

The Causes and Consequences of Student Mobility: Evidence from New York City

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Mobility can mean a lot of different things

Summer move	Change schools between June and September
Structural	Change schools between June and September after completing the terminal grade of the origin school
Non-structural	Change schools between June and September before completing the terminal grade of the origin school
Articulated	Change schools between June and September and enter the lowest grade of the destination school
Non-articulated	Change schools between June and September and enter the destination school mid-grade span
Mid-year move	Change schools between September and June
Within district (state/country)	Both origin and destination schools are in a single school district (state/country)
Between district (state/country)	Origin and destination schools are in different school districts (states/countries)
Residential move	Change residences

Selected Work on Mobility

Published:

- Schwartz, Stiefel, and Chalico (2009). “The Multiple Dimensions of Student Mobility and Implications for Academic Performance: Evidence from New York City Elementary and Middle School Students.” Condition Report, Education Finance Research Consortium, New York State Education Department.
- Stiefel, Schwartz, and Conger (2010). “Age of Entry and the High School Performance of Immigrant Youth.” *Journal of Urban Economics*.
- Schwartz and Stiefel (2011). “Immigrants and Inequality in Public Schools,” Greg Duncan and Richard Murnane, eds., Whither Opportunity? Rising Inequality, Schools, and Children’s Life Chances. Russell Sage Foundation, New York, NY.
- Been, Ellen, Schwartz, Stiefel, and Weinstein (2011). “Does Losing Your Home Mean Losing Your School? Effects of Foreclosures on the School Mobility of Children.” *Regional Science and Urban Economics*.
- Schwartz, Stiefel, Rubenstein and Zabel (2011). “The Path Not Taken: How Does School Organization Affect Eight-Grade Achievement?” *Educational Evaluation and Policy Analysis*.

In Progress:

- Schwartz and Stiefel. “Moving Matters: The Causal Effect of School Mobility on Student Performance.”
- Cordes, Schwartz, and Stiefel. “Does Residential Mobility Harm School Performance?”
- Cordes, Schwartz, Stiefel, and Zabel. "Re-examining Whether Neighborhood is Destiny: How Initial Conditions Shape K-12 Educational Experiences.”
- Schwartz, Stiefel, and Whitesell. “Stable Students, Unstable Peers: The Spillover Effects of Mid-Year Entry on Stable Student Achievement.”

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Considerable mobility into and out of the school district

	All Students	1-7 Grade Exiters	8 th Grade Exiters	Stayers	New 1st Grade	New 2-8 Grade	All Students
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
N. Obs.	660,698	52,982	65,147	542,569	80,085	40,970	663,624
White	0.15	0.14	0.17	0.15	0.15	0.13	0.15
Black	0.35	0.36	0.35	0.35	0.32	0.35	0.35
Hispanic	0.39	0.40	0.35	0.39	0.40	0.37	0.39
Asian	0.11	0.09	0.13	0.11	0.12	0.14	0.11
Age	10.91	10.96	14.54	10.46	6.40	10.37	9.97
Female	0.49	0.45	0.51	0.49	0.50	0.45	0.49
Foreign Born	0.16	0.17	0.26	0.15	0.09	0.41	0.15
Free Lunch Elig.	0.75	0.74	0.69	0.76	0.72	0.72	0.73
Red. Price Lunch	0.07	0.07	0.08	0.07	0.07	0.07	0.08
LEP	0.11	0.10	0.11	0.11	0.11	0.30	0.10

Less than 2/3 of NYCDOE 1st graders are enrolled in 8th grade seven years later

		Enrolled in 8 th Grade		Total
		No	Yes	
Enrolled in 1 st Grade	No	23,794 41.7%	33,207 58.3%	57,001 39.3%
	Yes	42,021 47.8%	45,914 52.2%	87,935 60.7%
Total		65,815 45.4%	79,121 54.6%	144,936 100.0%

Key:

Frequency

Row Percentage

Column Percentage

Less than 1/3 of NYCDOE 1st graders are enrolled in 12th grade eleven years later

		Enrolled in 12 th Grade		Total
		No	Yes	
Enrolled in 1 st Grade	No	103,932 80.4% 63.6%	25,339 19.6% 47.9%	129,271 59.7%
	Yes	59,569 68.3% 36.4%	27,595 31.7% 52.1%	87,164 40.3%
Total		163,501 77.2%	52,934 22.8%	216,435 100.0%

