

Appendix

Multi-level Modeling Equations

Study 1

The following equation can be obtained with the combined variables in the two levels.

$$Y_{ti} = \beta_{00} + \beta_{01}SAM_i + \beta_{10}Year_{ti} + \beta_{11}SAM_i \times Year_{ti} + u_{1i}Year_{ti}u_{0i} + \varepsilon_{ti} \quad (1)$$

In equation 1, the observed state assessment score (Y_{ti}) for individual i at time t is described. The $Year_{ti}$ is a time-varying variable representing the SAM implementation year. The variable $Year$ was coded to indicate nonlinear trajectories (i.e., quadratic shape of the growth) as well as linear growth with the non-coded $Year$. The quadratic component was defined to capture any variation (acceleration or deceleration) in the rate of change that might occur over the three measurement occasions. Time intervals were squared for the quadratic shape of the growth, and the variable $Year$ was correspondingly coded 0, 1, and 4. In addition, orthogonal transformations were applied to reduce any potential multicollinearity issues. The linear $Year$ was recoded to -1, 0, and 1 for the orthogonal linear year intervals, and 1, -2, and 1 for the orthogonal quadratic year intervals. β_{00} is an intercept, and β_{10} is growth rate, β_{01} represents SAMAN growth or SAM status difference rate. With the cross-level interaction, β_{11} , it was proposed that the SAMAN score or SAM status group would explain differences in their state assessment score intercepts and growth rates. u_{0i} and u_{1i} represent variation associated with estimating the intercept and slope parameters between individuals, and ε_{ti} describes variation in estimating growth within individuals.

Study 2

The level 1 model for individual i measured at time occasion t as follows:

$$Y_{ti} = \pi_{0i} + \pi_{1i}Year_{ti} + \varepsilon_{ti} \quad (2)$$

Results using the model with time specified as linear were used to describe growth over the short period of time of the study. At Level 2, it was assumed that the intercept varies between subjects:

$$\pi_{0i} = \beta_{00} + \beta_{01}SAM_i + u_{0i} \quad (3)$$

It can be also modeled that the time slope is randomly varying:

$$\pi_{1i} = \beta_{10} + \beta_{11}SAM_i + u_{1i} \quad (4)$$

After substituting the Level 2 equations into the Level 1 equation, the combined model can be written as follows.

$$Y_{ti} = \beta_{00} + \beta_{01}SAM_i + \beta_{10}Year_{ti} + \beta_{11}Year_{ti} * SAM_i + u_{1i}Year_{ti} + u_{0i} + \varepsilon_{ti} \quad (5)$$

In the equation above, SAM represents a dichotomous variable for SAM implementation experience (0 = comparison group, 1 = SAM implementation group), and $Year$ is the SAM implementation year (correspondingly coded 0, 1, and 2). The key parameter in the model is the $Year \times SAM$ interaction, which is used to determine whether different growth trajectories exist for individuals in the SAM and comparison groups.

Tables

Table S1

Estimates of Fixed Effects Analyzed with All Students with IEPs who Attended Any Study Year

Variables	Model 1		Model 2	
	β	SE	β	SE
Math with SAMAN (SAM schools only)				
Intercept	35.24**	1.07	36.24**	1.10
Year (quadratic)	1.37**	0.34	1.52**	0.38
SAMAN			6.43**	1.75
SAMAN x Year			-3.57**	0.84
AIC	4,743.60		4,719.69	
Math with SAM Group (all schools)				
Intercept	34.28**	0.78	34.31**	1.06
Year (linear)	1.85**	0.52	0.53	0.74
SAM Group			-0.14	0.94
SAM Group x Year			1.55*	0.64
AIC	8,823.16		8,798.96	
Reading with SAMAN (SAM schools only)				
Intercept	33.88**	0.87	33.85**	0.88
Year (quadratic)	0.73	0.39	0.84*	0.41
SAMAN			1.32	1.47
SAMAN * Year			-0.27	0.91
AIC	4,812.69		4,807.55	

(table continues)

Variables	Model 1		Model 2	
	β	SE	β	SE
Reading with SAM Group (all schools)				
Intercept	31.67**	0.81	31.32**	1.10
Year (linear)	1.37*	0.55	1.95*	0.78
SAM Group			0.43	0.98
SAM Group x Year			-0.73	0.67
AIC	8,861.61		8,855.56	

* $p < .05$, ** $p < .01$

Note: IEP = Individual Educational Program. SAM Group represents 3 groups of SAM implementation status. Those are: (a) comparison schools, (b) schools didn't meet fidelity criteria, and (c) schools met fidelity criteria. SAMAN data was collected from schools implemented SAM only. Therefore, analyses with SAMAN were conducted with data from 7 SAM implementation schools only. Analyses with SAM Groups included all 14 schools. Student N was 621 for all schools (355 for SAM and 266 for comparison schools).

