

Transition to the Middle School Building and Academic Achievement in Iowa

Mary Linnenbrink

Iowa Department of Education

Abstract—The effect of middle school building transitions on academic achievement in Iowa is examined. A two year matched cohort difference-in-difference model shows building transitions having a negative effect on achievement for grades 5-8. A five year matched cohort group multi-level multiple regression model demonstrates transitions at different times, multiple transitions (two), and the lasting effects of transitions on achievement through eighth grade. Effect of building transitions varied depending on the grade level at which the transition occurred. Over half of Iowa students transition to middle school at sixth grade and a negative relationship exists between building transition at sixth grade and test scores. School districts need effective ways to lessen the effects of middle school building transitions on academic achievement.

Objectives—The transition to middle school is a time of substantial change for students. New stressors and a new environment are presented. Several educators and professionals recognize this fact and many programs have been created in middle school buildings focusing on adjustment and social-emotional learning. All of this stress on students leads to the question: Do building transitions to the middle school grade levels affect academic achievement? Perhaps the grade-configuration of middle schools could be better for student learning. Is the timing of a building transition a factor on academic achievement? (Does a transition between fifth and sixth grade set a student further back than a transition between sixth and seventh grade?) Do students who transition buildings recover these setbacks in academic achievement and catch up academically with their peers who did not transition buildings in subsequent grades?

Background—Students are presented with many stressors at the time of a middle school building transition, including: a new social structure and forming new friendships; managing increased academic demands with expectations for personal responsibility; puberty; and moving from self contained to departmentalized classrooms (Rosenblatt and Elias, 2008). Compared to elementary schools, middle schools have larger and less child-centered environments and more impersonal relationships with teachers, as teachers have many students for short periods of time (Alspaugh, 1998). Under the stress of a transition, the bulk of a student's attention and resources may go to adjusting to the new environment, leaving little to no resources to focus on academics.

According to Alspaugh and Harting (1995), all grades (5-8) can expect a decline in achievement during the year of transition from self-contained classrooms (elementary building) to departmentalized classrooms (middle school building). The transition loss was largest for fifth grade and eighth grade students. However, the academic achievement loss is recovered in the subsequent years following the transition for all grades (5-8).

Students attending middle school experienced a greater achievement loss in the transition to high school and an increased high school dropout rate than students who attended a K-8 elementary (Alspaugh, 1998). The higher dropout rate may be associated with the achievement losses during the two transitions (grades 6 and 9) for students who attended middle school (Alspaugh, 1998).

Wihry, Coladarci, and Meadow (1992) studied the influence of grade configuration on eighth grade student achievement in Maine and found that total achievement was higher in K-8, K-9, and 3-8 buildings than in middle schools (4-8, 5-8, 6-8) or middle/high schools (6-12, 7-12, 8-12). Wihry et al. controlled for school-level socioeconomic status, per-capita income in the community, and parent educational attainment.

Controlling for school size and community socioeconomic status, Franklin and Glascock (1998) found that sixth and seventh graders in K-6, K-7, and K-12 school performed significantly higher than students in middle schools (6-8 and 7-9) in state achievement tests in a study of about 700 rural Louisiana schools. Compared to students who attended 7-12, 8-12, or 9-12 schools, students who attended K-12 schools had higher test scores and fewer behavior problems in the tenth grade.

Examining approximately 40 K-8 schools and 40 middle schools in Philadelphia, Offenber (2001) found that students in K-8 schools had higher academic achievement than students who attended middle school. Once in high school, the grade point averages of students who attended K-8 schools were higher than those of former middle school students. Offenber (2001) noted that the number of students at a grade level may be contributing to the differences in achievement outcomes between K-8 and middle school buildings. As the number of students in a grade increases, performance gains decrease. Epstein and Mac Iver (1990) also found grade span to be confounded by number of students per grade. Perhaps with fewer students per grade in a stressful time when students often take on more responsibility and move from self-contained classrooms to departmentalized classroom, students received more mentoring and attention from teachers with less competition for attention from peers, enabling them to achieve at a higher standard.

Methods—Unique state student identifiers (known as Iowa student numbers) were used to match Iowa Tests of Basic Skills (ITBS) test scores and demographic information across years in order to track building transitions and academic progress of individual students.

First, a simple two year match was created across several years and consecutive grade levels in order to see a simple building transition effect without controlling for any other variables. For this simple building transition comparison, the national scale score (NSS) of the year before the building transition is subtracted from the national scale score of the year after the building transition for both students who changed buildings (treatment) and

students who remained in the same building (control). This is the academic achievement gain for the student in that year (also known as a difference-in-difference model). The effect of the building transition is the academic achievement gain for students who transition buildings minus the academic achievement gain for students who did not transition buildings.

Effect of building transition = Δ NSS students who transition - Δ NSS students who do not transition

School districts in Iowa retain local control of when they administer the ITBS assessment. Based on when students were tested during the year, their test score may be standardized to fall, midyear, or spring norms. These three norms groupings are not directly comparable with one another. Any student who changed test norms between years was not included in this simple analysis. Students who changed districts were also not included in the analysis.

For the primary analysis of this study, national scale scores are converted to z-scores with a mean of zero and a standard deviation of one in order to make comparisons across the three testing norms. A five-year matched cohort group was tracked from fourth through eighth grade. The cohort was split into 11 groups: those who experienced a building transition (first year in new building) during the fifth grade year, sixth grade year, seventh grade year, eighth grade year, fifth and sixth grade year, fifth and seventh grade year, fifth and eighth grade year, sixth and seventh grade year, sixth and eighth grade year, seventh and eighth grade year, and those did not transition buildings at all between fourth and eighth grades. Students who transferred districts during the five year study were excluded from the analysis, as changing districts may prove more stressful than changing buildings within a district.

