Elementary At-Risk Status and Post-secondary Access in the Toronto District School Board, 2000-2013

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Robert S. Brown, Toronto District School Board/York University
Maria Yau, Toronto District School Board
Yueming Xi, Ontario Institute for Studies in Education/University of Toronto
Gillian Parekh, York University
George Tam, Toronto District School Board

Toronto District School Board

Ontario Public School Education – In A Transition

- Formerly, focus has been on high school graduation/dropout from high school.
- Now, it is being recognized that post-secondary credentials (college diploma, university degree) are necessary for long-term employment and long-term health (e.g., Ministry of Education/York University/Toronto District School Board (TDSB) report "Unlocking Student Potential Through Data", 2017).

The new definition of at-risk status: lack of direct entry to post-secondary by end of five years.
(A bit of a paradigm switch for Ontario public school education)

Question: How early can we confidently predict this new at-risk status?

- A Fishing Expedition: Looking at what we have in terms of available information on our earliest cohort in predicting lack of post-secondary access.
- Next Step in the Fishing Expedition: A logistic regression.
- Note: Hierarchical Linear and Nonlinear Modeling (HLM) is not relevant since most students attended 3-5 schools by the end of the study.

Details

- Cohort started in Spring 2000, with the Early Development Instrument (EDI) administered to 1999-2000 Senior Kindergarten (SK) students in part of the TDSB (North York and Toronto legacy systems).

- Cohort tracking for 13 years, until Fall 2013, when students had finished secondary school and transitioned to post-secondary schooling.

Progress of Students from SK to Post-secondary

Start of tracking: 1999-2000 SK
(EDI administered in Spring 2000)

- 2000-01 • Grade 1
- 2001-02 • Grade 2
- 2002-03 • Grade 3 (Provincial Grade 3 test in reading, writing, mathematics)
- 2003-04 • Grade 4 (earliest absenteeism information available from TDSB)
- 2004-05 • Grade 5 (earliest Special Education programming from TDSB)
- 2005-06 • Grade 6 (Provincial Grade 6 test in reading, writing, mathematics)
- 2006-07 • Grade 7 (TDSB Student Census)
- 2007-08 • Grade 8 (end of Ontario elementary panel)
- 2008-09 • Grade 9 (beginning of secondary panel; Provincial Grade 9 mathematics test; TDSB Grade 9 Secondary Success Indicators)
- 2009-10 • Grade 10 (Provincial Grade 10 Literacy Test)
- 2010-11 • Grade 11
- 2011-12 • Grade 12 (Year 4) – First year of post-secondary pathways (2012 OUAC[1] and OCAS[2] application cycle)
- 2012-13 • Grade 12 (Year 5) – Second year of post-secondary pathways (2013 OUAC[1] and OCAS[2] application cycle)

End of tracking: Fall 2013
(beginning of secondary Year 6)

[1] Ontario Universities' Application Centre
[2] Ontario College Application Service

Logistic Regression looking at odds of not applying to college or university by the end of Year 5

- Dependent variable: Students who did not apply to post-secondary by the end of five years of secondary school.
- **Why five years of secondary school?** TDSB studies have found that while some will attend post-secondary later, the five year outcome accounts for the vast majority of students going to post-secondary, and that those who did not apply over that time are also less likely to apply as adults.
- It doesn't provide the whole picture, but it provides most of the picture.
- Post-secondary information taken from Ontario college and university application data (OCAS and OUAC) over two years (2012 and 2013 post-secondary application cycles).

Independent Variables

Socio-demographic

- Gender
- Month of birth
- Race (2006-07 Student Census)
- Parental education
- Family structure

Elementary panel variables

- EDI administered in SK
- Grade 3 EQAO (Reading, Writing, Mathematics)
- Absenteeism Grade 4 (2003-04)
- Grade 5 Special Education programming (congregation/regular Special Education from 2004-05)
- Suspensions in elementary school, 2000-01 to 2007-08 school years or Grade 1 to Grade 8

Secondary panel variables

- Average mark in Grade 9 Mathematics
- Program of Study in Grade 9 (Academic/non-Academic)
- Grade 9 credits completed

Model

- Model 1: EDI, age, and gender significant but the overall model explained little.
- Model 2: Socio-economic and elementary achievement/school variables, model valid and explained 15-25%.
- Most of these variables are significant: gender, age, EDI, low achievement in EQAO, Special Education placement, absenteeism had significant influence on whether students applied or did not apply to post-secondary (see Table 1).
- Odds of not going to post-secondary if suspended during elementary school are quite high.

