PRI Middle School Follow-Up Project

August 2015 Update

Study conducted by the Peabody Research Institute

at Vanderbilt University

PEABODY research institute

Generously funded by:

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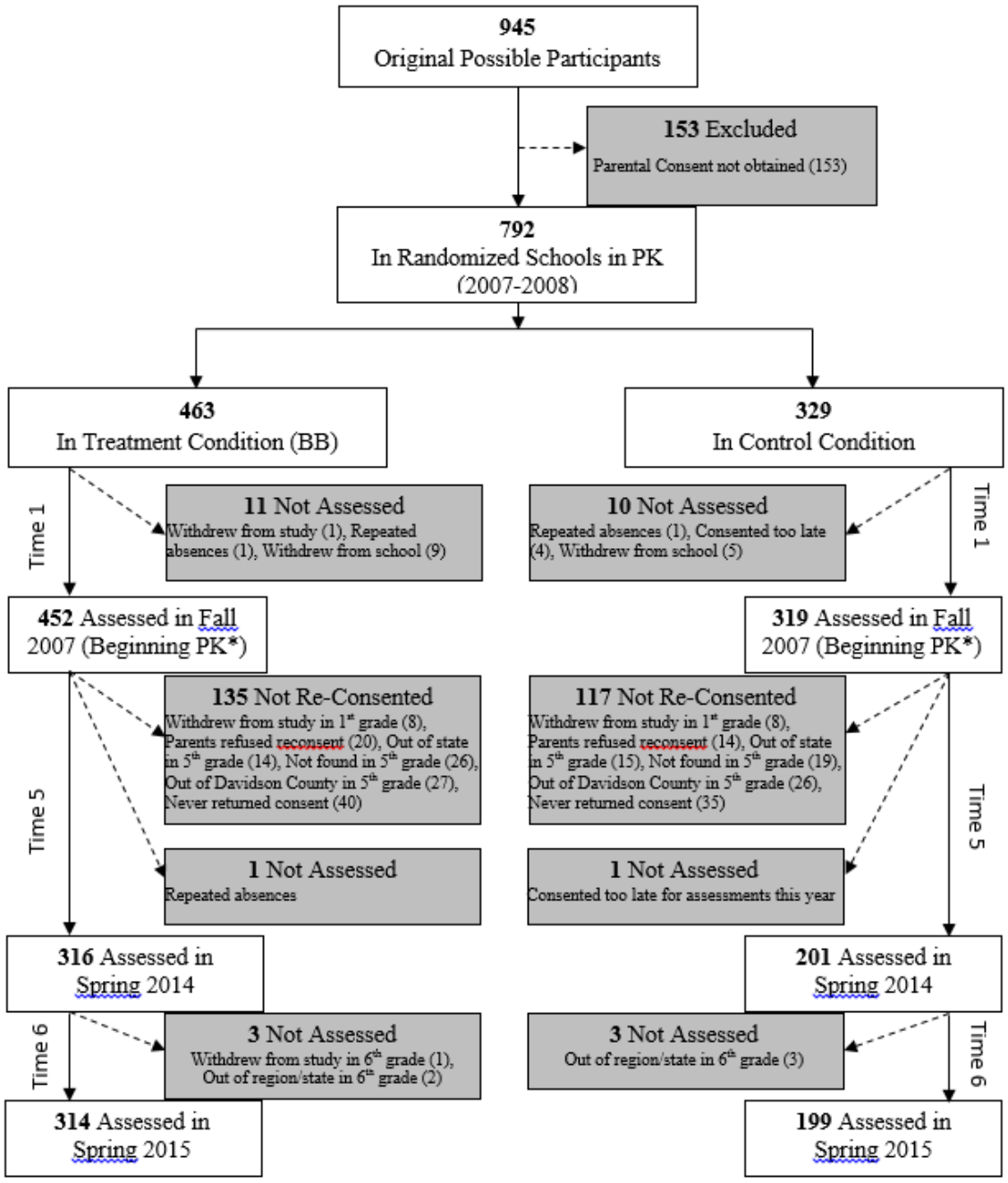
Official Analysis Sample

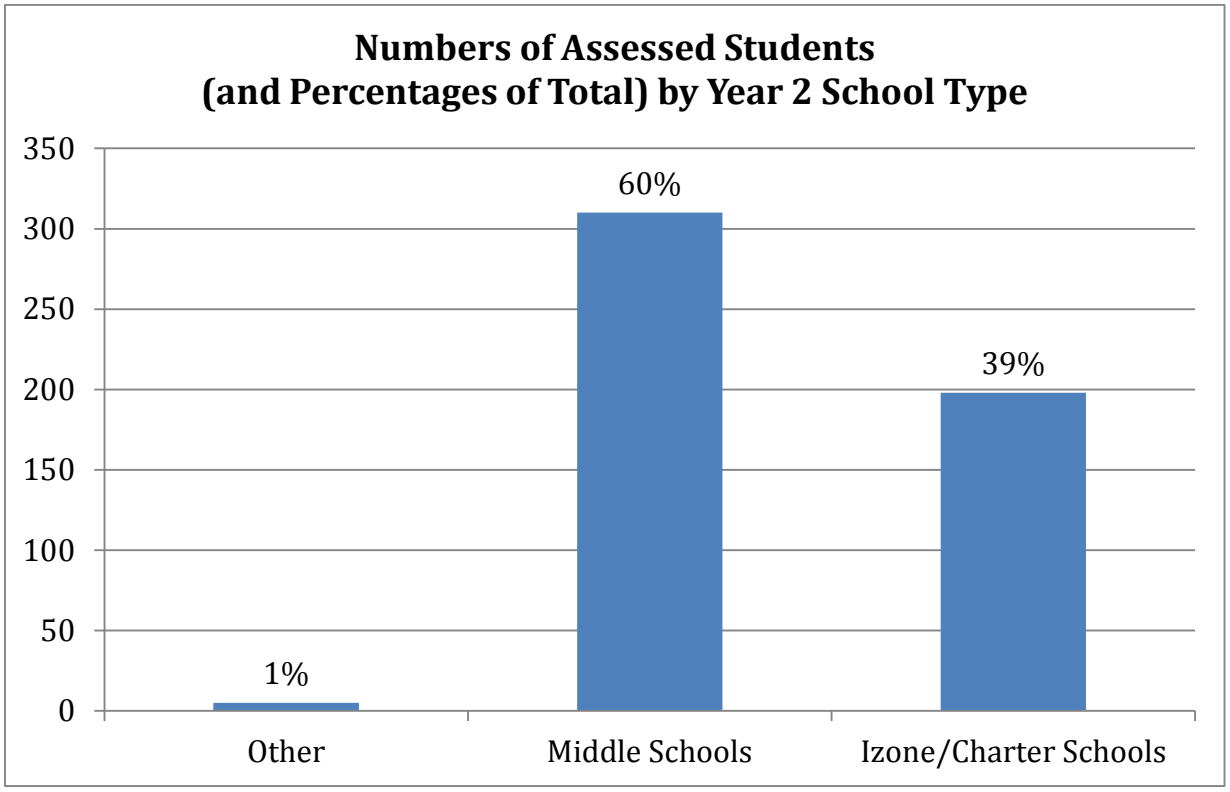
- We originally had 771 students in our database from the Pre-K study, and our goal for the newly-consented sample, as written in the grant proposal, was 500 students.
- 16 students withdrew from the study in 1st grade.
- 29 students are no longer in the state.
- 53 students are in the state but are not in Davidson County.
- 45 students have not been located despite all efforts.
- 34 students' parents have declined to participate this year (though 16 of those were communicated via the math teacher).
- 72 students were located in Davidson County, but we could not get parental consent.
- 3 additional students initially agreed to participate but parents never returned hard copy of consent form
- **OUR OFFICIAL ANALYSIS SAMPLE CONSISTS OF 519 STUDENTS (517 assessed in Year 1, 513 assessed in Year 2).**

Consort Chart: From Original Early Math Study through Middle School Follow-Up



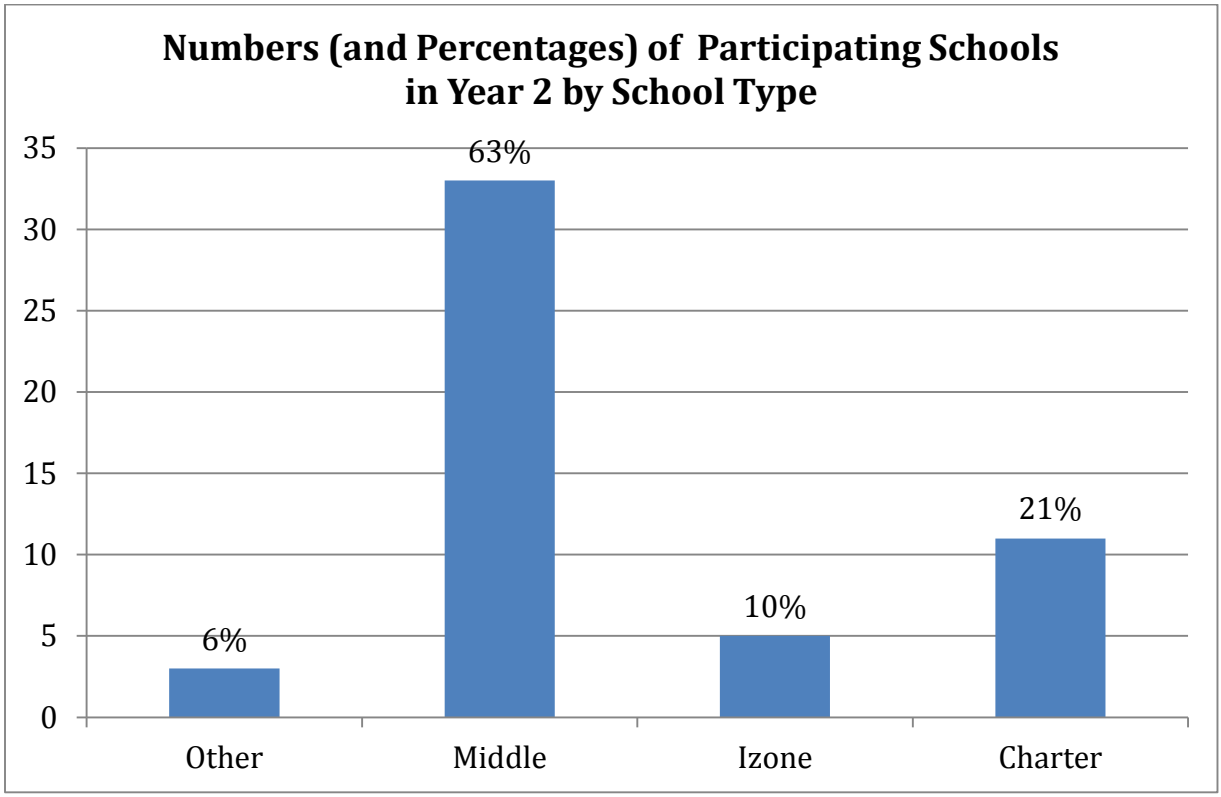
*original official analysis sample of 771 was defined as those assessed at the beginning of pk; official analysis sample of 519 for the follow-up study was defined as those re-consented (whether assessed in Spring 2014 or not)

Assessed Students in Year 2



*"Other" schools include 1 that serves emotionally fragile students only and 2 alternative schools.

Participating Schools in Year 2



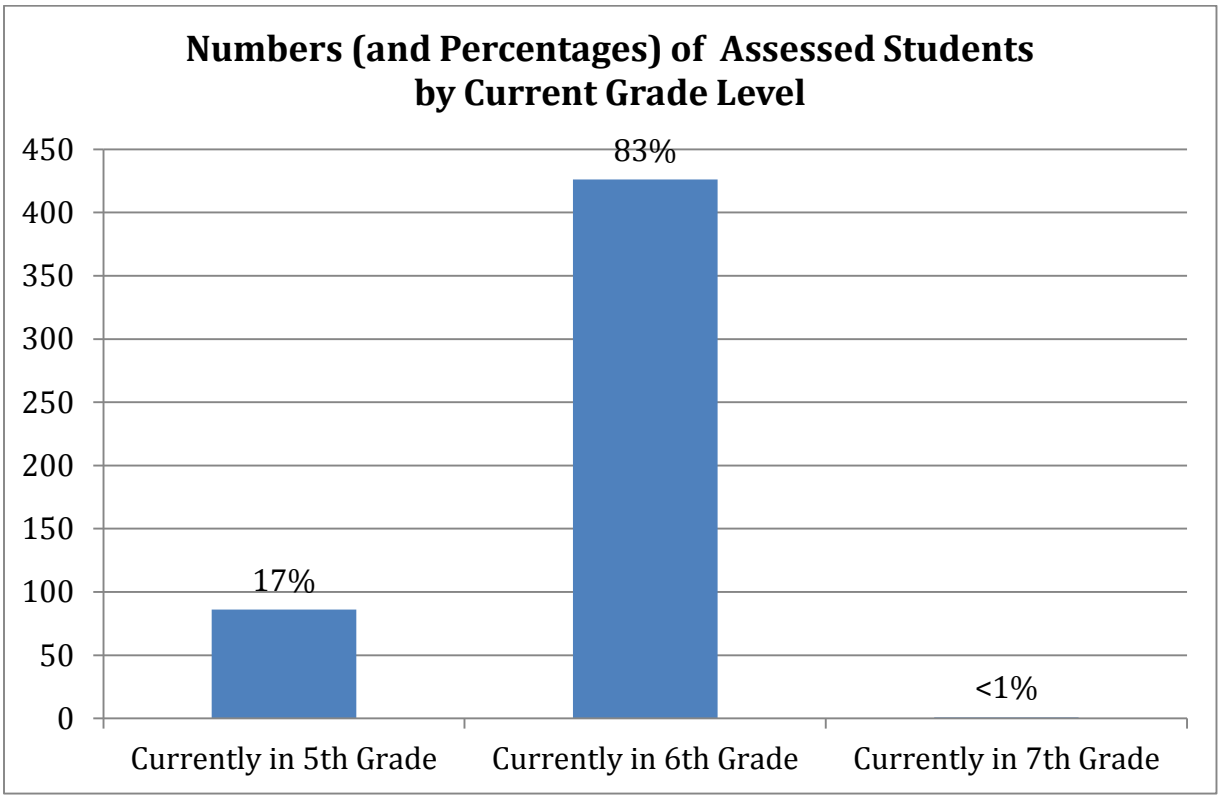
Demographic Information (Assessed Sample)

	N	Min	Max	Mean	SD
Age at Time of Testing (in years)	513	11.4	13.4	12.1	.322
PK Treatment Condition	314	11.4	13.4	12.0	.319
PK Control Condition	199	11.5	13.3	12.1	.322

	Overall		PK Treatment		PK Control	
	Freq	Pct	Freq	Pct	Freq	Pct
Ethnicity						
Black	406	79.1	256	81.5	150	75.4
White	44	8.6	23	7.3	21	10.6
Hispanic	41	8.0	20	6.4	21	10.6
Other	22	4.2	15	4.8	7	3.5
Gender						
Male	225	43.9	139	44.3	86	43.2
Female	288	56.1	175	55.7	113	56.8
Number of Current Schools*	52	-	46	-	48	-
Pre-K School System						
MAC	209	40.7	151	48.1	58	29.1
MNPS	304	59.3	163	51.9	141	70.9

*Most students were located in Davidson County, but we also assessed any student who had moved to a contiguous county (3 in Robertson, 3 in Rutherford, 1 in Sumner, 1 in Wilson).