Using multi-level multiple regression analysis, a model is built to predict academic achievement (NSS converted to z-score) while taking school-level effects into account for the year student achievement is measured. Dependent variables of interest include: building transition, district size, special education, talented and gifted, free or reduced price lunch (low socioeconomic status), English language learner, race/ethnicity, and gender. Demographic indicators are taken from the student's eighth grade year.

$$\text{Student Achievement}_{ij} = \beta_0 + \beta(\text{building transition})_{ij} + \beta(\dots)_{ij} + \varepsilon_{ij}$$

(where j= school effects)

District size may influence the building environment, particularly the number of students per grade level in a building and the number of supports and activities offered to students. Districts were categorized into six groups: those with enrollments of less than 450 students, 450 to 899 students, 900 to 1,999 students, 2,000 to 4,999 students, 5,000 to 8,999 students, and 9,000 or more students.

Data Sources—Iowa school districts submit student demographic information to Riverside Publishing and Iowa Testing Programs on the ITBS (grades K-8). Iowa Testing Programs provides this information along with test scores to the Iowa Department of Education (IDE) for the completion of the Adequate Yearly Progress (AYP) report. ITBS scores and demographics were provided to the IDE for grades 4 and 8 in the 2005 school year (2004-2005, school years will be referred to by the second half of the year), grades 3 through 8 in the 2006 school year, and K-8 in the 2007 through 2009 school years. The IDE provided school

districts the opportunity to clean the individual student level demographic data each year as a part of the AYP reporting process.

District enrollment numbers are taken from the October 2008 certified enrollment (grade 8 of the five year cohort). These numbers are a count of students enrolled in Iowa school districts as of October 1, 2008 submitted by public school districts to the IDE for funding purposes.

Results and Conclusions—The tables below (1-2) show the differences between the students who transition buildings and students who remained in the same building for the simple two year match for multiple cohorts of students.

Table 1—Change in Reading Score (ΔNSS students who transition-
ΔNSS students who do not transition)

	2005-2006		2006-2007		2007-2008		2008-2009	
5th grade building transition	-0.260	n=35460	-0.507*	n=33135	-0.388	n=33955	-0.335	n=29768
6th grade building transition	†	†	-1.780*	n=31167	-2.329*	n=31110	-2.829*	n=29058
7th grade building transition	†	†	-1.781*	n=30266	-1.179*	n=29428	-1.115*	n=28973
8th grade building transition	†	†	-2.776*	n=31401	-1.414*	n=30558	-0.150	n=30085

Source: Iowa Department of Education, AYP Files.

Note: *p<0.05, †data not available for 2005

Table 2—Change in Math Score (ΔNSS students who transition-
ΔNSS students who do not transition)

	2005-2006		2006-2007		2007-2008		2008-2009	
5th grade building transition	-1.278*	n=35536	-0.787*	n=33071	-0.106	n=32809	-0.481*	n=29768
6th grade building transition	†	†	-2.217*	n=33104	-1.895*	n=31062	-3.521*	n= 29058
7th grade building transition	†	†	-0.848*	n=30186	-1.245*	n=29384	-0.427*	n=28973
8th grade building transition	†	†	-2.198*	n=31316	-0.612*	n=30498	-0.326	n=30085

Source: Iowa Department of Education, AYP Files.

Note: *p<0.05, †data not available for 2005

Based on tables 1 and 2, students who transition buildings at grade levels 5 through 8 have lower test scores in reading and math than students who do not transition buildings. This transition gap appears to be the largest for students transitioning into sixth and eighth grade buildings. The gap is also larger for math test scores for the most part, with the exception of the seventh grade building transition, when the transition gap is larger for reading test scores than for math test scores.

Table 3 and 4 display the average reading and math NSS converted to z-scores of the matched cohort (N=25069) of students in grade 4 in the 2004-2005 school year. The cohort is broken out into groups dependent on when they transitioned into middle school buildings. Only four students in the cohort transitioned buildings in fifth and eighth grade (moved within district), so this group will not be included in the comparison. Students who never changed buildings have the lowest averaged reading and math scores at every grade. Only students who transition at grade 6 had notably lower reading and math scores during the year of their building transition than their peers who are not transitioning buildings that same year. However, these students are consistently lower than students that transition in fifth or seventh grade in both reading and math each year.

Table 3—Average Reading and Math NSS converted to z-scores for the five year cohort

	5th grade building transition		6th grade building transition		7th grade building transition		8th grade building transition		No building transition	
	n=2473		n=12582		n=5999		n=67		n=360	
	Reading Z-Score	Math Z-Score	Reading Z-Score	Math Z-Score						
4th grade	0.074	0.078	0.052	0.050	0.119	0.140	0.255	0.380	-0.088	-0.115
5th grade	0.103**	0.048**	0.054	0.081	0.134	0.135	0.292	0.332	0.046	-0.024
6th grade	0.135	0.093	0.042**	0.045**	0.152	0.169	0.353	0.188	-0.065	-0.037
7th grade	0.120	0.088	0.050	0.054	0.128**	0.143**	0.341	0.269	-0.009	0.039
8th grade	0.105	0.119	0.016	0.031	0.090	0.107	0.222**	0.411**	-0.104	-0.044

Source: Iowa Department of Education, AYP Files.

Note: **test score for building transition year.