Table 1: Logistic Regression on At-risk Status – Elementary/Socio-demographic Variables

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Elementary Suspensions	1.245	0.114	119.39	1	0	3.475	2.779	4.344
	EDI High Risk	0.084	0.141	0.359	1	0.549	1.088	0.826	1.434
	Congregated SEN	0.955	0.175	29.701	1	0	2.597	1.843	3.661
	Regular SEN	0.44	0.139	9.938	1	0.002	1.552	1.181	2.04
	Absenteeism (0-100%)	0.093	0.01	84.847	1	0	1.098	1.076	1.12
	Low Achievement Grade 3 Tests	0.392	0.094	17.322	1	0	1.48	1.231	1.78
	Less than University parental education	0.296	0.088	11.231	1	0.001	1.344	1.131	1.598
	Black, Indigenous or Latino	0.33	0.114	8.405	1	0.004	1.391	1.113	1.739
	Male	0.338	0.088	14.858	1	0	1.403	1.181	1.666
	Youngest four months of birth	-0.213	0.101	4.463	1	0.035	0.808	0.663	0.985
	Other than Two Parent Family	0.517	0.1	26.609	1	0	1.678	1.378	2.042
	Constant	-2.451	0.103	567.942	1	0	0.086		

Model con't

- Model 3: With Grade 9 achievement and structure variables (see Table 2).
- Grade 9 structure variables wipe out many variables seen in Model 2. Streaming was easily the strongest variable, followed by Grade 9 credit completion.

Table 2: Logistic Regression on At-risk status – Grade 9 Variables Added

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Elementary Suspensions	0.611	0.133	21.036	1	0	1.842	1.419	2.391
	EDI High Risk	-0.227	0.163	1.927	1	0.165	0.797	0.579	1.098
	Congregated SEN	0.033	0.204	0.025	1	0.873	1.033	0.693	1.541
	Regular SEN	-0.207	0.164	1.595	1	0.207	0.813	0.59	1.121
	Absenteeism (0-100%)	0.058	0.011	26.992	1	0	1.06	1.037	1.083
	Low Achievement Grade 3 Test	0.221	0.105	4.422	1	0.035	1.248	1.015	1.534
	Less than University parental education	-0.028	0.1	0.08	1	0.778	0.972	0.8	1.182
	Black, Indigenous or Latino	-0.168	0.131	1.637	1	0.201	0.846	0.654	1.093
	Male	0.385	0.098	15.513	1	0	1.469	1.213	1.779
	Youngest four months of birth	-0.214	0.111	3.693	1	0.055	0.808	0.649	1.004
	Other than Two Parent Family	0.458	0.112	16.778	1	0	1.58	1.269	1.967
	Non-Academic Pathway Gr 9	1.311	0.123	113.386	1	0	3.71	2.914	4.722
	Fewer than 8 Credit s Gr 9	1.62	0.186	75.81	1	0	5.053	3.509	7.276
	First Math Course Mark (Secondary)	-0.033	0.003	105.869	1	0	0.968	0.962	0.974
	Constant	-0.152	0.245	0.385	1	0.535	0.859		

At-risk Status

- At this point, it is worthwhile to look at the actual dataset information to get more of a handle on what is happening.
- Table 3: Let's look at cross-tabulations of the elementary achievement and school variables – EDI, suspensions, provincial assessments in Grade 3, absenteeism, special education.
- In some cases – as with 'high risk' as defined by EDI in kindergarten, and with the Grade 3 EQAO assessments (Level 1 or below) it turns out that most of those students flagged as 'high risk' do end up applying to post-secondary – and most of those who do not apply were not flagged by these variables.
- These are general flags – and hence show up as significant – but not highly **accurate** predictors.