Grade Retention Information in Year 2



*426 students have gone through 5th and 6th grade as expected

*76 students were in 4th last year and 5th this year

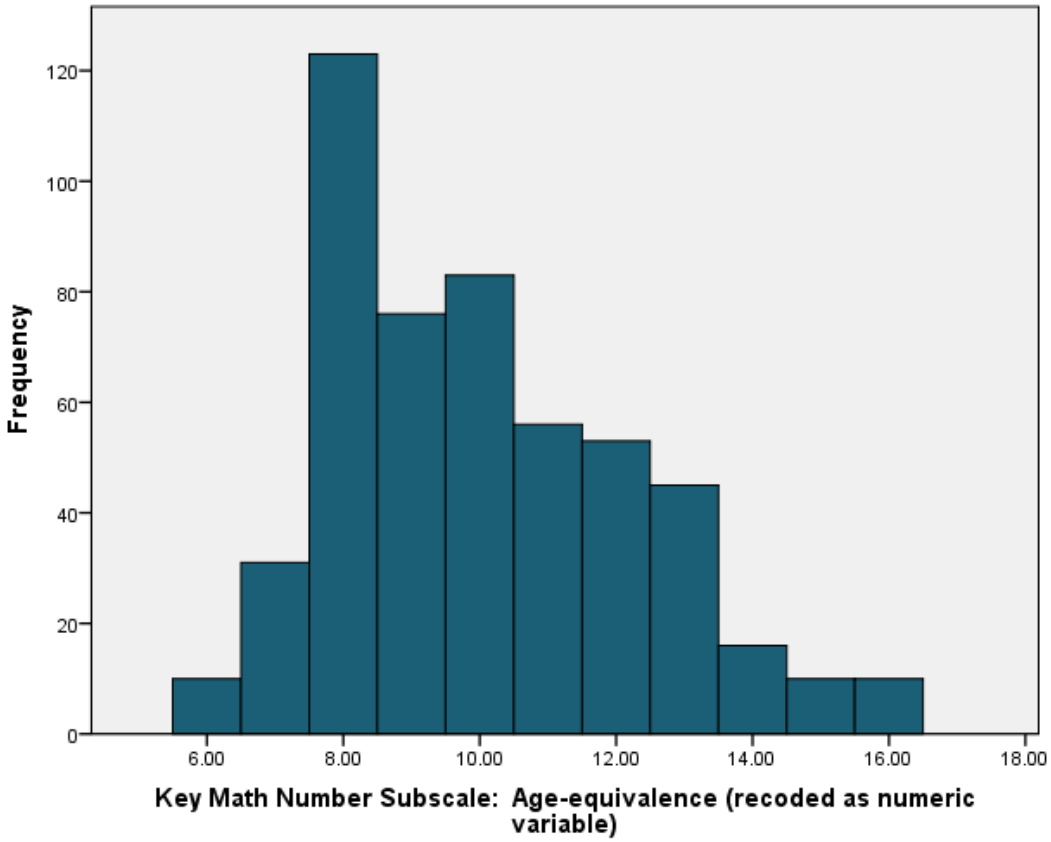
*10 students were in 5th last year and repeated 5th this year

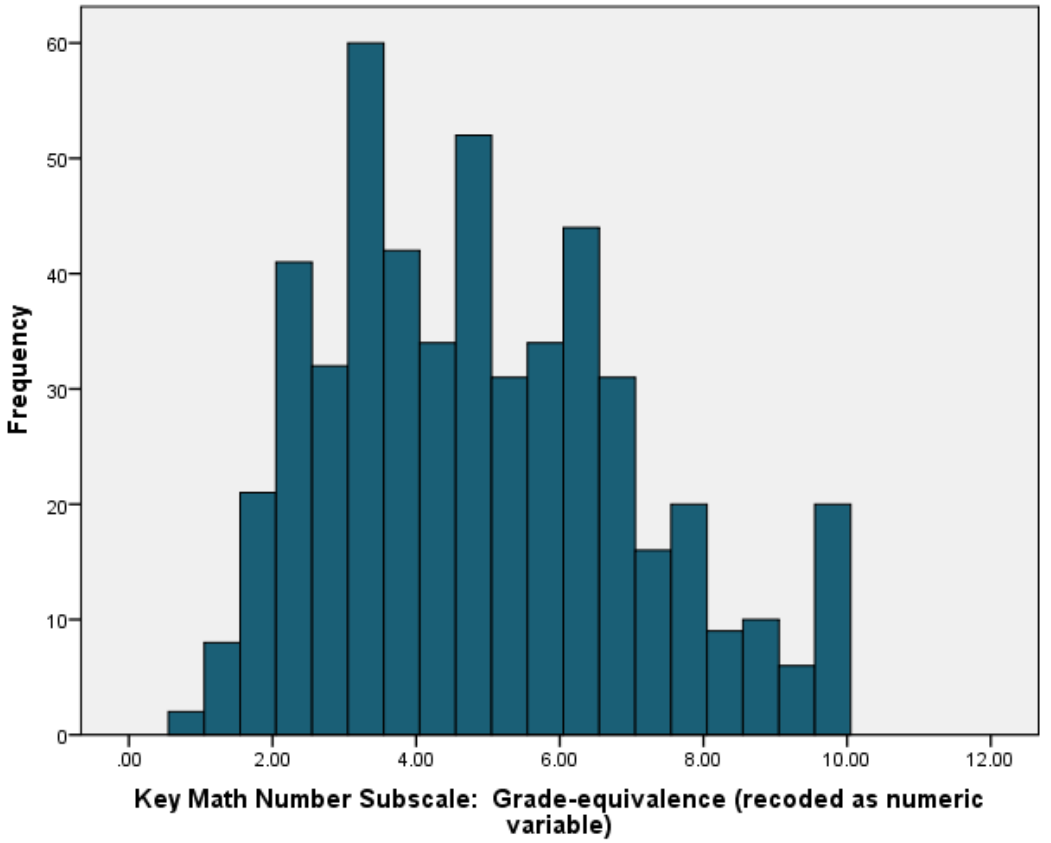
*1 student skipped 6th grade and went straight into 7th this year

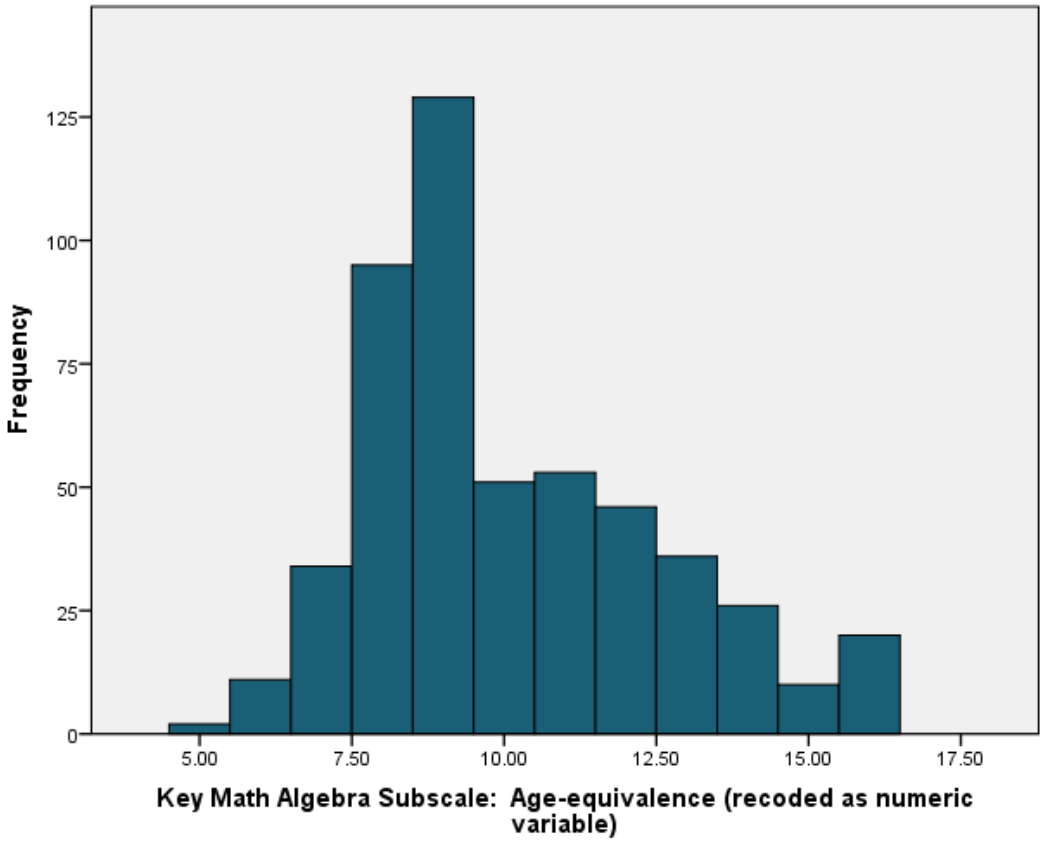
Assessment Descriptives: Key Math

	N	Min	Max	Mean	SD
KeyMath: Numeration					
Raw Score	513	7.0	49.0	23.85	7.87
Age-Scaled Score	513	2.0	19.0	7.82	2.71
Grade-Scaled Score	513	2.0	19.0	7.47	2.76
Age Equivalent	513	6.0	16.0	10.03	2.23
Grade Equivalent	513	0.8	10.0	4.98	2.15
Key Math: Algebra					
Raw Score	513	2.0	34.0	18.03	6.09
Age-Scaled Score	513	1.0	17.0	8.15	2.91
Grade-Scaled Score	513	1.0	16.0	7.82	2.95
Age Equivalent	513	5.0	16.0	10.10	2.41
Grade Equivalent	513	0.0	10.0	5.20	2.25
Key Math: Geometry					
Raw Score	513	7.0	32.0	19.62	4.98
Age-Scaled Score	513	2.0	14.0	7.75	2.39
Grade-Scaled Score	513	2.0	15.0	7.62	2.42
Age Equivalent	513	5.0	16.0	9.51	2.10
Grade Equivalent	513	2.0	10.0	4.80	2.06

*Note: The average age of these students is around 12.1 years (minimum 11.4 years, maximum 13.4 years, SD .32 years).


Frequency
120
100
80
60
40
20
0
6.00
8.00
10.00
12.00
14.00
16.00
18.00
Key Math Number Subscale: Age-equivalence (recoded as numeric variable)


Frequency
60
50
40
30
20
10
0
.00
2.00
4.00
6.00
8.00
10.00
12.00
Key Math Number Subscale: Grade-equivalence (recoded as numeric variable)


Frequency
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100
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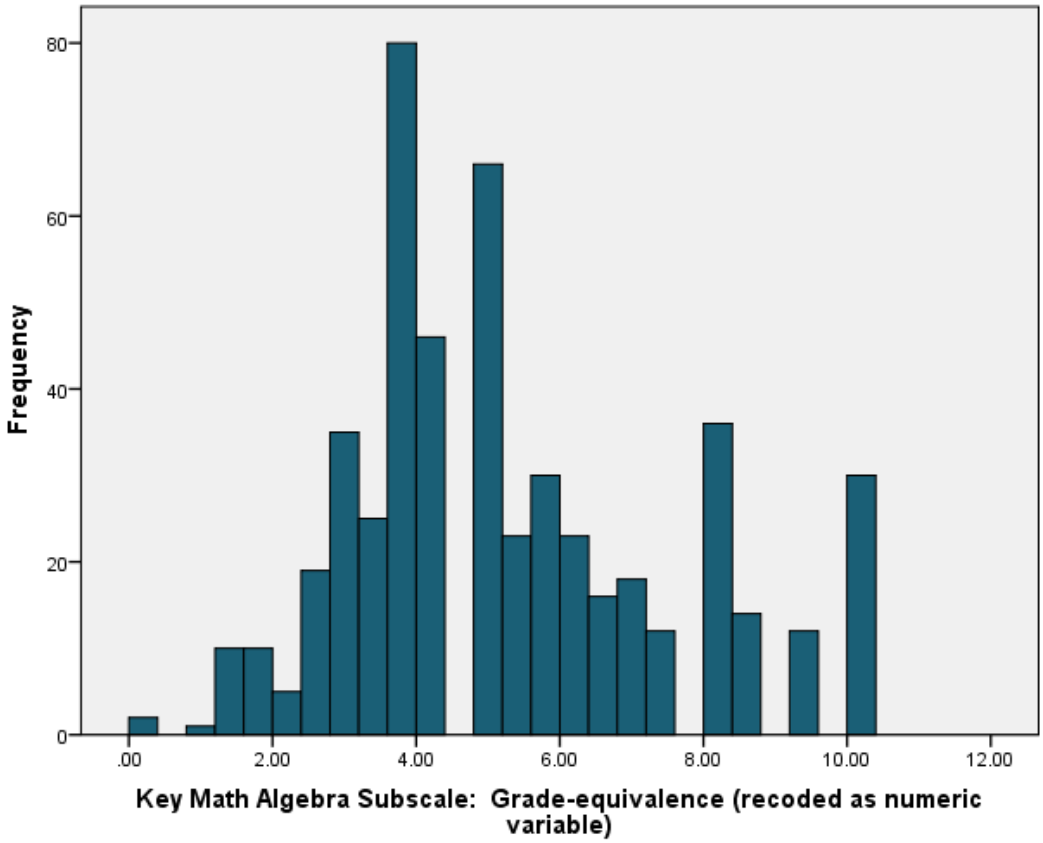
50
25
0
5.00
7.50
10.00
12.50
15.00
17.50
Key Math Algebra Subscale: Age-equivalence (recoded as numeric variable)