Key:

Frequency

Row Percentage

Column Percentage

12th grade persistors (since 1st grade) differ from entrants, exiters, and “visitors”

	Visitors	Exiters	Entrants	Persistors
Percent				
Asian	10.6	8.1	20.1	17.0
Hispanic	43.4	42.1	34.9	34.8
Black	36.9	35.7	33.3	30.4
White	9.1	14.1	11.7	17.8
Male	56.3	53.4	49.6	44.1
Native born	70.0	90.8	52.7	88.4
Ever Free lunch eligible	95.9	93.0	93.5	91.2
Ever ESL	29.6	20.8	40.6	18.8
Ever Special Ed.	17.9	21.5	12.2	7.8
Average				
3 rd Grade ELA	-0.35	-0.13	-0.23	0.36
3 rd Grade Math	-0.35	-0.14	-0.21	0.39
# Yrs in NYCDOE	6.2	8.1	7.3	12.0
Age as of 12/31/08 (12 th)	19.0	17.6	18.2	17.6
N	103,932	63,098	25,339	24,066

Moving Matters: The Causal Effect of School Mobility on Student Performance (Schwartz and Stiefel, 2013)

- Student mobility across U.S. schools is significant
 - GAO (2010): 95% of K-8th grade students change schools at least once before 9th grade; roughly 30% change schools 3+ times
- Conventional wisdom is that mobility hurts students' academic performance
- But research on the causal rather than correlational effects of mobility is scarce
- In this paper, we aim to provide causal evidence on the impact of school mobility

- Early literature using cross sectional data finds a negative correlation between mobility and performance (Mehana and Reynolds, 2004)
- More recent work uses longitudinal data with improved controls and, in one case, student FX (Alexander, Entwisle, and Dauber 1996; Temple and Reynolds 2000; Hanushek, Kain, and Rivkin 2004)
 - Typically focuses on *non-structural* moves
 - Non-structural: moves not related to “graduating” from school’s terminal grade
 - Finds most moves have negative effects on performance, but some (to better schools) have positive effects
- Parallel literature (grade span) focuses on *structural* moves and consistently finds negative effects (Schwartz, Stiefel, Rubenstein, Zabel 2011; Rockoff and Lockwood 2010)

Three empirical challenges

- Movers are likely different than non-movers
 - Both in observable and unobservable characteristics
- Heterogeneity in the impact of mobility depending on timing of moves
 - Between-year vs. within-year
 - Structural vs. non-structural
 - Articulated vs. non-articulated
- Mobility is likely endogenous
 - Determined by student academic performance, among other things

Data

- 5 cohorts of students in the 8th grade classes of 2005-2009 (students making standard academic progress)
- 8 years of data per student: grades 1-8 (test data in grades 3-8)
- Roughly 37,000 students per SAP cohort
- Over 185,000 unique students in 1,100 different schools
- Roughly 1 million student-year observations
 - Rich data on student demographics, ELA and Math test scores
 - Mobility measures are constructed using unique student identifiers and school codes in Oct., Mar., and Jun. in grades 1-8

Regression model

$$Y_{itg} = \alpha_i + \beta X_{itg} + \gamma M_{it} + \alpha_t + \alpha_g + \varepsilon_{it}$$

- Where
 - i indexes individual
 - t indexes time
 - g indexes grade
- Outcome variable Y_{itg} is ELA (Math) test score (z-score)
- Coefficient of interest is γ : impact of moving in year t
- Also include:
 - Student specific characteristics: X_{itg}
 - Grade (α_g) and year (α_t) effects
 - Student fixed effects: α_i
- Alternate specifications include a measure of school quality

Motivating the identification strategy

- Parents choose to move child's schools if expected benefits of new school \geq expected costs of moving
- Implies that mobility is shaped by schedule of structural moves (grade spans)
- Parents likely consider both *prior* and *anticipated* moves
 - Time since last move
 - Time until next structural move
- Credible instruments for mobility