Table 3: Regression Variables According to At-Risk Status – SK to Post-secondary Cohort

Variable	% of all who do not apply	% of this group that do not apply
Elementary (JK to Grade 8)		
EDI high risk (2 or more domains)	18%	40%
Grade 3 EQAO Level 1 or below (3 subjects)	38%	34%
More than 10% Absenteeism Grade 4	18%	52%
Congregated Special Education Needs (Grade 5)	16%	56%
Integrated Special Education Needs	15%	39%
Suspended during elementary	32%	54%
Demographic		
Without University education	70%	26%
Male	60%	27%
Other than 2 parent family structure	35%	36%
Black/Aboriginal/Latino students	22%	37%
Secondary (Grade 9)		
Proportion Non-Academic in Grade 9 (streaming)	55%	57%
Proportion with fewer than 7 credits	49%	70%

At-risk Status con't

- **Elementary at-risk:** With three elementary variables – high absenteeism in Grade 4, suspended at some point over the elementary panel, and being placed in a congregated Special Education class by Grade 5 – the majority of these students did not apply to post-secondary. That being said, each higher-risk group in itself did not by itself, account for a majority of students who did not apply. For example, over half (52%) of the students with very high absenteeism in Grade 4 did not apply to post-secondary. But those high absenteeism students accounted for only 18% of all students who did not apply to post-secondary.

- However, interestingly, **if the three elementary variables are combined, they account for half of the students who do not apply to post-secondary** (468 of 929 students who did not apply to post-secondary, or 50%).

- **Secondary at-risk:** When we looked at just two Grade 9 variables – students enrolled in the non-Academic streams, and those who completed fewer than the standard of 8 credits by the end of Grade 9 – this provided the row-column combination: most of the students who were identified as 'at-risk' this way did not go to college; while most who did not go to college were identified as 'at-risk' this way.

- (633 of 1,137 or 56% of students identified as high risk this way did not apply to post-secondary, while of the 929 students who did not go to college, 633 or 68% were identified this way).

Figure 1: Non-application to Post-secondary – Elementary At-risk

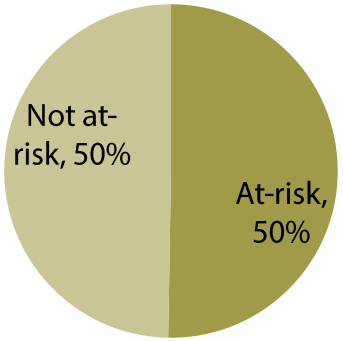
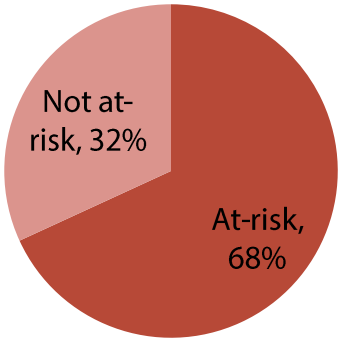


Figure 2: Non-application to Post-secondary – Secondary At-risk



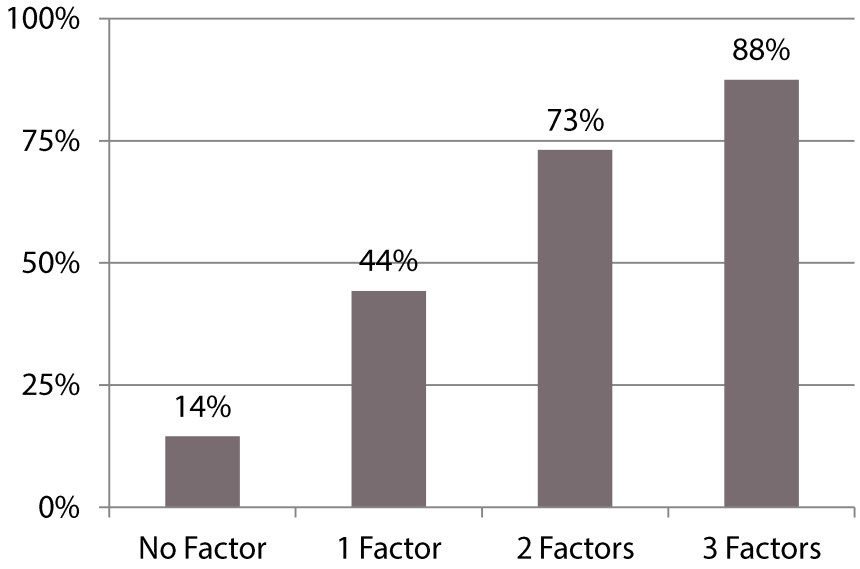
Elementary At-risk

- Overall, students who had any one of these factors:
  - Student suspended at least once at some point over the elementary panel (JK to 8);
  - Very high (above 10%) absenteeism in Grade 4;
  - Congregated Special Education classes in Grade 5

  accounted for half of the students who did not apply to post-secondary.