Frequency
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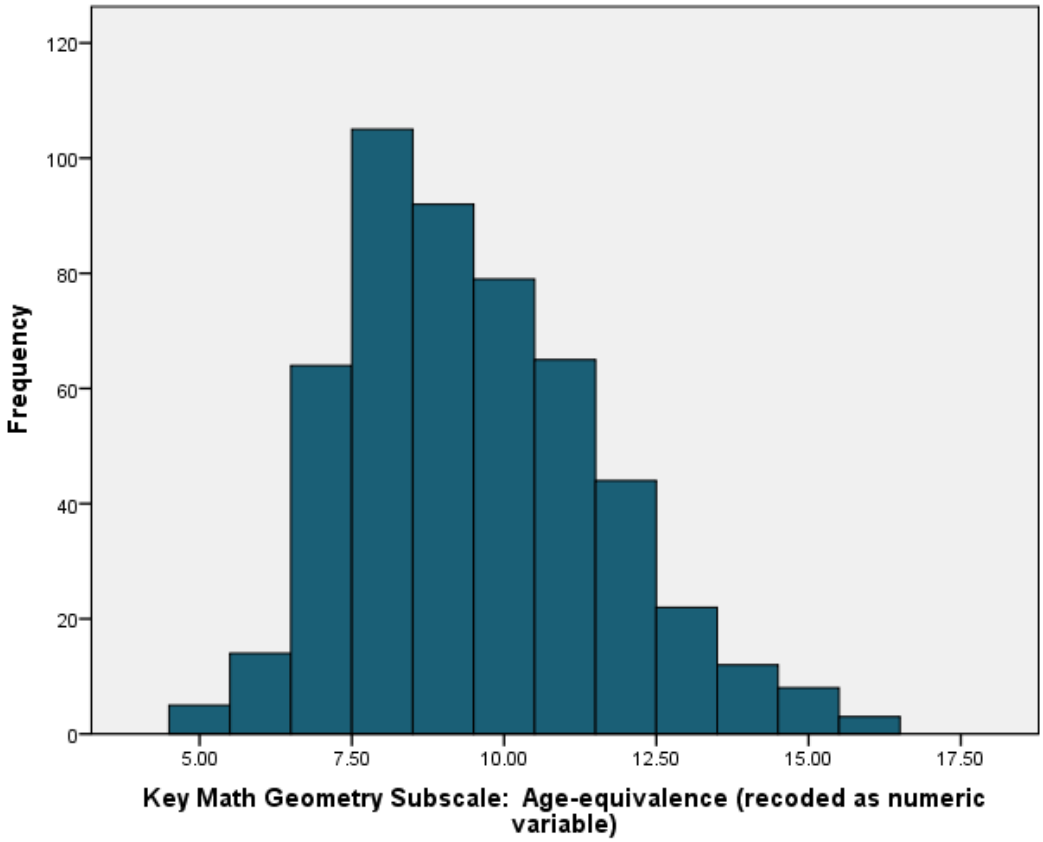
2.00
4.00
6.00
8.00
10.00
12.00
Key Math Algebra Subscale: Grade-equivalence (recoded as numeric variable)


Frequency
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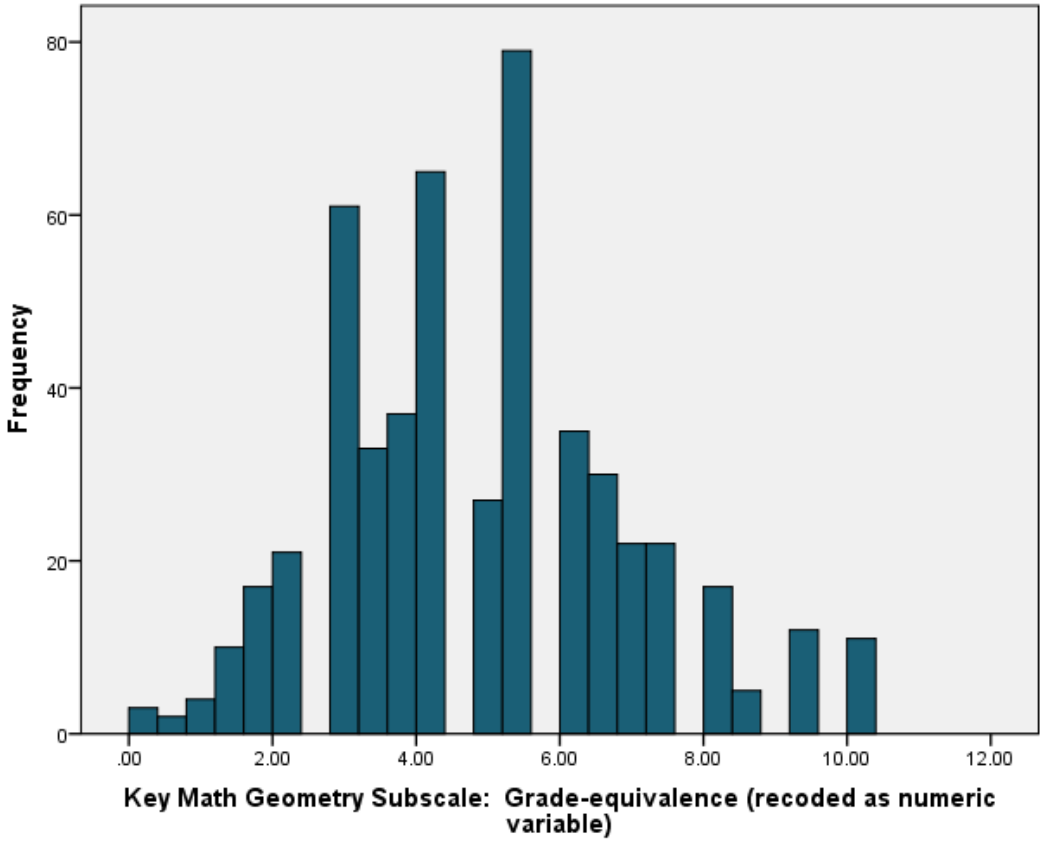
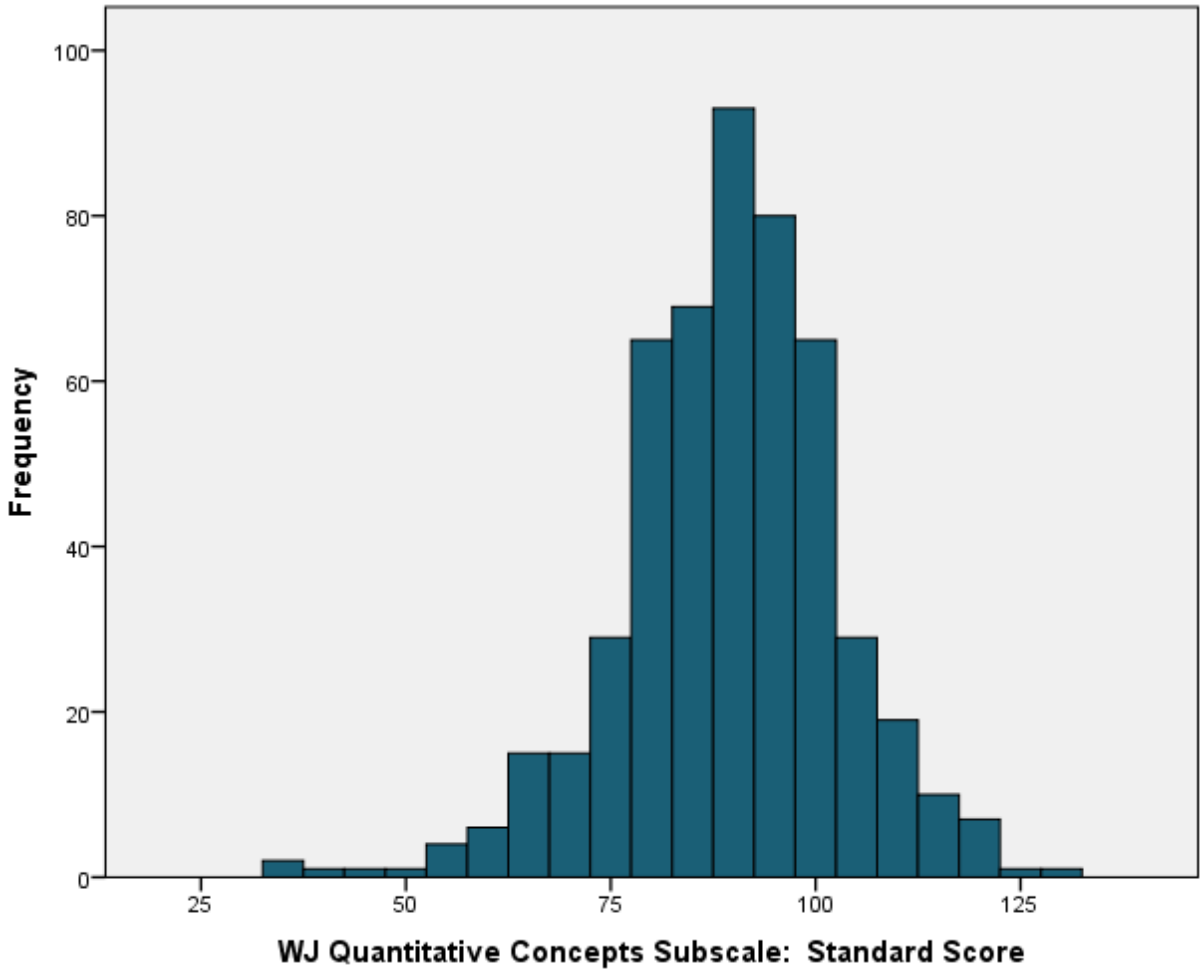
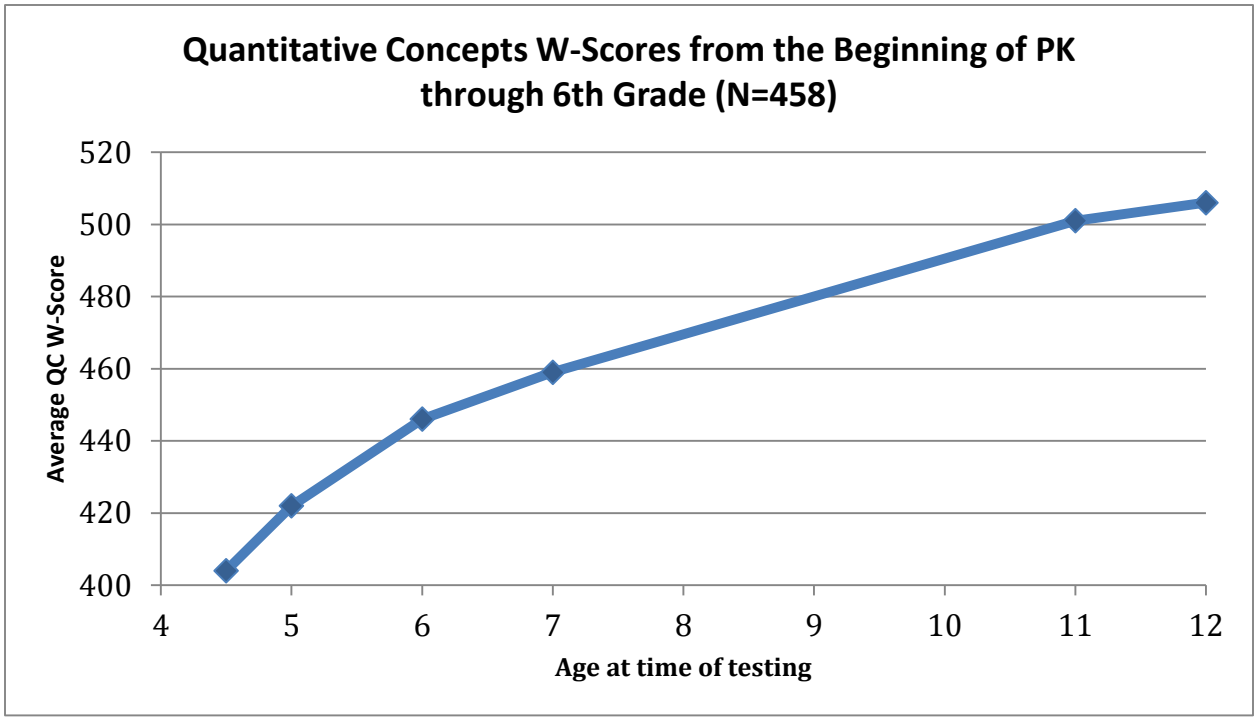
100
80
60
40
20
0
5.00
7.50
10.00
12.50
15.00
17.50
Key Math Geometry Subscale: Age-equivalence (recoded as numeric variable)


Frequency
80
60
40
20
0
.00
2.00
4.00
6.00
8.00
10.00
12.00
Key Math Geometry Subscale: Grade-equivalence (recoded as numeric variable)

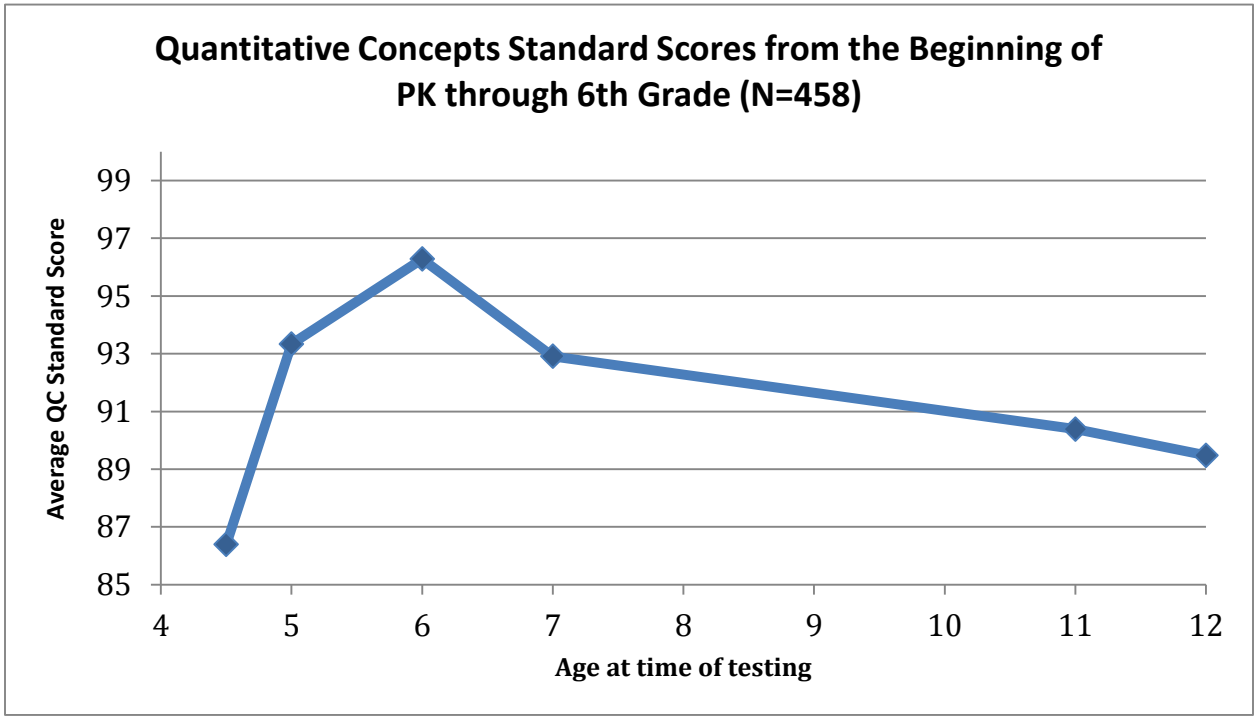
Assessment Descriptives: Woodcock Johnson Quantitative Concepts

	N	Min	Max	Mean	SD
W-Score	513	447	545	506.11	13.905
Standard Score	513	35	132	89.56	13.146