Table 4—Average Reading and Math NSS converted to Z-scores for the five year cohort

	5th and 6th grade building transition		5th and 7th grade building transition		6th and 7th grade building transition		6th and 8th grade building transition		7th and 8th grade building transition	
	n=906		n=836		n=575		n=1152		n=119	
	Reading Z-Score	Math Z-Score								
4th grade	-0.108	-0.146	-0.019	-0.010	-0.395	-0.376	0.217	0.194	0.103	-0.055
5th grade	-0.051**	-0.140**	-0.029**	0.025**	-0.279	-0.242	0.206	0.209	-0.064	-0.104
6th grade	-0.119**	-0.123**	0.089	0.145	-0.346**	-0.323**	0.246**	0.281**	-0.005	-0.049
7th grade	-0.152	-0.146	0.043**	0.068**	-0.405**	-0.372**	0.269	0.253	-0.003**	-0.021**
8th grade	-0.173	-0.189	0.068	0.076	-0.388	-0.367	0.237**	0.263**	0.113**	0.073**

Source: Iowa Department of Education, AYP Files.

Note: **test score for building transition year.

Descriptors of the ten transition groups are listed in Table 5. Approximately half of the cohort group is in the sixth grade building transition group. Almost one-fourth is in the seventh grade building transition group. The eighth grade building transition group is the least racially/ethnically diverse group with only Whites and Asians. The sixth and seventh grade building transition group is the most racially/ethnically diverse group and also has the most students receiving free or reduced priced lunch. Students who transition buildings more than once also tend to attend larger districts (5,000 or more students).

Table 5—Five Year Cohort Descriptive Statistics by Building Transition Group

	5th grade building transition n=2473	6th grade building transition n=12582	7th grade building transition n=5999	8th grade building transition n=67	No building transition n=860	5th and 6th grade building transition n=906	5th and 7th grade building transition n=836	6th and 7th grade building transition n=575	6th and 8th grade building transition n=1152	7th and 8th grade building transition n=119
Asian	1.33%	2.04%	2.03%	2.99%	1.11%	3.31%	0.96%	1.39%	2.26%	0.84%
African American	1.09%	4.99%	2.32%	0.00%	3.33%	12.03%	4.43%	12.70%	5.56%	3.36%
Hispanic	3.64%	6.42%	3.33%	0.00%	15.28%	7.06%	3.47%	22.43%	3.56%	2.52%
Native American	0.24%	0.66%	0.37%	0.00%	0.00%	0.77%	0.00%	0.52%	0.09%	0.00%
White	93.69%	85.88%	91.95%	97.01%	80.28%	76.82%	91.15%	62.96%	88.54%	93.28%
Female	48.40%	49.21%	49.46%	38.81%	50.83%	49.23%	47.61%	43.48%	50.00%	57.98%
Male	51.60%	50.79%	50.54%	61.19%	49.17%	50.77%	52.39%	56.52%	50.00%	42.02%
Special Education	10.07%	12.89%	12.22%	8.96%	13.89%	16.00%	13.76%	20.70%	9.72%	12.61%
Talented and Gifted	11.44%	17.73%	14.64%	17.91%	13.61%	13.69%	11.36%	11.48%	11.98%	11.76%
Free or Reduced Lunch	23.78%	31.15%	24.02%	25.37%	39.44%	45.03%	28.71%	56.70%	16.15%	24.37%
English Language Learner	2.51%	2.69%	1.13%	0.00%	4.44%	3.97%	1.08%	13.74%	1.39%	0.00%
District Size: Less than 450 students	1.25%	3.82%	10.65%	31.34%	17.78%	1.66%	0.12%	4.00%	0.00%	29.41%
District Size: 450 to 899 students	41.04%	14.30%	29.09%	64.18%	18.89%	7.73%	17.82%	0.00%	0.00%	20.17%
District Size: 900 to 1,999 students	53.86%	23.78%	13.79%	0.00%	38.33%	21.63%	37.08%	0.70%	6.51%	33.61%
District Size: 2,000 to 4,999 students	3.56%	19.46%	18.85%	0.00%	0.00%	24.83%	32.30%	8.35%	0.69%	0.00%
District Size: 5,000 to 8,999 students	0.12%	4.24%	12.45%	1.49%	9.17%	2.32%	1.56%	49.74%	79.51%	3.36%
District Size: 9,000 or more students	0.16%	34.39%	15.17%	2.99%	15.83%	41.83%	11.12%	37.22%	13.28%	13.45%

Source: Iowa Department of Education, AYP Files.

Note: *p<0.05

Multi-level multiple regression results with coefficients are presented in Tables 6 through 17 (Tables 11-17 are located in appendix A). The building transition variable does not have a consistent relationship with reading and math test scores across all building transition groups. A negative relationship exists between building transition and reading test scores for the sixth grade transition, fifth and sixth grade transition (math at grades 5, 7, and 8), sixth and seventh grade transition (math at grades 6, 7 and 8; reading at grade 7), and sixth and eighth grade transition (math at grades 7 and 8) groups. There is no relationship between building transition and test scores for the fifth grade, seventh grade, eighth grade, fifth and seventh grade, and fifth and eighth grade groups.