Table 1: 8th grade student characteristics by mobility history

	Summer moves			Mid-year moves	
	None (1)	One (2)	Two plus (3)	None (4)	Any (5)
Female	0.54	0.53	0.54	0.53	0.53
Asian	0.08	0.17	0.13	0.16	0.12
Black	0.41	0.27	0.36	0.29	0.39
Hispanic	0.35	0.36	0.40	0.37	0.38
White	0.15	0.20	0.12	0.19	0.10
Foreign born	0.07	0.09	0.10	0.09	0.11
Limited English proficient	0.01	0.01	0.02	0.01	0.01
Non-English at home	0.36	0.43	0.41	0.42	0.37
Poor	0.81	0.73	0.79	0.74	0.81
Graded special ed	0.06	0.04	0.05	0.05	0.06
Observations	9,114	122,312	53,774	160,601	24,599
Percent of total	4.9%	66.0%	29.0%	86.7%	13.3%

Notes: Mobility history includes all moves made between grades 1-8. Summer moves are made between June and October. Mid-year moves made between October and June. Poverty is defined by eligibility for free/reduced price lunch or attendance in a universal free meal school. Foreign born students have birthplaces outside the U.S. Graded special education students include those receiving full or part time services. Test scores are measured as z-scores (mean zero and standard deviation one for all tested students in a grade each year).

Table 1: 8th grade student characteristics by mobility history

	Summer moves			Mid-year moves	
	None (1)	One (2)	Two plus (3)	None (4)	Any (5)
Test scores					
3rd grade ELA	0.120	0.322	0.178	0.294	0.113
8th grade ELA	0.224	0.312	0.162	0.295	0.067
3rd grade math	0.134	0.345	0.167	0.313	0.091
8th grade math	0.220	0.302	0.122	0.282	0.010
Average # summer moves	0.00	1.00	2.32	1.24	1.95
Average # mid-year moves	0.10	0.08	0.35	0.00	1.21
Grade span of 4th grade school					
K to 8+	0.66	0.05	0.05	0.08	0.07
K to 4	0.00	0.04	0.06	0.04	0.05
K to 5	0.15	0.71	0.62	0.66	0.62
K to 6	0.16	0.19	0.19	0.19	0.21
all others	0.03	0.01	0.08	0.03	0.04
Observations	9,114	122,312	53,774	160,601	24,599
Percent of total	4.9%	66.0%	29.0%	86.7%	13.3%

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Table 2: Distribution of structural and non-structural moves

		Total # non-structural moves				Total
		0	1	2	3	
Total # structural moves	0	9,114 <i>31.0</i>	14,120 <i>48.1</i>	4,619 <i>15.7</i>	1,528 <i>5.2</i>	29,381 <i>100.0</i>
	1	108,192 <i>72.5</i>	30,617 <i>20.5</i>	8,335 <i>5.6</i>	2,010 <i>1.4</i>	149,154 <i>100.0</i>
	2	4,738 <i>71.1</i>	1,514 <i>22.7</i>	338 <i>5.1</i>	75 <i>1.1</i>	6,665 <i>100.0</i>
	Total	122,044 <i>65.9</i>	46,251 <i>25.0</i>	13,292 <i>7.2</i>	3,613 <i>2.0</i>	185,200 <i>100.0</i>

Notes: The total number of structural and non-structural moves includes summer moves (between June and October) made between grades 1-8. Each cell presents the frequency and the row percentages. The correlation between structural and non-structural moves is -0.27.

Table 3: OLS regression results, predicting timing of moves

	Structural (1)	Non-Structural (2)
Years to move	-0.070*** (0.006)	0.012** (0.005)
Years to move squared	0.008*** (0.001)	-0.002*** (0.001)
Move year	0.602*** (0.014)	-0.032*** (0.007)
Post move	-0.094*** (0.015)	-0.005 (0.008)
Years post move	-0.006 (0.010)	-0.013*** (0.003)
Years post move squared	-0.002 (0.002)	0.001 (0.001)
Observations	1,111,200	1,111,200
R-squared	0.563	0.203

Robust standard errors, clustered by first grade school by cohort, in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Anticipated moves are determined by the highest grade of students' first grade school. Mobility variables include YEARSTO (years to move), MOVEEXP (move year), POSTMOVE (post move), YEARSPOST (years post move), and their squares. All models include controls for poverty, English proficiency, home language, special education, residence borough, and student fixed effects.