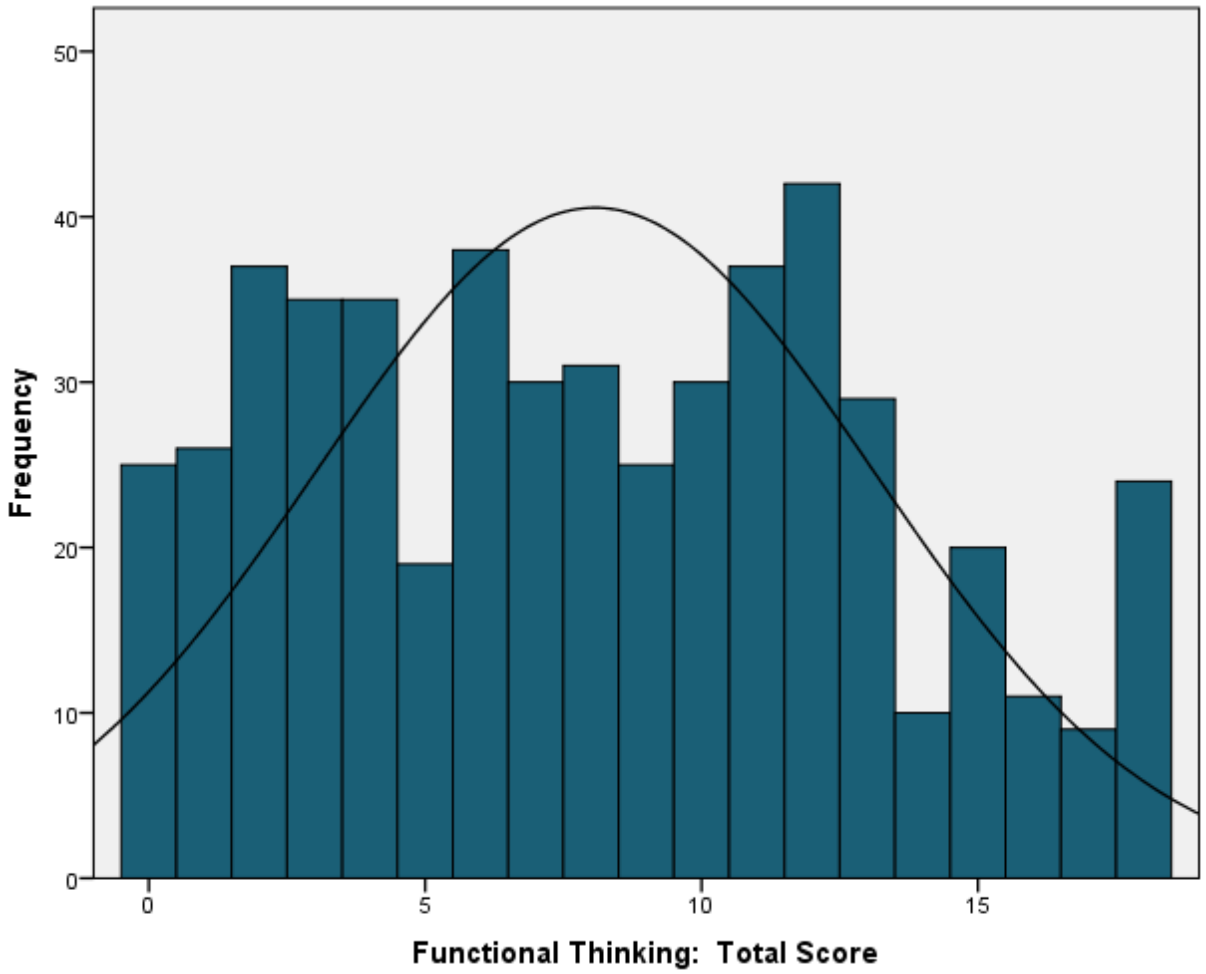


*6 testing times: fall PK, spring PK, spring K, spring 1st grade, spring 5th grade, and spring 6th grade



Assessment Descriptives: Functional Thinking

	N	Min	Max	Mean	SD
Problem Set 1, Input	513	0	1	.49	.500
Problem Set 1, Output	513	0	1	.76	.427
Problem Set 1, Rule	513	0	1	.63	.482
Problem Set 2, Input	513	0	1	.52	.500
Problem Set 2, Output	513	0	1	.78	.417
Problem Set 2, Rule	513	0	1	.65	.479
Problem Set 3, Input	513	0	1	.47	.499
Problem Set 3, Output	513	0	1	.55	.498
Problem Set 3, Rule	513	0	1	.54	.499
Problem Set 4, Input	513	0	1	.38	.485
Problem Set 4, Output	513	0	1	.51	.500
Problem Set 4, Rule	513	0	1	.52	.500
Problem Set 5, Input	513	0	1	.14	.350
Problem Set 5, Output	513	0	1	.45	.498
Problem Set 5, Rule	513	0	1	.12	.326
Problem Set 6, Input	513	0	1	.18	.384
Problem Set 6, Output	513	0	1	.25	.432
Problem Set 6, Rule	513	0	1	.13	.342
Subscale: Addition	513	0	6	3.83	2.22
Subscale: Multiplication	513	0	6	2.97	2.41
Subscale: Operation	513	0	6	1.27	1.75
Subtotal: Input	513	0	6	2.18	1.926
Subtotal: Output	513	0	6	3.30	1.746
Subtotal: Rule	513	0	6	2.59	1.852
Total Score	513	0	18	8.07	5.047



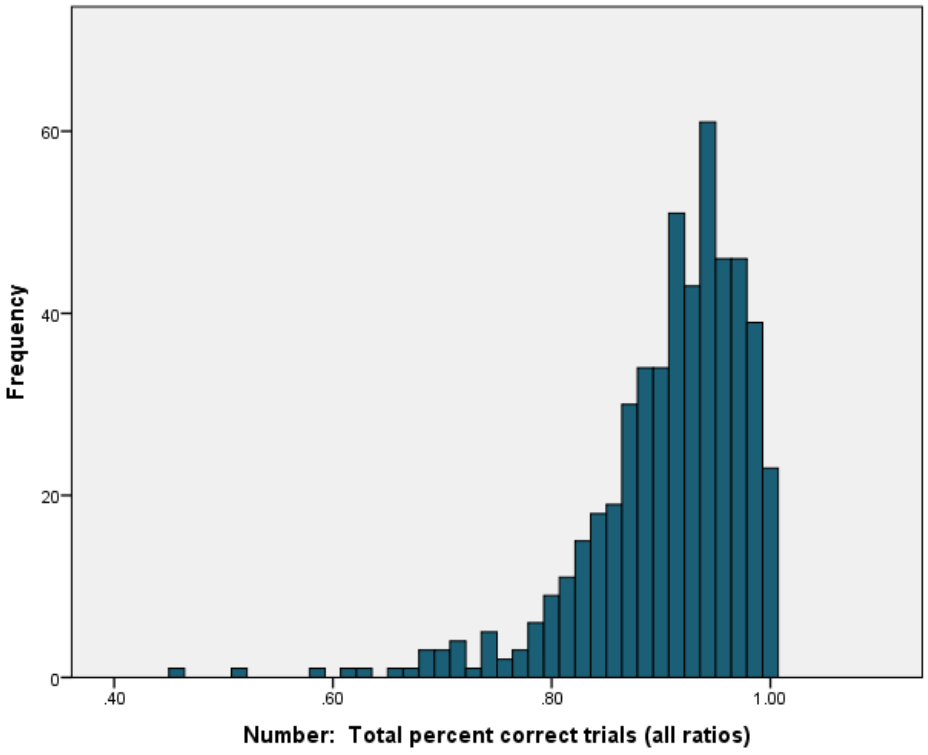
Correlations between Functional Thinking and First Grade REMA Geometry Assessment (N=500)

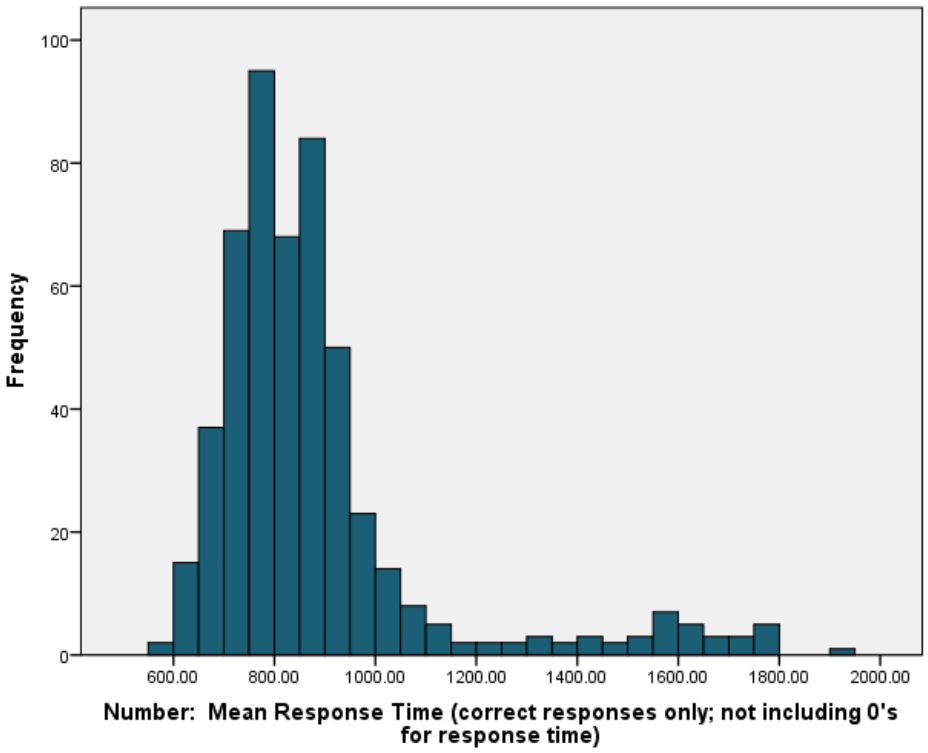
	First Grade REMA: Number	First Grade REMA: Geometry	First Grade REMA: Patterning Items Only
Functional Thinking Subtotal: Input	.479**	.335**	.283**
Functional Thinking Subtotal: Output	.448**	.247**	.225**
Functional Thinking Subtotal: Rule	.501**	.321**	.255**
Functional Thinking: Total Score	.522**	.332**	.280**

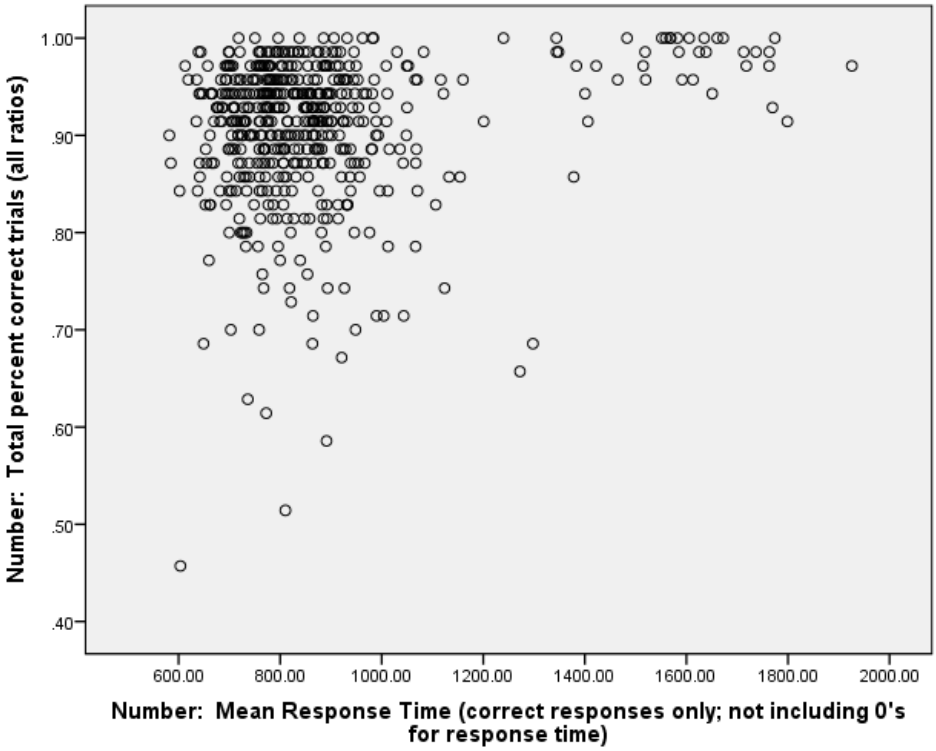
**. Correlation is significant at the 0.01 level (2-tailed).

Symbolic Number Descriptives (NUM)

	N	Min	Max	Mean	SD
NUM Percent Trials Correct	513	.46	1.00	.91	.07
NUM Mean RT for Correct Trials	513	581.73	1925.82	880.65	228.06
NUM Percent Trials Incorrect	513	.00	.54	.09	.07
NUM Slope of Accuracy	490	-1.00	.34	-.22	.19
NUM Slope of RT for Correct Trials	513	-254.51	839.60	290.27	176.02
NUM Performance Score	513	648.00	2144.60	1037.89	259.45

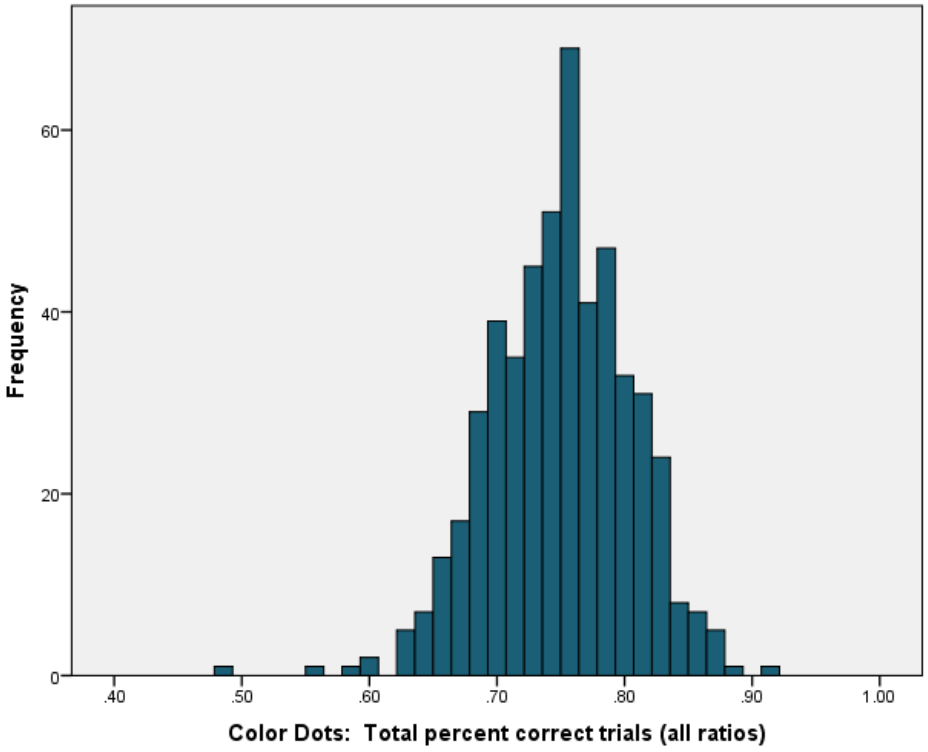


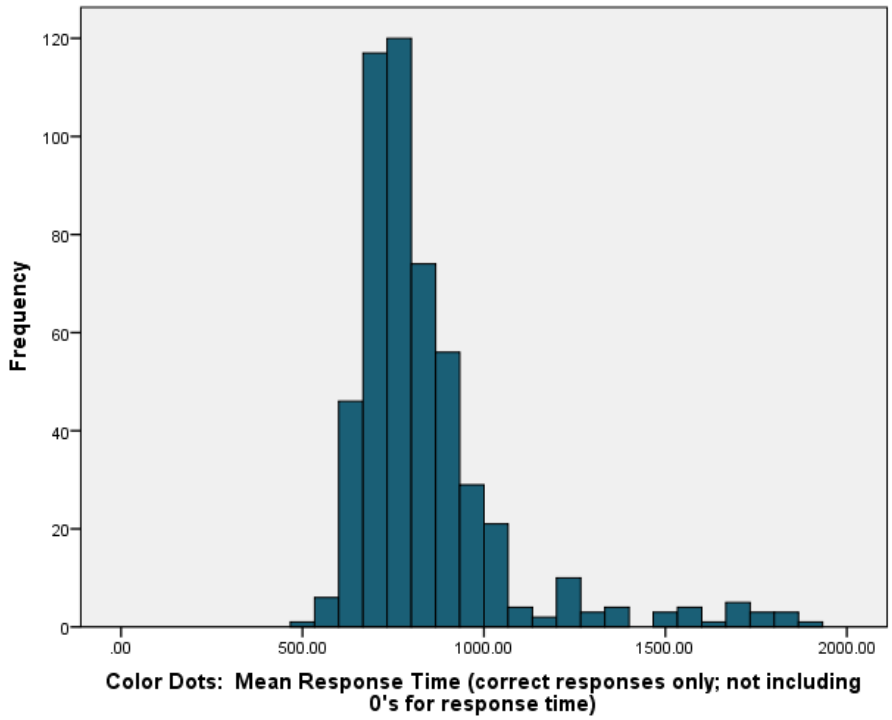

Frequency
100
80
60
40
20
0
600.00
800.00
1000.00
1200.00
1400.00
1600.00
1800.00
2000.00
Number: Mean Response Time (correct responses only; not including 0's for response time)