Table 6—6th Grade Building Transition Group

	6th Grade				7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	-0.033*	(0.016)	-0.016	(0.016)	0.033	(0.017)	0.034	(0.018)	0.020	(0.018)	0.034	(0.018)
Asian	-0.033	(0.034)	0.058	(0.033)	0.048	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.207*	(0.025)	-0.272*	(0.024)	-0.195*	(0.025)	-0.315*	(0.025)	-0.249*	(0.025)	-0.316*	(0.025)
Hispanic	-0.118*	(0.025)	-0.118*	(0.024)	-0.086*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.180*	(0.067)	-0.274*	(0.067)	-0.138*	(0.069)	-0.157*	(0.068)	-0.176*	(0.069)	-0.224*	(0.068)
Female	0.040*	(0.009)	-0.148*	(0.009)	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.025*	(0.014)	-0.974*	(0.014)	-1.007*	(0.015)	-1.008*	(0.014)	-1.053*	(0.015)	-1.019*	(0.015)
Talented and Gifted	0.958*	(0.013)	0.981*	(0.013)	1.098*	(0.014)	1.103*	(0.013)	1.034*	(0.014)	1.065*	(0.013)
Free or Reduced Lunch	-0.188*	(0.011)	-0.181*	(0.011)	-0.245*	(0.012)	-0.232*	(0.011)	-0.224*	(0.012)	-0.245*	(0.012)
English Language Learner	-0.415*	(0.036)	-0.316*	(0.036)	-0.426*	(0.037)	-0.450*	(0.036)	-0.454*	(0.037)	-0.398*	(0.036)
District Size: Less than 450	0.023	(0.039)	0.025	(0.040)	0.089*	(0.045)	0.090	(0.049)	0.015	(0.044)	0.109*	(0.050)
District Size: 450 to 899	0.058	(0.031)	0.060	(0.032)	0.134*	(0.038)	0.115*	(0.043)	0.079*	(0.037)	0.148*	(0.043)
District Size: 900 to 1,999	0.130*	(0.033)	0.115*	(0.034)	0.226*	(0.040)	0.190*	(0.045)	0.197*	(0.039)	0.243*	(0.045)
District Size: 2,000 to 4,999	0.134*	(0.038)	0.168*	(0.039)	0.226*	(0.048)	0.275*	(0.055)	0.192*	(0.048)	0.247*	(0.056)
District Size: 5,000 to 8,999	0.207*	(0.049)	0.258*	(0.050)	0.355*	(0.067)	0.436*	(0.076)	0.279*	(0.066)	0.348*	(0.078)
AIC	55622.5		54820.2		56169.3		54968.6		56334.6		55765.0	
AICC	55622.5		54820.2		56169.3		54968.6		56334.6		55765.0	
BIC	55630.7		54828.4		56177.2		54976.4		56342.5		55773.0	

Table 7—5th and 6th Grade Building Transition Group

	5th grade				6th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
Building Transition	-0.014	(0.029)	-0.093*	(0.029)	-0.013	(0.029)	-0.050	(0.028)
Asian	-0.031	(0.033)	0.069*	(0.032)	-0.033	(0.034)	0.058	(0.033)
African American	-0.193*	(0.024)	-0.245*	(0.024)	-0.205*	(0.025)	-0.269*	(0.024)
Hispanic	-0.117*	(0.024)	-0.117*	(0.024)	-0.118*	(0.025)	-0.118*	(0.024)
Native American	-0.189*	(0.066)	-0.205*	(0.064)	-0.181*	(0.067)	-0.273*	(0.067)
Female	0.019*	(0.009)	-0.170*	(0.009)	0.040*	(0.009)	-0.148*	(0.009)
Special Education	-0.985*	(0.014)	-0.893*	(0.014)	-1.025*	(0.014)	-0.974*	(0.014)
Talented and Gifted	0.910*	(0.013)	0.959*	(0.013)	0.957*	(0.013)	0.980*	(0.013)
Free or Reduced Lunch	-0.167*	(0.011)	-0.157*	(0.011)	-0.187*	(0.011)	-0.180*	(0.011)
English Language Learner	-0.442*	(0.035)	-0.315*	(0.035)	-0.415*	(0.036)	-0.315*	(0.036)
District Size: Less than 450	0.102*	(0.034)	0.054	(0.037)	0.026	(0.039)	0.025	(0.040)
District Size: 450 to 899	0.106*	(0.026)	0.071*	(0.028)	0.061	(0.032)	0.060	(0.032)
District Size: 900 to 1,999	0.168*	(0.027)	0.081*	(0.030)	0.131*	(0.033)	0.114*	(0.034)
District Size: 2,000 to 4,999	0.214*	(0.029)	0.172*	(0.032)	0.136*	(0.038)	0.169*	(0.039)
District Size: 5,000 to 8,999	0.237*	(0.035)	0.239*	(0.038)	0.216*	(0.049)	0.262*	(0.050)
AIC	54389.2		53286.5		55624.8		54817.0	
AICC	54389.2		53286.5		55624.8		54817.0	
BIC	54398.0		53295.4		55633.0		54825.2	

Note: *p<0.05

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 8—5th and 6th Grade Building Transition Group (continued)

	7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	-0.046	(0.029)	-0.065*	(0.029)	-0.039	(0.029)	-0.069*	(0.029)
Asian	0.048	(0.035)	0.142*	(0.034)	0.052	(0.035)	0.145*	(0.034)
African American	-0.197*	(0.025)	-0.316*	(0.024)	-0.250*	(0.025)	-0.317*	(0.025)
Hispanic	-0.086*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.137*	(0.069)	-0.155*	(0.068)	-0.176*	(0.069)	-0.223*	(0.068)
Female	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.008*	(0.015)	-1.008*	(0.014)	-1.053*	(0.015)	-1.019*	(0.015)
Talented and Gifted	1.098*	(0.014)	1.103*	(0.013)	1.034*	(0.014)	1.065*	(0.013)
Free or Reduced Lunch	-0.246*	(0.012)	-0.232*	(0.011)	-0.224*	(0.012)	-0.245*	(0.012)
English Language Learner	-0.426*	(0.037)	-0.450*	(0.036)	-0.454*	(0.037)	-0.397*	(0.036)
District Size: Less than 450	0.076	(0.044)	0.075	(0.049)	0.006	(0.044)	0.094	(0.049)
District Size: 450 to 899	0.120*	(0.037)	0.100*	(0.042)	0.070	(0.037)	0.133*	(0.042)
District Size: 900 to 1,999	0.217*	(0.039)	0.181*	(0.044)	0.192*	(0.039)	0.234*	(0.045)
District Size: 2,000 to 4,999	0.221*	(0.048)	0.270*	(0.055)	0.189*	(0.048)	0.243*	(0.055)
District Size: 5,000 to 8,999	0.340*	(0.066)	0.420*	(0.075)	0.270*	(0.066)	0.330*	(0.076)
AIC	56169.2		54966.0		56333.0		55762.3	
AICC	56169.2		54966.0		56333.0		55762.3	
BIC	56177.0		54973.9		56341.0		55770.3	