Table S2

Estimates of Fixed Effects for the Comparison Group Study

Fixed effects	β	SE
Math		
Intercept	33.19**	1.62
SAM Implementation	-2.10	2.16
Year	0.17	1.29
Year x SAM Implementation	3.99*	1.61
Reading		
Intercept	28.23**	1.70
SAM Implementation	1.46	2.28
Year	1.95	1.42
Year x SAM Implementation	-1.54	1.78

* $p < .05$, ** $p < .01$

Table S3

Estimates of Fixed Effects of the Model with Year Variable as Categorical

Fixed effects	β	SE
Intercept	33.23**	2.61
SAM Implementation	6.02	3.12
[Year=0]	0.14	2.67
[Year=1]	0.41	2.65
[Year=2]	0.00 ^a	0.00
[Year=0] x SAM Implementation	-8.27*	3.28
[Year=1] x SAM Implementation	-3.75	3.29
[Year=2] x SAM Implementation	0.00 ^a	0.00

* $p < .05$, ** $p < .01$, ^a 0 is set because it is redundant.

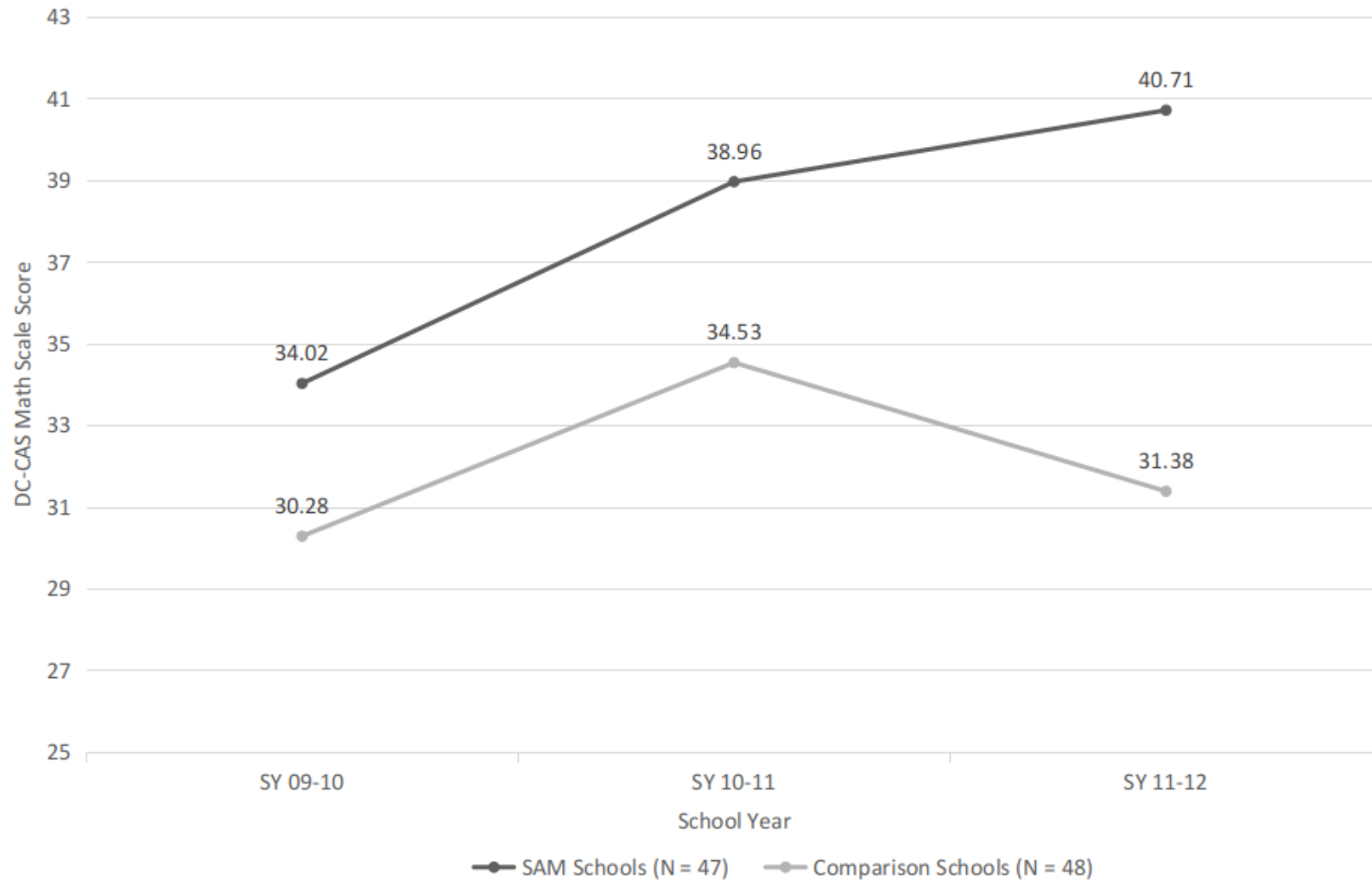
Figure

Figure S1. State assessment mean score changes on math for students who took the test consistently for the 3 years