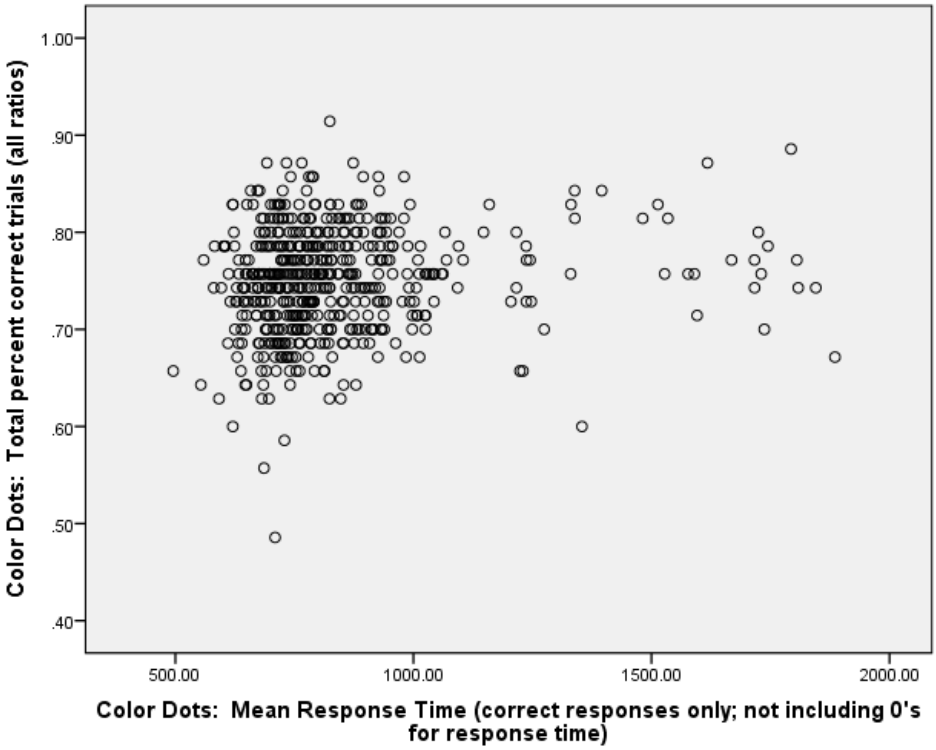

Number: Total percent correct trials (all ratios)
1.00
.90
.80
.70
.60
.50
.40
600.00
800.00
1000.00
1200.00
1400.00
1600.00
1800.00
2000.00
Number: Mean Response Time (correct responses only; not including 0's for response time)

NonSymbolic Number Descriptives (COLOR DOTS)

	N	Min	Max	Mean	SD
CD Percent Trials Correct	513	.49	.91	.75	.05
CD Mean RT for Correct Trials	513	495.48	1885.32	839.77	220.70
CD Percent Trials Incorrect	513	.09	.51	.25	.05
CD Slope of Accuracy	513	-1.35	.02	-.86	.20
CD Slope of RT for Correct Trials	513	-444.60	1481.15	323.34	248.52
CD Performance Score	513	814.92	3124.24	1257.32	328.62



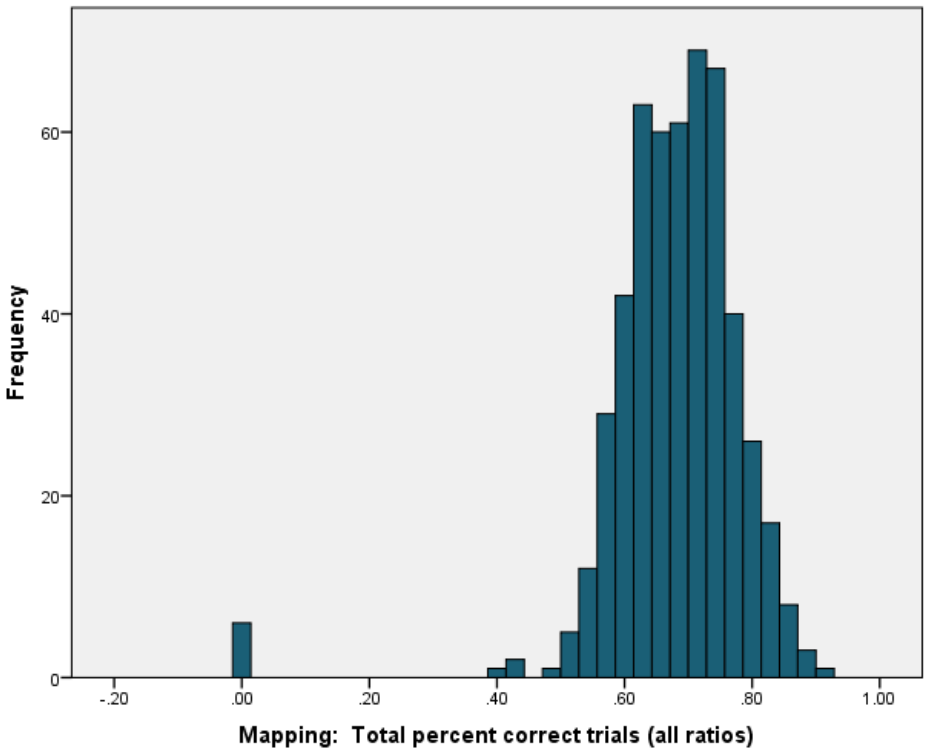

Frequency
120
100
80
60
40
20
0
.00
500.00
1000.00
1500.00
2000.00
Color Dots: Mean Response Time (correct responses only; not including 0's for response time)

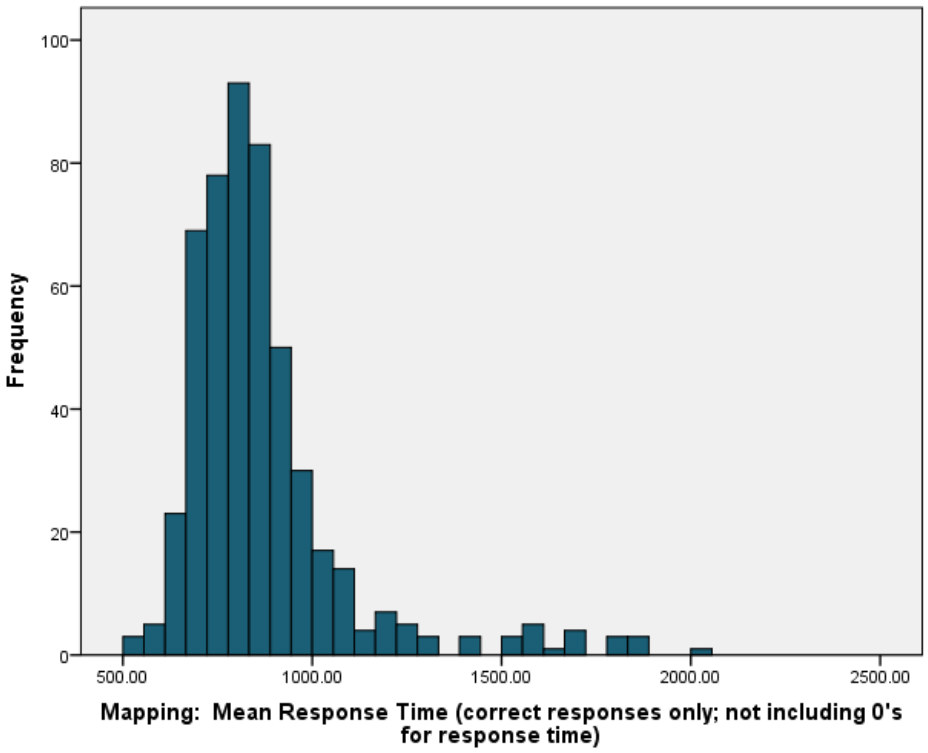

Color Dots: Total percent correct trials (all ratios)
1.00
.90
.80
.70
.60
.50
.40
500.00
1000.00
1500.00
2000.00
Color Dots: Mean Response Time (correct responses only; not including 0's for response time)

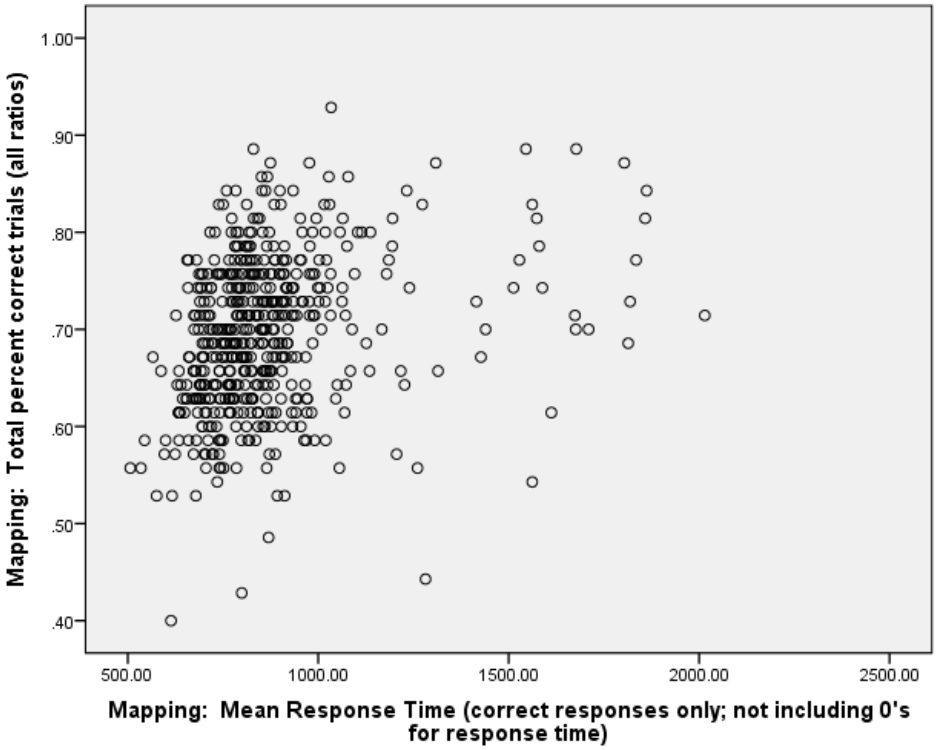
Mapping Task Comparison

	N	Min	Max	Mean	SD
MAP Percent Trials Correct	513	.00	.93	.69	.11
MAP Mean RT for Correct Trials	507	506.56	2014.86	870.30	217.81
MAP Slope of Accuracy	507	-1.24	.31	-.67	.23
MAP Slope of RT For Correct Trials	507	-910.53	977.87	92.17	242.19

Note. 6 students did not pass the practice trials and thus have an accuracy score of 0 and no reaction time values.



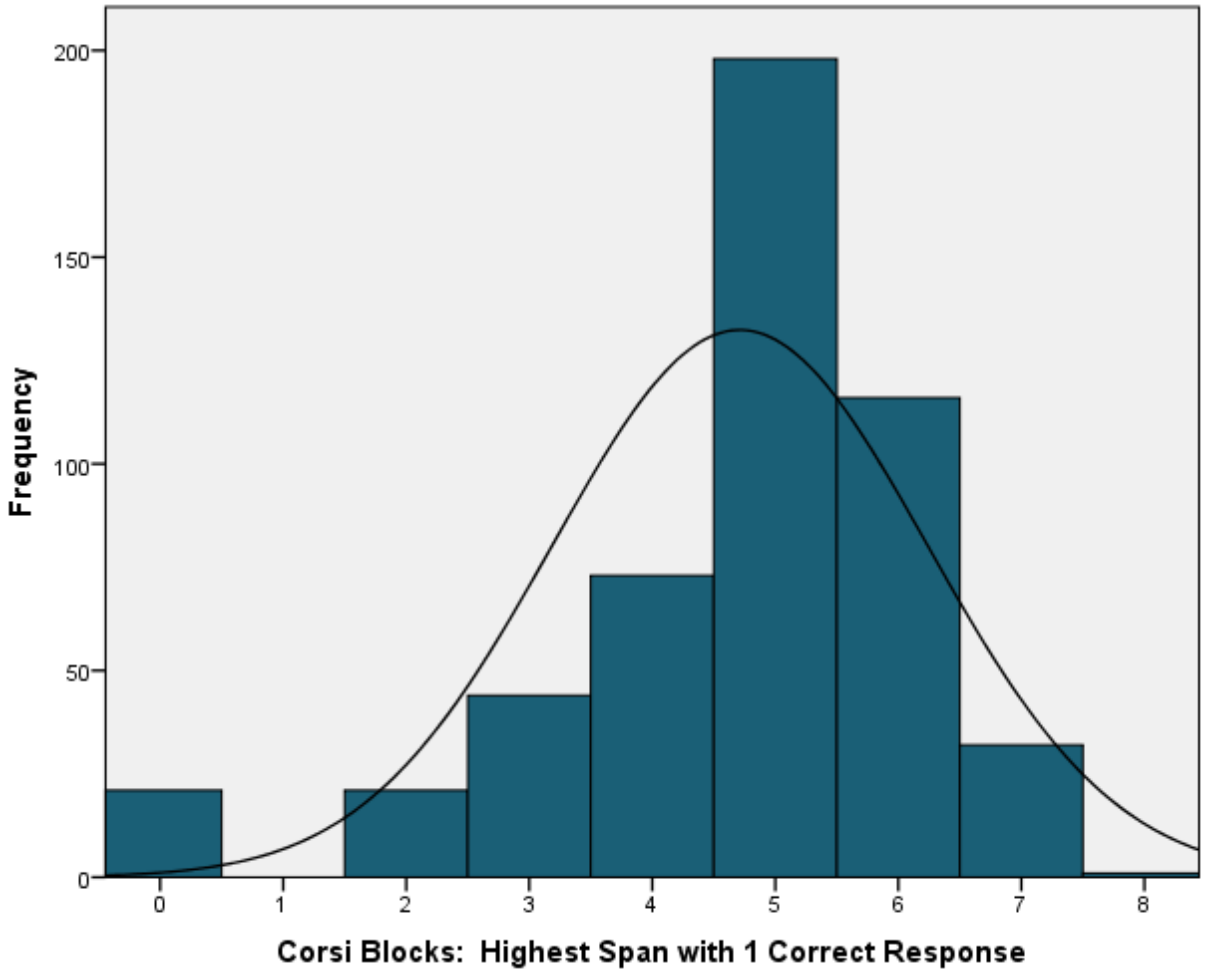

Frequency
100
80
60
40
20
0
500.00
1000.00
1500.00
2000.00
2500.00
Mapping: Mean Response Time (correct responses only; not including 0's for response time)