Note: *p<0.05

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 9—6th and 7th Grade Building Transition Group

	6th grade				7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	-0.064	(0.042)	-0.093*	(0.042)	-0.151*	(0.043)	-0.087*	(0.043)	-0.072	(0.043)	-0.090*	(0.043)
Asian	-0.034	(0.034)	0.057	(0.033)	0.047	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.203*	(0.025)	-0.268*	(0.024)	-0.194*	(0.025)	-0.315*	(0.024)	-0.249*	(0.025)	-0.316*	(0.025)
Hispanic	-0.118*	(0.025)	-0.118*	(0.024)	-0.085*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.181*	(0.067)	-0.275*	(0.067)	-0.139*	(0.069)	-0.158*	(0.068)	-0.177*	(0.069)	-0.225*	(0.068)
Female	0.040*	(0.009)	-0.148*	(0.009)	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.189*	(0.009)
Special Education	-1.025*	(0.014)	-0.973*	(0.014)	-1.006*	(0.015)	-1.008*	(0.014)	-1.052*	(0.015)	-1.019*	(0.015)
Talented and Gifted	0.957*	(0.013)	0.980*	(0.013)	1.098*	(0.014)	1.103*	(0.013)	1.034*	(0.014)	1.065*	(0.013)
Free or Reduced Lunch	-0.187*	(0.011)	-0.180*	(0.011)	-0.245*	(0.012)	-0.233*	(0.011)	-0.224*	(0.012)	-0.245*	(0.012)
English Language Learner	-0.415*	(0.036)	-0.316*	(0.036)	-0.425*	(0.037)	-0.450*	(0.036)	-0.454*	(0.037)	-0.398*	(0.036)
District Size: Less than 450	0.026	(0.039)	0.025	(0.040)	0.077	(0.044)	0.078	(0.049)	0.008	(0.044)	0.096*	(0.049)
District Size: 450 to 899	0.059	(0.032)	0.058	(0.032)	0.118*	(0.037)	0.101*	(0.042)	0.070	(0.037)	0.133*	(0.042)
District Size: 900 to 1,999	0.129*	(0.033)	0.111*	(0.034)	0.214*	(0.039)	0.180*	(0.044)	0.191*	(0.039)	0.233*	(0.045)
District Size: 2,000 to 4,999	0.135*	(0.038)	0.167*	(0.039)	0.220*	(0.048)	0.270*	(0.054)	0.189*	(0.048)	0.243*	(0.055)
District Size: 5,000 to 8,999	0.218*	(0.049)	0.265*	(0.050)	0.352*	(0.065)	0.429*	(0.075)	0.277*	(0.066)	0.340*	(0.076)
AIC	55621.9		54814.4		56158.9		54966.2		56331.2		55762.9	
AICC	55621.9		54814.4		56158.9		54966.2		56331.2		55762.9	
BIC	55630.1		54822.6		56166.7		54974.0		56339.2		55770.8	

Source: Department of Education, AYP Files.
 Note: *p<0.05

Table 10—6th and 8th Grade Building Transition Group

	6th Grade				7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	0.027	(0.049)	-0.036	(0.049)	-0.077	(0.051)	-0.118*	(0.051)	-0.103*	(0.052)	-0.161*	(0.053)
Asian	-0.033	(0.034)	0.057	(0.033)	0.048	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.206*	(0.025)	-0.270*	(0.024)	-0.196*	(0.025)	-0.314*	(0.024)	-0.248*	(0.025)	-0.314*	(0.025)
Hispanic	-0.118*	(0.025)	-0.118*	(0.024)	-0.086*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.181*	(0.067)	-0.275*	(0.067)	-0.138*	(0.069)	-0.157*	(0.068)	-0.177*	(0.069)	-0.225*	(0.068)
Female	0.040*	(0.009)	-0.148*	(0.009)	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.025*	(0.014)	-0.974*	(0.014)	-1.008*	(0.015)	-1.009*	(0.014)	-1.053*	(0.015)	-1.020*	(0.015)
Talented and Gifted	0.957*	(0.013)	0.980*	(0.013)	1.098*	(0.014)	1.103*	(0.013)	1.034*	(0.014)	1.065*	(0.013)
Free or Reduced Lunch	-0.187*	(0.011)	-0.181*	(0.011)	-0.246*	(0.012)	-0.232*	(0.011)	-0.224*	(0.012)	-0.245*	(0.012)
English Language Learner	-0.415*	(0.036)	-0.316*	(0.036)	-0.426*	(0.037)	-0.450*	(0.036)	-0.454*	(0.037)	-0.397*	(0.036)
District Size: Less than 450	0.027	(0.039)	0.026	(0.040)	0.076	(0.044)	0.076	(0.049)	0.004	(0.044)	0.089	(0.050)
District Size: 450 to 899	0.062*	(0.032)	0.061	(0.032)	0.121*	(0.037)	0.101*	(0.042)	0.067*	(0.037)	0.128*	(0.043)
District Size: 900 to 1,999	0.131*	(0.033)	0.115*	(0.034)	0.218*	(0.039)	0.182*	(0.044)	0.190*	(0.039)	0.230*	(0.045)
District Size: 2,000 to 4,999	0.137*	(0.038)	0.169*	(0.039)	0.220*	(0.048)	0.268*	(0.055)	0.186*	(0.048)	0.236*	(0.056)
District Size: 5,000 to 8,999	0.213*	(0.049)	0.268*	(0.051)	0.362*	(0.068)	0.453*	(0.077)	0.296*	(0.067)	0.371*	(0.079)
AIC	55623.6		54818.5		56168.4		54964.7		56329.7		55757.6	
AICC	55623.6		54818.5		56168.4		54964.7		56329.7		55757.6	
BIC	55631.8		54826.7		56176.2		54972.5		56337.7		55765.5	

Source: Department of Education, AYP Files.
 Note: *p<0.05

Source: Department of Education, AYP Files.