- However, looking in more detail, we can see that there are four levels:
  - Of students with no factors, 14% did not apply to post-secondary (448 of 3,091);
  - Of students with any one of the three factors, this tripled to 44% who did not apply to post-secondary (341 of 770);
  - Of students with two of the three factors, this increased to 73% who did not apply to post-secondary (106 of 145);
  - Of students with all three factors, this increased to 88% who did not apply to post-secondary (14 of 16) (see Figure 3).

Figure 3: Non-application to Post-secondary by Number of Risk Factors – Elementary At-risk



Summary

A few general findings:

- 1. a) None of the available variables from the elementary panel were definitive in predicting at-risk status. For example most of the students at Level 1 or below from the provincial assessments ended up applying to post-secondary. The lack of EQAO in predicting at-risk is something we previously documented in looking at secondary school mathematics (Brown et al., 2015).
- The Ministry of Education/EQAO are in the process of re-examining provincial testing, and the lukewarm connection of EQAO indicators to post-secondary access is something that should be a focus.

- 1. b) We did find three elementary variables – elementary suspensions, placement in congregated Special Education classes, and high absenteeism – which collectively did account for half of the students who did not apply to post-secondary. Given the paucity of elementary indicators in this dataset, this shows the potential with more comprehensive information.

- 2. At the same time two Grade 9 structural variables – Grade 9 credit accumulation and streaming – ended up with explaining most of the at-risk status. The power of Grade 9 structure was so intense that it ended up making Special Education and most socioeconomic variables insignificant. In part this is because Special Education and socioeconomic status are so strongly connected to Grade 9 structure in Ontario.

Summary con't

- 3. The power of credit accumulation is especially troubling since it means that the current available interventions (e.g., credit recovery) appear to make little substantive difference (see for example Brown et al., 2015 to see this in place looking at Mathematics in this cohort).
- It is also important to note that the strongest links to at-risk are not found in an individual subject – such as Mathematics or English or Science – but a broader structural process.
- Currently, Ontario initiatives tend to be very subject specific – currently much of the direction is on a new Mathematics initiative, focusing on the decline in Mathematics common to most developed nations (most noticeably Programme for International Student Assessment (PISA) scores).
- The structural issues found in this long-term cohort study suggests that while subject-specific initiatives are important, they need to take place over a broader focus of general student achievement.

- 4. The consistent and strong role of cumulative suspensions as a barrier to post-secondary access, has been found in other TDSB research (see Brown and Parekh, 2013; Brown et al., 2017).
- At this point however Ontario does not even collect information looking at cumulative suspensions, but provides only an annual summary indicator which is not student based.
- This is an obvious next step for future investigation.

- 5. From the elementary variable (Step 2) regression (and cross tabulations) it appears that younger students appear to do slightly better than older students – the reverse of earlier findings, which had looked at Elementary student achievement. It would be worthwhile looking at future cohorts to see if this is a consistent pattern.

Summary Wrap-up

- We can't really do a comprehensive prediction of post-secondary access from our elementary panel information. Our elementary achievement information (EQAO) and school readiness indicator (EDI) can provide general flags: but most students identified end up applying to college, while most who do not apply to college are not flagged.

- We do have other indicators that show strong effects: high absenteeism, being suspended during the elementary grades, and placement in congregated Special Education classes.

- And our Grade 9 variables of streaming and credit accumulation are extremely strong predictors – which also indicates that our interventions after Grade 9 seem to have limited effects.

Next Steps?

- Elementary variables – EDI, provincial assessment, absenteeism, suspensions, Special Education status – were significantly related to lack of post-secondary access. However, none of the elementary variables in themselves were able to predict post-secondary attainment.

- This study was the first of its kind and some variables were missing. It might have been useful to look at early Learning Skills, for example, which was not available for this cohort.

- **Down the road:** The TDSB's SK cohort of 2004-05 participated in the first board-wide EDI; those students are now entering Grade 12 Year 5 in the 2017-2018 school year. When we have their 2018 application cycle information (spring 2019) we will be able to replicate this study but with greater numbers and more (and earlier) variables.

- At that point, the construction of a weighted variable based on multiple elementary school indicators may provide more precise at-risk prediction, which would increase the efficacy of early interventions.