Mapping: Total percent correct trials (all ratios)
1.00
.90
.80
.70
.60
.50
.40
500.00
1000.00
1500.00
2000.00
2500.00
Mapping: Mean Response Time (correct responses only; not including 0's for response time)

Assessment Descriptives: Working Memory (CORSI)

	N	Min	Max	Mean	SD
Highest Span Reached	506	0	8	4.71	1.525

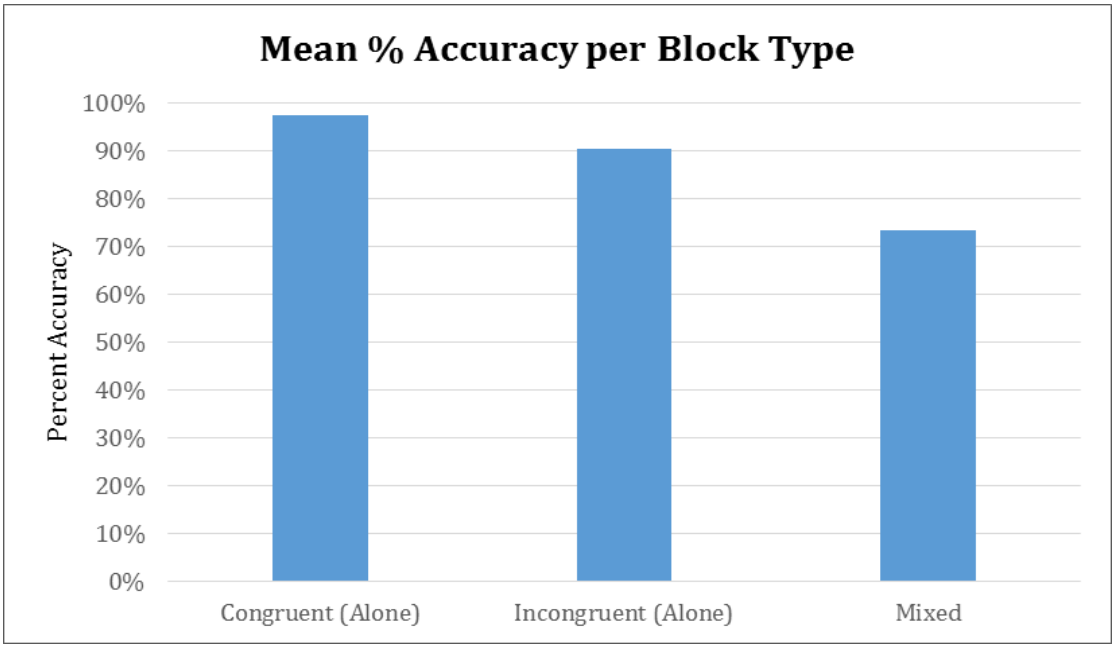
*Note – 7 kids did not pass the practice and so currently have a score of '999'. A score of '0' represents those who passed the practice but did not get any correct in the first set (N=21).

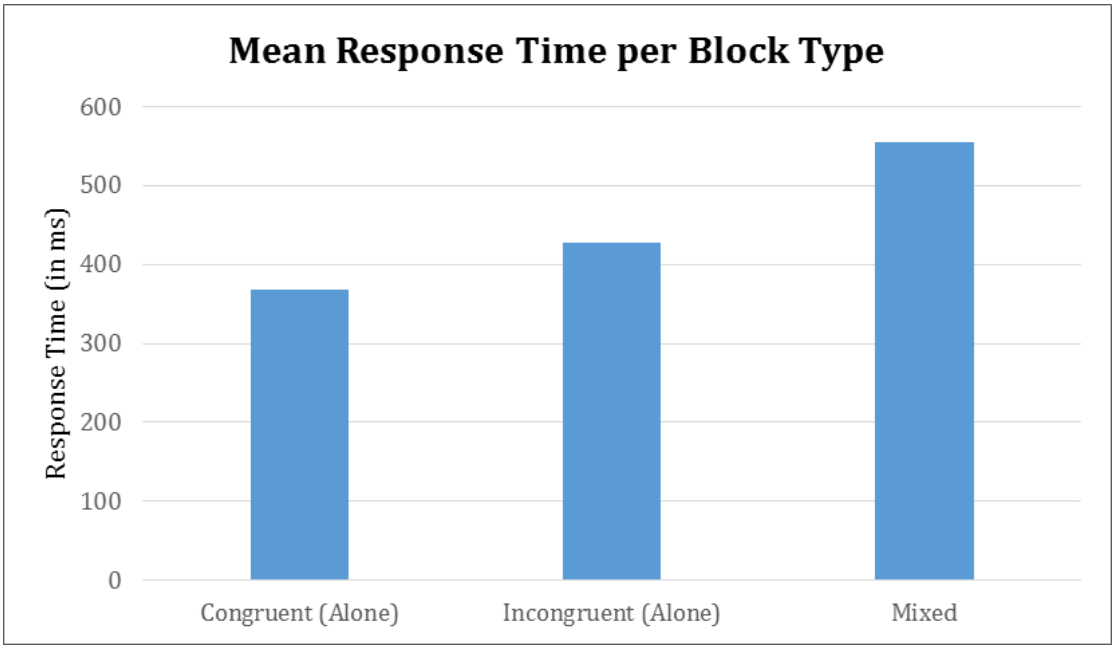


Assessment Descriptives: Directional Stroop Task (Hearts and Flowers)

	N	Min	Max	Mean	SD
Congruent Trials Presented Alone					
Percent trials correct	512	0.5	1.0	0.97	0.06
Mean response time per trial	512	260.2	679.1	368.17	65.83
Incongruent Trials Presented Alone					
Percent trials correct	511	0.0	1.0	0.90	0.16
Mean response time per trial	508	268.5	1059.0	428.24	91.02
Mixed Trials					
Percent trials correct	511	0.4	1.0	0.73	0.15
Mean response time per trial	511	311.3	825.0	555.13	75.02
Fixed Trials					
Percent trials correct	512	0.4	1.0	0.94	0.09
Mean response time per trial	512	281.6	698.5	395.04	63.48

*Note. Response time includes both correct and incorrect responses.


Mean % Accuracy per Block Type
Percent Accuracy
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Congruent (Alone)
Incongruent (Alone)
Mixed


Mean Response Time per Block Type
Response Time (in ms)
600
500
400
300
200
100
0
Congruent (Alone)
Incongruent (Alone)
Mixed

Correlations among 6th Grade Measures

Zero-Order Correlations

	I	II	III	IV	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	XXIV	XXV
I. KM Number (Age-Scaled)																								
II. KM Algebra (Age-Scaled)	.85																							
III. KM Geometry (Age-Scaled)	.72	.71																						
IV. WJ Quant. Cpts. (Std. Score)	.72	.74	.61																					
V. Functions: Input	.66	.69	.55	.58																				
VI. Functions: Output	.59	.63	.48	.55	.70																			
VII. Functions: Rule	.63	.68	.56	.61	.82	.73																		
VIII. Functions: Total	.68	.74	.58	.64	.93	.88	.93																	
IX. TIMSS (Total)	.31	.35	.24	.27	.27	.31	.27	.31																
X. Number: Accuracy	.37	.38	.29	.42	.34	.37	.35	.39	.17															
XI. Number: Correct RT	-.06	-.09	-.04	-.07	-.04	-.05	-.09	-.06	.00	.20														
XII. Color Dots: Accuracy	.14	.16	.19	.20	.14	.18	.17	.18	.07	.30	.05													
XIII. Color Dots: Correct RT	.04	.02	.03	.04	.04	.03	-.01	.02	.04	.28	.80	.13												
XIV. Mapping: Accuracy	.15	.17	.12	.21	.14	.19	.13	.17	.02	.30	.02	.12	.15											
XV. Mapping: Correct RT	.06	.03	.03	.05	.05	.04	.03	.04	.05	.24	.74	.10	.89	.29										
XVI. ALL: RT (Grouped)																								
XVII. ALL: RT (Random)																								
XVIII. ALL: RT (Symbolic)																								
XIX. Corsi: Highest span	.35	.38	.33	.37	.29	.28	.29	.31	.14	.30	.03	.19	.05	.11	.04									
XX. HAF: Accuracy (Cong.)	.17	.17	.18	.12	.17	.20	.16	.19	.14	.21	.01	.09	.04	.05	.04				.07					
XXI. HAF: RT (Congruent)	-.14	-.18	-.12	-.17	-.14	-.15	-.16	-.17	-.07	-.12	.15	-.07	.14	-.04	.10				-.09	-.14				
XXII. HAF: Accuracy (Incong.)	.27	.26	.22	.22	.26	.27	.26	.29	.13	.25	-.05	.14	.00	.03	-.02				.17	.28	-.12			
XXIII. HAF: RT (Incong.)	-.28	-.28	-.21	-.24	-.21	-.20	-.26	-.24	-.12	-.19	.17	-.15	.13	-.08	.12				-.18	-.11	.46	-.45		
XXIV. HAF: Accuracy (Mix)	.38	.39	.36	.38	.36	.39	.41	.42	.17	.37	-.11	.26	-.02	.19	-.03				.25	.24	-.07	.41	-.29	
XXV. HAF: RT (Mixed)	-.06	-.02	.00	.01	.01	.03	-.03	.01	.01	.18	.11	.05	.15	.01	.15				-.02	.06	.22	.06	.34	.03

*Red cells indicate correlations greater than .20, Green cells indicate correlations less than -.20

Correlations among 5th Grade and 6th Grade Measures

Year 1 (5th Grade) Outcomes	Year 2 (6th Grade) Outcomes														
	KM NUM	KM ALG	KM GEO	QCS	FUN Input	FUN Output	FUN Rule	FUN Total	TIMSS Total	NUM Acc	NUM RT	CD Acc	CD RT	MAP Acc	MAP RT
KM NUM	.84	.80	.67	.70	.63	.55	.61	.65	.28	.35	-.11	.13	-.01	.17	.02
KM ALG	.79	.80	.65	.71	.58	.52	.60	.62	.28	.35	-.09	.16	.01	.15	.03
KM GEO	.60	.60	.64	.54	.43	.38	.46	.47	.19	.26	-.04	.14	-.01	.15	.01
QCS	.69	.72	.58	.73	.57	.54	.60	.63	.24	.37	-.06	.13	.04	.16	.02
FUN Input	.62	.62	.50	.55	.59	.49	.56	.60	.21	.26	-.08	.08	.01	.10	.02
FUN Output	.55	.58	.44	.52	.55	.54	.54	.60	.25	.30	-.10	.09	-.02	.12	-.01
FUN Rule	.60	.60	.45	.53	.58	.50	.57	.60	.18	.30	-.08	.06	.00	.10	.02
FUN Total	.64	.66	.51	.59	.63	.56	.61	.66	.24	.31	-.09	.08	.00	.12	.01
FAM Total	.20	.23	.09	.16	.22	.19	.17	.21	.49	.06	-.03	-.02	-.02	.03	-.03
NUM Acc	.35	.34	.29	.37	.34	.33	.38	.38	.11	.52	-.01	.29	.08	.24	.07
NUM RT	-.10	-.12	-.05	-.12	-.10	-.09	-.14	-.12	-.05	.08	.54	.00	.47	.07	.42
CD Acc	.14	.15	.19	.11	.23	.12	.21	.21	.02	.20	.03	.23	.04	.07	.04
CD RT	.07	.05	.14	.05	.08	.15	.05	.10	.03	.17	.24	.03	.34	.03	.30
DOT Acc	.17	.17	.13	.16	.15	.14	.11	.15	.10	.31	.02	.20	.05	.14	.03
DOT RT	.14	.12	.17	.13	.09	.10	.06	.09	.03	.23	.38	.12	.47	.14	.45

Year 1 (5th Grade) Outcomes	Year 2 (6th Grade) Outcomes						
	HAF Acc (cong)	HAF RT (cong)	HAF Acc (incong)	HAF RT (incong)	HAF Acc (mix)	HAF RT (mix)	Corsi Highest
HAF Acc (cong)	.13	-.03	.18	-.10	.15	.00	.04
HAF RT (cong)	-.05	.31	-.06	.33	-.11	.26	-.04
HAF Acc (incong)	.09	-.02	.25	-.12	.31	-.03	-.02
HAF RT (incong)	-.06	.29	-.17	.39	-.26	.25	-.08
HAF Acc (mix)	.16	-.06	.26	-.16	.51	-.11	-.06
HAF RT (mix)	.01	.15	.07	.20	.17	.41	-.08
Corsi Highest	.09	-.08	.24	-.24	.29	.01	.39

Student Survey Descriptives: TIMSS
(Trends in International Mathematics and Science Study)

	N	Min	Max	Mean	SD
I enjoy learning math	513	1	4	3.51	0.65
I wish I did not have to study math	513	1	4	3.31	0.87
Math is boring	513	1	4	3.27	0.92
I learn interesting things in math	513	1	4	3.71	0.62
I like math	513	1	4	3.52	0.75
It is important to do well in math	513	1	4	3.86	0.49
I know what my math teacher expects	513	1	4	3.78	0.51
I think of things not related to the lesson	513	1	4	2.77	0.97
My math teacher is easy to understand	513	1	4	3.28	0.84
I am interested in what my math teacher says	513	1	4	3.46	0.73
My math teacher gives me interesting things to do	513	1	4	3.45	0.78
I usually do well in math	513	1	4	3.36	0.79
Math is more difficult for me than my classmates	513	1	4	2.85	1.04
Math is not one of my strengths	513	1	4	3.11	1.09
I learn quickly in math	513	1	4	3.03	0.92
Math makes me confused and nervous	513	1	4	2.99	1.01
I am good at working out hard math problems	513	1	4	2.91	0.94
My teacher thinks I am good at working out hard math problems	512	1	4	3.33	0.80
My teacher tells me I am good at math	513	1	4	3.35	0.86
Math is harder for me than other subjects	513	1	4	3.04	1.08
Learning math will help me in daily life	513	1	4	3.81	0.51
I need math to learn other subjects	513	1	4	3.30	0.85
I need to do well in math to get into college	513	1	4	3.79	0.55
I need to do well in math to get job I want	513	1	4	3.74	0.60
I would like a job that uses math	513	1	4	2.83	0.99
My family thinks I am good at math	512	1	4	3.57	0.72
Total summed score of TIMSS items	513	42	104	86.90	11.63

Creating TIMSS Subscales

TIMSS subscales were created based upon the 2007 and 2011 TIMSS International Results in Mathematics reported by TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College (Mullis, Martin & Foy, 2007; Mullis, Martin, Foy, & Arora, 2011).

http://timss.bc.edu/timss2007/PDF/TIMSS2007_InternationalMathematicsReport.pdf
http://timssandpirls.bc.edu/timss2011/downloads/T11_IR_Mathematics_FullBook.pdf

The following table provides a list of the TIMSS items, the corresponding subscale to which we have assigned it to, and the source that was used to make the subscale assignment.