Being African American, Hispanic, or Native American are negatively related with test scores for most building transition groups (White is the comparison group). Talented and gifted students tend to achieve higher test scores, while special education students, students who receive free or reduced price lunch, and English language learners achieve lower test scores in all building transition groups. Attending a district with an enrollment of 900 to 8,999 students (compared to over 9,000 students) is positively related with test scores for all building transition groups.

For some building transitions groups that had a significant relationship between building transition and test scores, the relationship continued to be significant beyond the first year of the building transition through the eighth grade in math (last year of available data). This is counter to the work of Alspaugh and Harting (1995), who found that middle school building transition losses were recovered in subsequent years. Not all building transition groups experienced a negative relationship between building transition and test scores. This also contradicts Alspaugh and Harting (1995), as they found all grades (5-8) experiencing a decline in achievement during the year of transition into middle school.

Among building transition groups with significant relationships between building transition and test scores, groups who transition more than once have the strongest negative relationship between building transition and test scores. Transitions appear to be more damaging if they occur more than once. The transition into middle school also appears to have more of a detrimental effect on math test scores than on reading test scores.

Even when controlling for school building level variation with a multi-level model, district size is still a factor contributing toward student achievement. The students in districts with enrollments of 5,000 to 8,999 had the highest coefficients with test scores. Perhaps these schools are large enough to offer students all the services they need, yet not so big that students feel they cannot establish personal, supportive relationships.

Significance of Study—Most building transition groups that transition two times had negative relationships with test scores (more so than groups with one transition). All building transition groups that included a transition at the sixth grade held a negative relationship with test scores in at least one subject and one grade. Math test scores appear to be more affected by building transitions than reading test scores.

Over half of students in Iowa transition to middle school at sixth grade. With a negative relationship between sixth grade building transition and test scores, school districts need effective ways to lessen the effects of middle school building transitions on test scores. Constructing new buildings and moving students around may not be the most cost-effective solution available. Perhaps dealing with the stress of transiting to middle school should be focused on. Rosenblatt and Elias (2008) found social-emotional development programs to lead to an increase in the academic achievement of fifth and sixth grade students transitioning to middle school in an urban low socioeconomic school district in New Jersey.

The academic achievement of students included in this study beyond middle school is unknown. The relationship between building transition and test scores may diminish during the high school years. Or, middle school transition effects may compound with the high school transition and lead to lower test score and perhaps even high school dropouts as found by Alspaugh (1998). As the years pass, the Iowa Department of Education will have more years of data and the ability to link middle school transition with high school academic achievement and graduation and dropout.

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APPENDIX A

Table 11—5th Grade Building Transition Group

	5th Grade				6th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	0.002	(0.033)	-0.018	(0.037)	0.030	(0.033)	0.004	(0.034)
Asian	-0.031	(0.033)	0.068*	(0.032)	-0.033	(0.034)	0.058	(0.033)
African American	-0.194*	(0.024)	-0.248*	(0.024)	-0.205*	(0.025)	-0.271*	(0.024)
Hispanic	-0.117*	(0.024)	-0.117*	(0.024)	-0.118*	(0.025)	-0.118*	(0.024)
Native American	-0.189*	(0.066)	-0.207*	(0.064)	-0.180*	(0.067)	-0.274*	(0.067)
Female	0.019*	(0.009)	-0.170*	(0.009)	0.040*	(0.009)	-0.148*	(0.009)
Special Education	-0.985*	(0.014)	-0.893*	(0.014)	-1.025*	(0.014)	-0.974*	(0.014)
Talented and Gifted	0.910*	(0.013)	0.960*	(0.013)	0.957*	(0.013)	0.980*	(0.013)
Free or Reduced Lunch	-0.167*	(0.011)	-0.158*	(0.011)	-0.187*	(0.011)	-0.181*	(0.011)
English Language Learner	-0.442*	(0.035)	-0.316*	(0.035)	-0.415*	(0.036)	-0.316*	(0.036)
District Size: Less than 450	0.103*	(0.034)	0.058	(0.037)	0.026	(0.039)	0.026	(0.040)
District Size: 450 to 899	0.106*	(0.026)	0.078*	(0.029)	0.056	(0.032)	0.061	(0.033)
District Size: 900 to 1,999	0.168*	(0.028)	0.086*	(0.031)	0.124*	(0.034)	0.114*	(0.035)
District Size: 2,000 to 4,999	0.213*	(0.029)	0.172*	(0.032)	0.136*	(0.038)	0.169*	(0.039)
District Size: 5,000 to 8,999	0.237*	(0.035)	0.243*	(0.038)	0.217*	(0.049)	0.263*	(0.050)
AIC	54389.1		53296.4		55623.9		54819.7	
AICC	54389.1		53296.4		55623.9		54819.7	
BIC	54398.0		53305.3		55632.1		54827.9	

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 12—5th Grade Building Transition Group (continued)

