of adults in the Grade 6 school community with some university – in parentheses)				
Assessment	**Grade 9 Mathematics**		**Grade 10 Literacy (OSSLT)**	
Path through middle school:	Extended	Standard	Extended	Standard
10th percentile (9%)	-5.4**	-6.2 **	-0.8	-3.2**
25th percentile (15%)	-3.6**	-4.1**	-0.5	-2.1**
50th percentile (25%)	-1.3**	-1.4**	-0.1	-0.7*
75th percentile (44%)	0.5	0.7*	0.2	0.3
90th percentile (75%)	2.4**	2.9**	0.5	1.4**

*This change is statistically significant at 5%. ** This change is statistically significant at 1%.

Sources: Author's calculations from EQAO, Ministry of Education and Statistics Canada data.

Indeed, students who follow the standard middle school path have, as predicted, much higher Grade 6 pass rates before switching schools than students who stay in elementary school. However, that gap in pass rates then shrinks when the same group of students is re-assessed in Grades 9 and 10, meaning their performance advantage in Grade 6 is eroded after attending a standard middle school. In other words, students who follow the standard middle school path make less academic progress relative to non-middle school students.

The Effect of Socio-Economic Factors

After controlling for differences in student background (see online Appendix at **http://www.cdhowe.org/pdf/e-brief_141_appendix.pdf**), I find that, compared to a student who does not attend middle school, the probability of passing the Grade 9 mathematics assessment is 1.5 percentage points lower when a student attends an extended middle school and 1.7 percentage points lower when a student follows the standard middle school path (Table 2).[5]

5 See the online Appendix for details on how I control for individual student backgrounds.

There are roughly 40,000 middle school students per year, meaning that if the path by which students transition from elementary to secondary schools is the cause of this decline, about 600 more students would have passed the Grade 9 mathematics assessments had they instead gone directly into a secondary school from elementary.[6]

A student following the extended middle school path has the same probability, after controlling for student background, of passing the OSSLT as a student who did not attend middle school (Table 2). However, a student following the more common standard middle school path has a 0.9 percentage point higher probability of failing the OSSLT than an otherwise similar student attending an elementary school that ends in Grade 8. There are about 30,000 students following the standard middle school path each year, meaning that, assuming that the education path is the cause of this lower performance, 270 more students fail the OSSLT because they attended a standard middle school.

The Middle School Effect by Student Socio-Economic Background

Lastly, I estimate how the middle school paths correlate with Grade 9 and 10 performances of students with different socio-economic backgrounds.[7] Students from the bottom tenth of this socio-economic measure – where students come from neighbourhoods where 9 percent of adults have a university education compared to the provincial average of 25 percent – have a 5 percentage points lower probability of passing the Grade 9 mathematics test when they attend middle schools relative to otherwise similar students who do not attend middle school.[8] For a group of 100 such disadvantaged students, five more students will fail Grade 9 mathematics if they attend middle school than if they stay in same elementary school. In contrast, students from the 90th percentile of this socio-economic measure who attend middle schools have a higher probability of passing the mathematics test than otherwise similar students who do not attend middle schools. This group of students who do better in middle schools is smaller than the group who underperform in middle schools, meaning that the overall effect is that fewer students pass these exams when they attend middle school.

Students from communities ranking in the bottom tenth by parental education pass the OSSLT at a 3 percent lower rate when they follow the standard middle school path instead of staying in the same elementary school until Grade 9. However, there is no statistically significant association of the extended middle school path and passing the OSSLT at any point on the distribution of parental education.

6 To put this number in context about 42,000 Grade 9 students do not pass the mathematics assessment each year.

7 The social and economic measure is the percent of adults with some university education in the catchment area of the student's Grade 6 school, which is a good predictor of school assessment results. See Johnson and Brydon (2012) for the most recent analysis of Ontario EQAO Primary and Junior Assessments using this type of student background variable. It would be possible to use the predicted pass rate at the student's Grade 6 school as a broader and more complex social and economic index measuring the advantages a student brings to school from his home environment. In another study with a similar methodology, Johnson (2011), I found that the broader index of predicted pass rates and the simpler index of the percent of adults in the school community with some university yielded similar results. I use the simpler measure here, and the results would likely not differ substantially if I included additional controls.

8 For the 25 percent most disadvantaged students in the province – that is, where students come from neighbourhoods where 15 percent of adults have a university education – students who attend middle schools have about a 4 percentage point lower probability of passing on the Grade 9 mathematics test than otherwise similar students who do not attend middle school.

Conclusion

Students who attend an elementary school and then move to a middle school prior to secondary school have a higher probability of failing the EQAO assessments in Ontario secondary schools than otherwise similar students who remain in the same elementary school to the end of Grade 8. The reduction in pass rates is highest on assessments of mathematics and highest for students from a lower socio-economic background. This result in Ontario confirms a series of similar results in other jurisdictions. Given this evidence, it makes no sense to open new middle schools. In fact, policymakers should place a high priority on closing middle schools in communities with shrinking student populations.

References

Dhuey, Elizabeth. 2012. "Middle School or Junior High? How Grade Level Configurations Affect Academic Achievement." University of Toronto Working Paper.

Johnson, David R. 2005. *Signposts of Success: Interpreting Ontario's Elementary School Test Scores*. Policy Study 40. Toronto: C.D. Howe Institute.

————. 2010a. "British Columbia's Best Schools: Where Teachers make a Difference." E-Brief. Toronto: C.D. Howe Institute.

————. 2010b. "School Grades: Identifying Alberta's Best Schools, an Update." E-Brief. Toronto: C.D. Howe Institute.

————. 2011. "Do Strikes and Work-to-Rule Campaigns Change Elementary School Assessment Results?" *Canadian Public Policy* 37(4): 479-494.

Johnson, David R., and Robbie Brydon. 2012. "Ontario's Best Public Schools: 2009-2011." E-Brief: Toronto: C.D. Howe Institute.

Rockoff, Jonah E., and Benjamin B. Lockwood. 2010. "Stuck in the Middle: Impacts of Grade Configuration in Public Schools." *Journal of Public Economics* 94: 1051-1061.

Schwert, Guido, and Martin R. West. 2011. "The Impact of Alternative Grade Configuration on Student Outcomes through Middle and High School." Harvard University Working Paper.

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