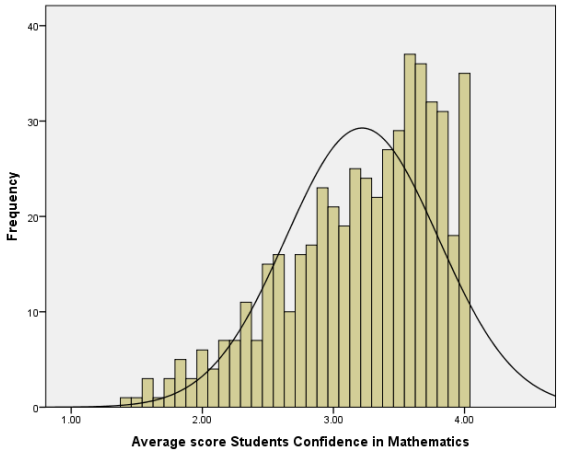
TIMSS ITEM	SOURCE	CONFIDENCE	VALUE	LIKING
I am good at working out hard math problems	2011	X		
Teacher tells me I am good at math	2011	X		
Usually do well in math	2007/2011	X		
Math is more difficult for me than my classmates	2007/2011	X		
I learn quickly in math	2007/2011	X		
Math is harder for me than other subjects	2011	X		
Know what math teacher expects	PRI	X		
Math teacher is easy to understand	PRI	X		
Math is not one of my strengths	PRI	X		
Math makes me confused and nervous	PRI	X		
Teacher thinks I am good at working out hard math problems	PRI	X		
My family thinks I am good at math	PRI	X		
Important to do well in math	2011		X	
I would like a job that uses math	2011		X	
Learning math will help me in daily life	2007/2011		X	
I need math to learn other subjects	2007/2011		X	
I need to do well in math to get into college	2007/2011		X	
I need to do well in math to get job I want	2007/2011		X	
I wish did not have to study math	2011			X
I learn interesting things in math	2011			X
I enjoy learning math	2007/2011			X
Math is boring	2007/2011			X
I like math	2007/2011			X
Think of things not related to lesson during math	PRI			X
Interested in what math teacher says	PRI			X
Math teacher gives me interesting things to do	PRI			X

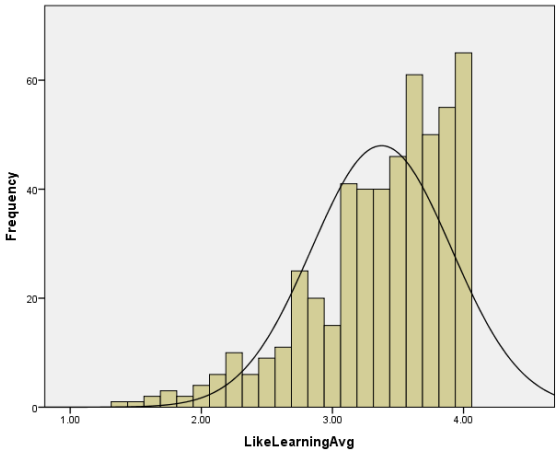
Note. A total of 8 items were either not explicitly stated as to what scale they belonged to or those items were new in relation to when the reports were published (or the items were simply not used in the analysis of the reports). There is 1 item that we added (My family thinks I am good at math) and thus is not a part of the published TIMSS items.

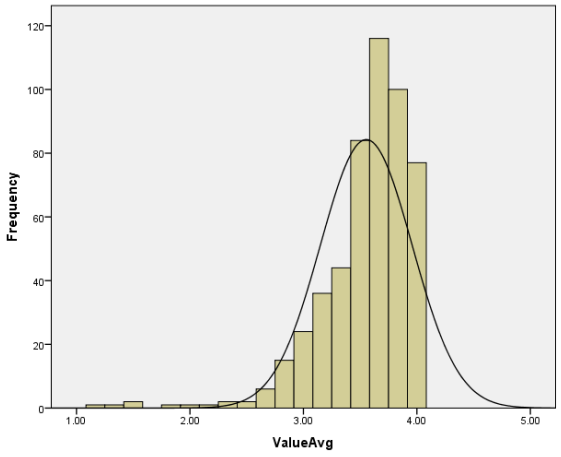
DESCRIPTIVES: TIMSS SUBSCALES

DESCRIPTIVES FOR SUBSCALES

	N	MIN	MAX	MEAN	SD
Average score Students' Confidence in Mathematics	512	1.42	4.00	3.22	.582
Average score Students Value Mathematics	513	1.17	4.00	3.55	.405
Average score Students Like Learning Mathematics	513	1.38	4.00	3.37	.533







CORRELATIONS OF TIMSS ITEMS WITHIN SUBSCALES

STUDENTS' CONFIDENCE IN MATHEMATICS	17a	17c	18a	18b	18c	18d	18e	18f	18g	18h	18i
17a. Know what math teacher expects											
17c. Math teacher is easy to understand	.232										
18a. Usually do well in math	.191	.344									
18b. Math is more difficult for me than my classmates	.106	.259	.428								
18c. Math is not one of my strengths	.099	.339	.490	.540							
18d. I learn quickly in math	.178	.465	.583	.378	.456						
18e. Math makes me confused and nervous	.131	.241	.362	.423	.474	.359					
18f. I am good at working out hard math problems	.154	.359	.537	.378	.381	.557	.342				
18g. My teacher things I am good at working out hard math problems	.233	.419	.430	.277	.371	.469	.253	.477			
18h. Teacher tells me I am good at math	.215	.432	.396	.243	.361	.439	.204	.365	.534		
18i. Math is harder for me than other subjects	.125	.292	.519	.546	.575	.486	.521	.382	.322	.303	
18o. My family thinks I am good at math	.189	.230	.522	.359	.388	.453	.292	.471	.457	.426	.385

STUDENTS VALUE MATHEMATICS	16f	18j	18k	18l	18m
16f. Important to do well in math					
18j. Learning math will help me in daily life	.276				
18k. I need math to learn other subjects	.265	.269			
18l. I need to do well in math to get into college	.344	.306	.268		
18m. I need to do well in math to get job I want	.250	.265	.286	.462	
18n. I would like a job that uses math	.027	.258	.138	.150	0.192

STUDENTS LIKE LEARNING MATHEMATICS	16a	16b	16c	16d	16e	17b	17d
16a. Enjoy learning math							
16b. Wish did not have to study math	.401						
16c. Math is boring	.472	.468					
16d. Learn interesting things in math	.370	.216	.298				
16e. Like math	.720	.483	.507	.394			
17b. Think of things not related to lesson during math	.302	.372	.400	.166	.299		
17d. Interested in what math teacher says	.469	.340	.445	.336	.483	.321	
17e. Math teacher gives me interesting things to do	.369	.263	.352	.339	.406	.271	.472

Note. Cells are highlighted if the correlation is greater than .30

CRONBACH'S ALPHA RELIABILITY STATISTICS FOR TIMSS SUBSCALES

RELIABILITY STATISTICS

	Alpha	N of Items
Students' confidence in math	.875	12
Students value math	.660	6
Students like learning math	.830	8

SCALE STATISTICS

	Mean	Variance	SD	N Items
Students' confidence in math	38.62	48.694	6.978	12
Students value math	18.49	3.993	1.998	6
Students like learning math	29.83	23.002	4.796	8

ITEM-TOTAL STATISTICS

	Scale Mean if Item Deleted	Variance Item Deleted	Corrected Correlation	Alpha if Item Deleted
STUDENTS' CONFIDENCE IN MATHEMATICS				
Know what math teacher expects	34.84	46.790	0.236	0.879
Math teacher is easy to understand	35.34	42.595	0.494	0.869
Usually do well in math	35.26	41.146	0.681	0.859
Math is more difficult for me than my classmates	35.77	40.108	0.567	0.865
Math is not one of my strengths	35.51	38.747	0.646	0.860
I learn quickly in math	35.58	39.993	0.679	0.858
Math makes me confused and nervous	35.63	41.032	0.513	0.869
I am good at working out hard math problems	35.71	40.548	0.611	0.862
My teacher thinks I am good at working out hard math problems	35.29	42.043	0.582	0.864
Teacher tells me I am good at math	35.27	42.013	0.530	0.867
Math is harder for me than other subjects	35.58	38.902	0.644	0.860
My family thinks I am good at math	35.05	42.674	0.581	0.865
STUDENTS VALUE MATHEMATICS				
Important to do well in math	17.46	4.929	0.330	0.583
Learning math will help me in daily life	17.52	4.660	0.439	0.550
I need math to learn other subjects	18.02	3.949	0.365	0.568
I need to do well in math to get into college	17.53	4.515	0.461	0.539
I need to do well in math to get job I want	17.58	4.403	0.451	0.537
I would like a job that uses math	18.49	3.993	0.230	0.660
STUDENTS LIKE LEARNING MATHEMATICS				
Enjoy learning math	23.49	14.551	0.648	0.795
Wish did not have to study math	23.68	13.944	0.536	0.807
Math is boring	23.72	13.193	0.624	0.794
Learn interesting things in math	23.29	15.749	0.421	0.821
Like math	23.48	13.789	0.689	0.787
Think of things not related to lesson during math	24.23	14.016	0.444	0.825
Interested in what math teacher says	23.54	14.351	0.597	0.799
Math teacher gives me interesting things to do	23.55	14.584	0.501	0.811

FACTOR ANALYSIS OF ALL TIMSS ITEMS

Factors Extracted

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.080	31.079	31.079	8.080	31.079	31.079
2	2.368	9.106	40.185	2.368	9.106	40.185
3	1.399	5.379	45.564	1.399	5.379	45.564
4	1.366	5.253	50.817	1.366	5.253	50.817
5	1.093	4.204	55.021	1.093	4.204	55.021
6	0.934	3.592	58.613			
7	0.880	3.384	61.997			
8	0.795	3.059	65.056			
9	0.770	2.962	68.019			
10	0.739	2.843	70.862			
11	0.699	2.690	73.552			
12	0.644	2.478	76.03			
13	0.599	2.305	78.335			
14	0.588	2.261	80.596			
15	0.559	2.151	82.747			
16	0.538	2.069	84.816			
17	0.486	1.869	86.685			
18	0.472	1.814	88.499			
19	0.452	1.739	90.238			
20	0.439	1.687	91.925			
21	0.409	1.573	93.498			
22	0.394	1.517	95.015			
23	0.367	1.413	96.428			
24	0.349	1.343	97.771			
25	0.331	1.272	99.043			
26	0.249	0.957	100.000			

Item Factor Loadings

	1	2	3	4	5
Enjoy learning math	.735	.089	.053	-.126	-.007
Wish did not have to study math	.547	.094	.179	-.415	-.108
Math is boring	.597	.008	.108	-.506	-.062
Learn interesting things in math	.448	.288	-.205	-.185	.339
Like math	.791	.055	.050	-.138	-.009
Important to do well in math	.286	.505	.253	.155	.473
Know what math teacher expects	.371	.334	-.214	.034	.476
Think of things not related to lesson during math	.456	-.056	.186	-.459	-.065
Math teacher is easy to understand	.581	-.079	-.354	-.094	.043
Interested in what math teacher says	.625	.251	-.182	-.244	.054
Math teacher gives me interesting things to do	.569	.270	-.310	-.151	-.104
Usually do well in math	.684	-.276	-.011	.241	.003
Math is more difficult for me than my classmates	.550	-.405	.310	.040	.096
Math is not one of my strengths	.630	-.372	.239	.116	-.039
I learn quickly in math	.697	-.202	-.103	.219	.007
Math makes me confused and nervous	.530	-.267	.381	.028	.175
I am good at working out hard math problems	.647	-.213	-.078	.207	.005
Teacher thinks I am good at working out hard math problems	.607	-.118	-.356	.294	-.059
Teacher tells me I am good at math	.603	-.053	-.448	.149	-.112
Math is harder for me than other subjects	.637	-.338	.312	.111	.122
Learning math will help me in daily life	.462	.397	.079	.113	-.008
I need math to learn other subjects	.235	.466	.241	.226	.016
I need to do well in math to get into college	.257	.613	.211	.224	-.153
I need to do well in math to get job I want	.225	.571	.236	.227	-.435
I would like a job that uses math	.522	.077	-.041	-.082	-.446
My family things I am good at math	.655	-.053	-.023	.289	-.093

Teacher Survey and Student Report (TSSR)

- The TSSR includes:
  - Section with teacher-specific questions (demographics, education, experience)
  - Section with student-specific questions (each consented student's math abilities, work habits, etc.) and classroom-specific questions (for math classes taught that include consented students, regarding textbook use, enrollment by ethnicity, etc.)
- We sent out around 150 TSSR's to teachers with at least 1 consented student.
- Two teachers did **not** complete the section with teacher-specific questions but did complete the section with student-specific questions
- **We have 139 <u>fully</u> completed and checked TSSR's (includes 503 students, around 97% of consented student sample).**

Teacher Survey Information

*Presented here is information from the 139 completed teacher surveys

- Gender
  - 113 females (81%), 26 males (19%)
- Grades Taught
  - 53 teach 5th grade (38%), 91 teach at least 6th grade (66%), 10 teach multiple grades (7%)
- Preferred Grade To Teach
  - 10 teachers (7%) reported that they would prefer to teach younger students than their current grade(s) level
  - 118 teachers (85%) reported that their current grade(s) level is just right
  - 11 teachers (8%) reported that they would prefer to teach older students than their current grade(s) level
- Math Taught
  - 92 teachers (66%) currently only teach math, while 47 teachers (34%) also teach other subjects
- Experience
  - Years as a teacher
    - This is 1st year: 20 (14%)
    - 2-4 years: 33 (24%)
    - 5-10 years: 31 (22%)
    - More than 10 years: 55 (40%)
  - Years at current school
    - This is 1st year: 46 (33%)
    - 2-4 years: 49 (35%)
    - 5-10 years: 24 (17%)
    - More than 10 years: 20 (14%)
  - Years teaching middle grades math
    - Don't teach middle grades math: 2 (1%)
    - This is 1st year: 30 (22%)
    - 2-4 years: 47 (34%)
    - 5-10 years: 28 (20%)
    - More than 10 years: 32 (23%)