	7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	0.042	(0.034)	0.020	(0.038)	0.054	(0.034)	0.031	(0.039)
Asian	0.048	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.198*	(0.025)	-0.318*	(0.024)	-0.251*	(0.025)	-0.319*	(0.025)
Hispanic	-0.086*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.138*	(0.069)	-0.157*	(0.068)	-0.176*	(0.069)	-0.224*	(0.068)
Female	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.008*	(0.015)	-1.008*	(0.014)	-1.053*	(0.015)	-1.020*	(0.015)
Talented and Gifted	1.098*	(0.014)	1.103*	(0.013)	1.035*	(0.014)	1.066*	(0.013)
Free or Reduced Lunch	-0.246*	(0.012)	-0.233*	(0.011)	-0.225*	(0.012)	-0.246*	(0.012)
English Language Learner	-0.427*	(0.037)	-0.450*	(0.036)	-0.455*	(0.037)	-0.398*	(0.036)
District Size: Less than 450	0.077	(0.044)	0.078	(0.049)	0.007	(0.044)	0.096	(0.049)
District Size: 450 to 899	0.114*	(0.038)	0.099*	(0.043)	0.061	(0.037)	0.130*	(0.043)
District Size: 900 to 1,999	0.208*	(0.040)	0.178*	(0.045)	0.180*	(0.039)	0.228*	(0.046)
District Size: 2,000 to 4,999	0.220*	(0.048)	0.270*	(0.055)	0.188*	(0.048)	0.243*	(0.055)
District Size: 5,000 to 8,999	0.342*	(0.066)	0.422*	(0.075)	0.271*	(0.066)	0.333*	(0.077)
AIC	56169.9		54970.2		56332.1		55766.8	
AICC	56169.9		54970.2		56332.1		55766.8	
BIC	56177.7		54978.1		56340.0		55774.7	

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 13—7th Grade Building Transition Group

	7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	0.010	(0.023)	0.037	(0.024)	-0.008	(0.023)	0.034	(0.025)
Asian	0.048	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.198*	(0.025)	-0.317*	(0.024)	-0.251*	(0.025)	-0.319*	(0.025)
Hispanic	-0.085*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.153*	(0.025)
Native American	-0.138*	(0.069)	-0.157*	(0.068)	-0.176*	(0.069)	-0.225*	(0.068)
Female	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.189*	(0.009)
Special Education	-1.008*	(0.015)	-1.009*	(0.014)	-1.053*	(0.015)	-1.020*	(0.015)
Talented and Gifted	1.098*	(0.014)	1.103*	(0.013)	1.034*	(0.014)	1.066*	(0.013)
Free or Reduced Lunch	-0.246*	(0.012)	-0.233*	(0.011)	-0.225*	(0.012)	-0.246*	(0.012)
English Language Learner	-0.426*	(0.037)	-0.450*	(0.036)	-0.454*	(0.037)	-0.398*	(0.036)
District Size: Less than 450	0.075	(0.045)	0.065	(0.050)	0.011	(0.044)	0.085	(0.050)
District Size: 450 to 899	0.120*	(0.038)	0.094*	(0.042)	0.074*	(0.037)	0.127*	(0.043)
District Size: 900 to 1,999	0.218*	(0.039)	0.182*	(0.044)	0.193*	(0.039)	0.234*	(0.045)
District Size: 2,000 to 4,999	0.220*	(0.048)	0.265*	(0.055)	0.191*	(0.048)	0.239*	(0.055)
District Size: 5,000 to 8,999	0.340*	(0.066)	0.417*	(0.076)	0.273*	(0.066)	0.328*	(0.077)
AIC	56172.0		54969.1		56335.1		55766.4	
AICC	56172.0		54969.1		56335.1		55766.4	
BIC	56179.9		54977.0		56343.1		55774.4	

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 14—8th Grade Building Transition Group

	8th Grade			
	Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)
Building Transition	0.080	(0.150)	0.192	(0.164)
Asian	0.051	(0.035)	0.144*	(0.034)
African American	-0.251*	(0.025)	-0.319*	(0.025)
Hispanic	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.176*	(0.069)	-0.224*	(0.068)
Female	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.053*	(0.015)	-1.020*	(0.015)
Talented and Gifted	1.034*	(0.014)	1.066*	(0.013)
Free or Reduced Lunch	-0.225*	(0.012)	-0.246*	(0.012)
English Language Learner	-0.454*	(0.037)	-0.398*	(0.036)
District Size: 450 to 899	0.071	(0.037)	0.134*	(0.042)
District Size: 900 to 1,999	0.193*	(0.039)	0.236*	(0.045)
District Size: 2,000 to 4,999	0.190*	(0.048)	0.244*	(0.055)
District Size: 5,000 to 8,999	0.271*	(0.066)	0.333*	(0.076)
AIC	56331.2		55763.1	
AICC	56331.2		55763.1	
BIC	56339.2		55771.1	

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 15—5th and 7th Grade Building Transition Group