Table 4: Baseline regression models, ELA and math exams

	ELA exam			Math exam		
	(1)	(2)	(3)	(4)	(5)	(6)
Summer move	-0.083*** (0.003)	-0.040*** (0.002)	-0.060*** (0.005)	-0.103*** (0.003)	-0.054*** (0.001)	-0.076*** (0.006)
Mid-year move	-0.235*** (0.006)	-0.028*** (0.004)	-0.025*** (0.004)	-0.298*** (0.006)	-0.054*** (0.004)	-0.051*** (0.004)
Student characteristics	N	Y	Y	N	Y	Y
Student FX	N	Y	Y	N	Y	Y
IV for summer move	N	N	Y	N	N	Y
Observations	1,092,488	1,092,488	1,092,488	1,102,440	1,102,440	1,102,440
Unique students	185,196	185,196	185,196	185,200	185,200	185,200
R-squared	0.029	0.744	---	0.034	0.771	---

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1). Standard errors in column (3) are clustered by first grade school by cohort. Summer moves occur between June and October. Mid-year moves occur between October and June. All models include controls for grade, residence borough, and year. Columns (2), (3), (5), and (6) include controls for poverty (measured as eligibility for free/reduced price lunch or attendance in a universal free meal school), English proficiency (LEP), home language, participation in special education services, and student fixed effects. Columns (3) and (6) use the interaction between the student's current grade and the terminal grade of his/her first grade school as an instrument for summer moves. The reference groups are grade 8 and terminal grade 8+.

Table 5: IV regression results, ELA and math exams

	ELA exam		Math exam	
	(1)	(2)	(3)	(4)
Summer move				
Structural	-0.026*** (0.009)	-0.046*** (0.013)	-0.029*** (0.010)	-0.068*** (0.016)
Non-structural	0.230*** (0.063)		0.322*** (0.075)	
Articulated		0.213*** (0.062)		0.290*** (0.074)
Non-articulated		-0.239 (0.236)		-0.588** (0.282)
Mid-year move	-0.060*** (0.009)	-0.004 (0.029)	-0.099*** (0.010)	0.009 (0.034)
Observations	1,092,488	1,092,488	1,102,440	1,102,440
Unique students	185,196	185,196	185,200	185,200

Robust standard errors, clustered by first grade school by cohort, in parentheses (*** p<0.01, ** p<0.05, * p<0.1). Summer moves occur between June and October. Mid-year moves occur between October and June. Moves after the completion of a terminal grade are structural moves. Moves after the completion of a non-terminal grade are non-structural moves. Entering a destination school in the lowest grade is an articulated move. Entering a destination school mid-grade span is a non-articulated move. All models include controls for poverty (measured as eligibility for free/reduced price lunch or attendance in a universal free meal school), English proficiency (LEP), home language, participation in special education services, residence borough, grade, year, and student fixed effects. All models use the interaction between the student's current grade and the terminal grade of his/her first grade school as an instrument for summer moves. The reference groups are grade 8 and terminal grade 8+.

Table 6: Long change, 3rd-8th grade moves only, 8th grade test scores

	ELA exam		Math exam	
	(1)	(2)	(3)	(4)
Summer moves				
Total number	-0.179*** (0.063)	-0.173*** (0.063)	-0.434*** (0.077)	-0.427*** (0.077)
Total number squared	0.044** (0.021)	0.044** (0.021)	0.125*** (0.026)	0.124*** (0.026)
At least one non-structural	0.127* (0.070)	0.132* (0.071)	-0.081 (0.080)	-0.074 (0.081)
Ever made a mid-year move		-0.129*** (0.019)		-0.133*** (0.023)
Observations	183,744	183,744	183,106	183,106
R-squared	0.438	0.439	0.449	0.451

Robust standard errors, clustered by first grade school by cohort, in parentheses (*** p<0.01, ** p<0.05, * p<0.1). The total number of moves is the sum of all summer moves made between 3rd and 8th grade. At least one non-structural is an indicator variable equal to one if at least one summer move is non-structural. Ever made a mid-year move is an indicator variable equal to one if the student ever moved mid-year during grades 3-8. All models include controls for gender, nativity, race\ethnicity, poverty (measured as eligibility for free\reduced price lunch or attendance in a universal free meal school), English proficiency (LEP), home language, participation in special education services, performance on standardized ELA exams in 3rd grade, residence borough, and year. All models use the terminal grade of a student's first grade school as an instrument for the number of summer moves made. The reference group is terminal grade 8+.

Summary and conclusions

- We estimate the causal effect of mobility using credible instruments and fixed effects
- Structural and non-structural mobility are related and endogenous
- Structural moves have negative effects
- Impact of non-structural moves may be positive

Policy implications

Findings raise questions about:

- Grade span policy
- School articulation/enrollment policies
- School accountability

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