	5th Grade				6th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	-0.071	(0.044)	-0.033	(0.045)	0.008	(0.045)	0.046	(0.045)
Asian	-0.032	(0.033)	0.068*	(0.032)	-0.033	(0.034)	0.058	(0.033)
African American	-0.194*	(0.024)	-0.248*	(0.024)	-0.205*	(0.025)	-0.271*	(0.024)
Hispanic	-0.117*	(0.024)	-0.117*	(0.024)	-0.118*	(0.025)	-0.118*	(0.024)
Native American	-0.190*	(0.066)	-0.207*	(0.064)	-0.181*	(0.067)	-0.274*	(0.067)
Female	0.019*	(0.009)	-0.170*	(0.009)	0.040*	(0.009)	-0.148*	(0.009)
Special Education	-0.985*	(0.014)	-0.893*	(0.014)	-1.025*	(0.014)	-0.974*	(0.014)
Talented and Gifted	0.910*	(0.013)	0.959*	(0.013)	0.957*	(0.013)	0.980*	(0.013)
Free or Reduced Lunch	-0.167*	(0.011)	-0.158*	(0.011)	-0.187*	(0.011)	-0.181*	(0.011)
English Language Learner	-0.442*	(0.035)	-0.316*	(0.035)	-0.415*	(0.036)	-0.316*	(0.036)
District Size: Less than 450	0.102*	(0.034)	0.057	(0.037)	0.027	(0.039)	0.028	(0.040)
District Size: 450 to 899	0.107*	(0.026)	0.075*	(0.028)	0.061	(0.032)	0.062	(0.032)
District Size: 900 to 1,999	0.170*	(0.027)	0.084*	(0.030)	0.131*	(0.033)	0.114*	(0.034)
District Size: 2,000 to 4,999	0.214*	(0.029)	0.172*	(0.032)	0.136*	(0.038)	0.169*	(0.039)
District Size: 5,000 to 8,999	0.236*	(0.035)	0.242*	(0.038)	0.217*	(0.049)	0.265*	(0.050)
AIC	54385.9		53295.7		55624.0		54818.1	
AICC	54385.9		53295.7		55624.0		54818.1	
BIC	54394.8		53304.6		55632.3		54826.4	

Source: Department of Education, AYP Files.

Note: *p<0.05

Table 16—5th and 7th Grade Building Transition Group (continued)

	7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	0.006	(0.043)	-0.025	(0.044)	0.046	(0.044)	-0.006	(0.045)
Asian	0.048	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.198*	(0.025)	-0.318*	(0.024)	-0.251*	(0.025)	-0.319*	(0.025)
Hispanic	-0.086*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.138*	(0.069)	-0.157*	(0.068)	-0.176*	(0.069)	-0.224*	(0.068)
Female	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.008*	(0.015)	-1.009*	(0.014)	-1.053*	(0.015)	-1.020*	(0.015)
Talented and Gifted	1.098*	(0.014)	1.103*	(0.013)	1.035*	(0.014)	1.066*	(0.013)
Free or Reduced Lunch	-0.246*	(0.012)	-0.233*	(0.011)	-0.225*	(0.012)	-0.246*	(0.012)
English Language Learner	-0.426*	(0.037)	-0.450*	(0.036)	-0.454*	(0.037)	-0.398*	(0.036)
District Size: Less than 450	0.078	(0.044)	0.078	(0.049)	0.009	(0.044)	0.097*	(0.049)
District Size: 450 to 899	0.122*	(0.037)	0.104*	(0.042)	0.071	(0.037)	0.136*	(0.042)
District Size: 900 to 1999	0.218*	(0.039)	0.184*	(0.044)	0.191*	(0.039)	0.236*	(0.045)
District Size: 2,000 to 4,999	0.221*	(0.048)	0.271*	(0.055)	0.188*	(0.048)	0.244*	(0.055)
District Size: 5,000 to 8,999	0.342*	(0.066)	0.422*	(0.076)	0.272*	(0.066)	0.333*	(0.077)
AIC	56170.9		54969.9		56332.9		55767.1	
AICC	56170.9		54969.9		56332.9		55767.1	
BIC	56178.8		54977.7		56340.8		55775.0	

Source: Department of Education, AYP Files.
 Note: *p<0.05

Table 17—7th and 8th Grade Building Transition Group

	7th Grade				8th Grade			
	Reading Z-Score		Math Z-Score		Reading Z-Score		Math Z-Score	
	coefficient	(std)	coefficient	(std)	coefficient	(std)	coefficient	(std)
Building Transition	-0.115	(0.098)	-0.141	(0.103)	0.041	(0.100)	-0.044	(0.107)
Asian	0.048	(0.035)	0.141*	(0.034)	0.051	(0.035)	0.144*	(0.034)
African American	-0.198*	(0.025)	-0.317*	(0.024)	-0.251*	(0.025)	-0.319*	(0.025)
Hispanic	-0.085*	(0.025)	-0.154*	(0.025)	-0.178*	(0.025)	-0.154*	(0.025)
Native American	-0.138*	(0.069)	-0.157*	(0.068)	-0.176*	(0.069)	-0.224*	(0.068)
Female	0.004	(0.009)	-0.173*	(0.009)	0.045*	(0.009)	-0.188*	(0.009)
Special Education	-1.008*	(0.015)	-1.009*	(0.014)	-1.053*	(0.015)	-1.020*	(0.015)
Talented and Gifted	1.098*	(0.014)	1.103*	(0.013)	1.034*	(0.014)	1.066*	(0.013)
Free or Reduced Lunch	-0.246*	(0.012)	-0.233*	(0.011)	-0.225*	(0.012)	-0.246*	(0.012)
English Language Learner	-0.427*	(0.037)	-0.451*	(0.036)	-0.454*	(0.037)	-0.398*	(0.036)
District Size: Less than 450	0.081	(0.044)	0.082	(0.049)	0.007	(0.044)	0.098*	(0.049)
District Size: 450 to 899	0.123*	(0.037)	0.104*	(0.042)	0.072	(0.037)	0.136*	(0.042)
District Size: 900 to 1999	0.219*	(0.039)	0.184*	(0.044)	0.193*	(0.039)	0.236*	(0.045)
District Size: 2000 to 4999	0.221*	(0.048)	0.270*	(0.055)	0.190*	(0.048)	0.243*	(0.055)
District Size: 5000 to 8999	0.341*	(0.066)	0.422*	(0.076)	0.272*	(0.066)	0.333*	(0.077)
AIC	56167.9		54966.6		56332.2		55765.2	
AICC	56167.9		54966.6		56332.2		55765.2	
BIC	56175.8		54974.5		56340.1		55773.1	

Source: Department of Education, AYP Files.

Note: *p<0.05