- Licensure (categories add up to more than 100%)
    - Early Childhood license (at least): 7 (5%)
    - Elementary license (at least): 96 (69%)
    - Middle Grades license (at least): 49 (35%)
    - Special Education license (at least): 16 (12%)
- Education
    - Highest degree earned
        - Bachelor's degree: 55 (40%)
        - Master's degree: 59 (42%)
        - Master's degree + 30: 23 (17%)
        - Doctoral degree: 2 (1%)
    - Majored in math in undergraduate program
        - Yes: 6 (4%)
        - No: 133 (96%)
    - Minored in math in undergraduate program
        - Yes: 4 (3%)
        - No: 125 (90%)
        - No minor (NA): 10 (7%)
    - Majored in math in graduate school
        - Yes: 12 (9%)
        - No: 99 (71%)
        - No grad school (NA): 28 (20%)
- Name of math textbook used (taken from individual student surveys, so 141 teachers after duplicates removed; 2 teachers completed student portion but not teacher portion)
    - Envision: 80 (56.7%)
    - None: 49 (34.8%)
    - Holt Math: 6 (4.3%)
    - College Preparatory Mathematics/Core Connections: 5 (3.5%)
    - Other: 1 (.7%)
- How much you supplement the textbook with other materials (taken from individual student surveys, so 141 teachers after duplicates removed; 2 teachers completed student portion but not teacher portion)
    - Almost never: 1 (.7%)
    - A little: 10 (7.1%)
    - Somewhat: 32 (22.7%)
    - A lot: 49 (34.8%)
    - NA (no math textbook used): 49 (34.8%)

Teacher-Reported Student Information

*Presented here is information from the 503 completed teacher-rated students

- Does student receive individual tutoring in math?
  - Yes: 79 (16%)
  - No: 277 (55%)
  - Program not available at this school: 147 (29%)
- Does student receive pull-out small group instruction in math?
  - Yes: 183 (36%)
  - No: 222 (44%)
  - Program not available at this school: 98 (20%)
- Does student participate in gifted/talented programs in math?
  - Yes: 11 (2%)
  - No: 280 (56%)
  - Program not available at this school: 212 (42%)
- Does student participate in a Title 1 program in math?
  - Yes: 97 (19%)
  - No: 175 (35%)
  - Program not available at this school: 231 (46%)
- Is ability grouping used within this student's grade?
  - Yes: 118 (24%)
  - No: 385 (77%)
- If there is ability grouping, how do the students in this student's class compare to typical students in this grade at this school?
  - Less skilled: 43 (8%)
  - About the same: 55 (11%)
  - More advanced: 20 (4%)
  - Not applicable (no ability grouping): 385 (77%)
- Does the teacher use ability grouping in this student's class?
  - Yes: 180 (36%)
  - No: 323 (64%)
- If there is ability grouping, how does this student compare to others in the class?
  - Less skilled: 61 (12%)
  - About the same: 79 (16%)
  - More advanced: 40 (8%)
  - Not applicable (no ability grouping): 323 (64%)
- To what extent does this student work to the best of his/her ability in math?
  - Always: 77 (15%)
  - Usually: 170 (34%)
  - Erratic: 170 (34%)
  - Seldom: 77 (15%)
  - Never: 9 (2%)

- How does this student's math skills compare to others in his/her grade?
    - Far above average: 18 (4%)
    - Above average: 100 (20%)
    - Average: 175 (35%)
    - Below average: 152 (30%)
    - Far below average: 58 (12%)
- How does this student's interest in math compare to others in his/her grade?
    - Far above average: 17 (3%)
    - Above average: 97 (19%)
    - Average: 249 (50%)
    - Below average: 107 (21%)
    - Far below average: 33 (7%)
- How prepared is this student for the next level in math?
    - Highly prepared: 48 (10%)
    - Mostly prepared: 131 (26%)
    - May struggle but is prepared: 143 (28%)
    - Somewhat unlikely to be prepared: 105 (21%)
    - Very unlikely to be prepared: 76 (15%)
- How long has the teacher taught this student math this year?
    - More than 6 months: 398 (79%)
    - 4-6 months: 78 (16%)
    - 1-3 months: 15 (3%)
    - Less than 1 month: 12 (2%)
- This student concentrates well and is not easily distracted when doing a task.
    - Strongly agree: 108 (22%)
    - Agree: 169 (34%)
    - Disagree: 149 (30%)
    - Strongly disagree: 77 (15%)
- This student does not have difficulty planning and carrying out activities with many steps.
    - Strongly agree: 93 (19%)
    - Agree: 167 (33%)
    - Disagree: 151 (30%)
    - Strongly disagree: 92 (18%)
- This student finishes tasks and activities.
    - Strongly agree: 125 (25%)
    - Agree: 215 (43%)
    - Disagree: 119 (24%)
    - Strongly disagree: 44 (9%)

- This student actively uses resources for help and information.
    - Strongly agree: 102 (20%)
    - Agree: 178 (35%)
    - Disagree: 166 (33%)
    - Strongly disagree: 57 (11%)
- Does this student have math-specific difficulties?
    - Yes: 33 (7%)
    - No: 470 (93%)
        - Some responses (and frequency) if "Yes":

Functionally Delayed/Specific Learning Disability	12
IEP	4
IEP for math	1
ADHD/ADD	2
Computations and applications	1
Receives accommodations for math	3
ELL	1
Life skills	1
Very low basic math skills	3
Sickle Cell Anemia	1
Other health impairment	1
Not diagnosed at this time/Referred for testing	3

Teacher Ratings by School Type

Ratings of Student Skills

	CHARTER (N=124)	IZONE (N=77)	MIDDLE (N=300)	OTHER (N=2)
Works to best of ability in math	3.51(0.984)	3.36(1.075)	3.45(0.958)	5.00(0.000)
Math skills compared to others	2.89(1.061)	2.62(1.052)	2.70(0.989)	3.00(1.414)
Interest in math compared to others	3.13(0.945)	2.78(0.941)	2.86(0.849)	3.00(0.000)
Prepared for next level in math	3.07(1.197)	2.95(1.276)	2.88(1.188)	3.50(2.121)
Concentrates well/not easily distracted	2.71(0.969)	2.52(1.021)	2.59(0.989)	3.00(0.000)
Difficulty planning and carrying out activities with many steps	2.58(0.920)	2.53(1.021)	2.42(1.014)	3.00(1.414)
Finishes tasks and activities	2.84(0.878)	2.69(0.907)	2.87(0.907)	3.50(0.707)
Actively uses resource for help and information	2.65(0.838)	2.56(0.939)	2.67(0.965)	2.50(0.707)

*Similar to last year's ratings, teachers at charter schools rated their students more highly than those at other school types almost across the board on all questions

Math Textbook Used (Percentages of teachers)

	CHARTER	IZONE	MIDDLE	OTHER
College Preparatory Mathematics/Core Connections	13.0		1.0	50.0
Envision		58.8	70.7	
Holt Math	4.3		4.0	50.0
None	82.6	41.2	23.2	
Other			1.0	
Total	100.0	100.0	100.0	100.0

How Much Textbook is Supplemented (Percentages of teachers)

	CHARTER	IZONE	MIDDLE	OTHER
Almost Never		5.9		
A Little		5.9	9.1	
Somewhat	8.7	29.4	25.3	
A lot	8.7	17.6	42.4	100.0
Not Applicable	82.6	41.2	23.2	
Total	100.0	100.0	100.0	

Correlations among 6th Grade Direct Assessments and Teacher Ratings

Zero-Order Correlations

Direct Assessment	TSSR: Math skills compared to others	TSSR: Interest in math compared to others	TSSR: Prepared for next level in math	TSSR: Self-Reg Items (Sum)
KM Number (Age-Scaled)	.599	.425	.546	.434
KM Algebra (Age-Scaled)	.615	.427	.572	.459
KM Geometry (Age-Scaled)	.489	.351	.446	.344
WJ Quant. Cpts. (Std Score)	.537	.365	.478	.405
Functions: Input	.546	.372	.500	.373
Functions: Output	.493	.347	.453	.367
Functions: Rule	.548	.380	.487	.382
Functions: Total	.581	.402	.527	.410
TIMSS Confidence Subscale	.430	.344	.454	.320
TIMSS Value of Math Subscale	.073	.129	.119	.117
TIMSS Like Math Subscale	.236	.253	.262	.224
TIMSS Total Score	.361	.329	.398	.302
Number: Accuracy	.311	.220	.271	.297
Number: Correct RT	-.073	-.020	-.055	-.001
Color Dots: Accuracy	.098	.077	.136	.128
Color Dots: Correct RT	.017	.057	.005	.023
Mapping: Accuracy	.103	.074	.071	.081
Mapping: Correct RT	.035	.064	.021	.012
HAF: Accuracy (Congruent)	.148	.111	.143	.174
HAF: RT (Congruent)	-.100	-.088	-.115	-.090
HAF: Accuracy (Incong.)	.292	.231	.270	.260
HAF: RT (Incongruent)	-.203	-.178	-.204	-.226
HAF: Accuracy (Mixed)	.344	.264	.317	.290
HAF: RT (Mixed)	.037	.044	.040	.106
Corsi: Highest span	.312	.244	.285	.233

*Red cells indicate correlations greater than .20
*Green cells indicate correlations less than -.20

Parent Interview

- Out of the 519 students in the official sample, we were able to conduct parent interviews with 93% (N=485).

Characteristics of respondent and household

Highest education of caregiver				
	Female Caregiver		Male Caregiver	
	Frequency	Percent	Frequency	Percent
Whole Sample				
Less than high school	109	22.5	93	19.2
High school diploma/GED	230	47.4	235	48.5
Associates degree	85	17.5	34	7.0
Bachelor's degree	38	7.8	19	3.9
Graduate degree	17	3.5	6	1.2
Not applicable	0	0.0	10	2.1
Don't know	4	0.8	87	17.9
Missing	2	0.4	1	0.2
Control				
Less than high school	54	26.7	40	19.8
High school diploma/GED	81	40.1	78	38.6
Associates degree	34	16.8	11	5.4
Bachelor's degree	9	4.5	5	2.5
Graduate degree	4	2.0	1	0.5
Not applicable	0	0.0	4	2.0
Don't know	1	0.5	45	22.3
Missing	19	9.4	18	8.9
Treatment				
Less than high school	55	17.4	53	16.7
High school diploma/GED	149	47.0	157	49.5
Associates degree	51	16.1	23	7.3
Bachelor's degree	29	9.1	14	4.4
Graduate degree	13	4.1	5	1.6
Not applicable	0	0.0	6	1.9
Don't know	3	0.9	42	13.2
Missing	17	5.4	17	5.4

Number of adults and children in the student's home				
	N adults		N children	
	Frequency	Percent	Frequency	Percent
Whole Sample				
1	204	39.3	69	13.3
2	206	39.7	131	25.2
3	57	11.0	138	26.6
4	7	1.3	77	14.8
5 or more	10	1.9	69	13.3
Missing	35	6.7	35	6.7
Control				
1	76	37.6	22	10.9
2	76	37.6	53	26.2
3	27	13.4	45	22.3
4	1	0.5	37	18.3
5 or more	4	2.0	27	13.4
Missing	18	8.9	18	8.9
Treatment				
1	128	40.4	47	14.8
2	130	41.0	78	24.6
3	30	9.5	93	29.3
4	6	1.9	40	12.6
5 or more	6	1.9	42	13.2
Missing	17	5.4	17	5.4

Note. A response of 1 child in the home is the child that is in the study.

Helping with students' math homework

Who helps student most often with math homework						
	Whole Sample		*Control*		*Treatment*	
	Freq.	Pct.	Freq.	Pct.	Freq.	Pct.
Female guardian	262	54.0	91	45.0	171	53.9
Male guardian	51	10.5	15	7.4	36	11.4
Grandparent	20	4.1	8	4.0	12	3.8
Older sibling	67	13.8	27	13.4	40	12.6
Partner of parent	15	3.1	8	4.0	7	2.2
Adult relative	18	3.7	9	4.5	9	2.8
Adult nonrelative	5.0	1.0	4	2.0	1	0.3
No one	47	9.7	23	11.4	24	7.6

How often respondent or other adult helps student with math homework in a typical week		
	Frequency	Percent
Whole Sample		
Never	59	12.2
Less than once a week	42	8.7
1 to 2 times a week	143	29.5
3 to 4 times a week	122	25.2
5 or more times a week	119	24.5
Control		
Never	26	12.9
Less than once a week	10	5.0
1 to 2 times a week	53	26.2
3 to 4 times a week	47	23.3
5 or more times a week	49	24.3
Treatment		
Never	33	10.4
Less than once a week	32	10.1
1 to 2 times a week	90	28.4
3 to 4 times a week	75	23.7
5 or more times a week	70	22.1

Where student receives additional help with math homework after school		
	Frequency	Percent
Whole Sample		
After school program at school	78	16.1
After school program outside of school	27	5.6
Teacher/aide at school	14	2.9
Paid private tutor program	3	0.6
Neighbor/adult non relative home	1	0.2
Grandparent/adult relative home	3	0.6
Other	20	4.1
Not applicable	339	69.9
Control		
After school program at school	30	14.9
After school program outside of school	9	4.5
Teacher/aide at school	4	2.0
Paid private tutor program	0	0.0
Neighbor/adult non relative home	0	0.0
Grandparent/adult relative home	2	1.0
Other	6	3.0
Not applicable	134	66.3

Treatment		
After school program at school	48	15.1
After school program outside of school	18	5.7
Teacher/aide at school	10	3.2
Paid private tutor program	3	0.9
Neighbor/adult non relative home	1	0.3
Grandparent/adult relative home	1	0.3
Other	14	4.4
Not applicable	205	64.7

Note. Not applicable means that the student does not receive any additional help with math homework.

How informed respondent is about student's math instruction		
	Frequency	Percent
Whole Sample		
Not informed	34	6.6
Slightly informed	89	17.1
Fairly informed	115	22.2
Very informed	194	37.4
Extremely informed	53	10.2
Control		
Not informed	16	7.9
Slightly informed	31	15.3
Fairly informed	50	24.8
Very informed	75	37.1
Extremely informed	13	6.4
Treatment		
Not informed	18	5.7
Slightly informed	58	18.3
Fairly informed	65	20.5
Very informed	119	37.5
Extremely informed	40	12.6

Parents' evaluation of students' interest and performance

Student's interest in math

	Whole Sample		Control		Treatment	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Not interested	15	3.1	7	3.5	8	2.5
Slightly interested	92	19.0	40	19.8	52	16.4
Fairly interested	141	29.1	48	23.8	93	29.3
Very interested	165	34.0	71	35.1	94	29.7
Extremely interested	72	14.8	19	9.4	53	16.7

Student's performance in math

	Whole Sample		Control		Treatment	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Much below average	9	1.9	5	2.5	4	1.3
Below average	58	12.0	21	10.4	37	11.7
Average	242	49.9	98	48.5	144	45.4
Above average	137	28.2	51	25.2	86	27.1
Much above average	39	8.0	10	5.0	29	9.1

Respondent's beliefs and expectations

Respondent's beliefs about own math skills

	Was good at math in elementary/high school		Good at math now		Knows enough about math to help student	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Not true	61	12.6	44	9.1	29	6.0
Slightly true	78	16.1	100	20.6	78	16.1
True half the time	84	17.3	100	20.6	92	19.0
Mostly true	126	26.0	142	29.3	161	33.2
Completely true	135	27.8	98	20.2	124	25.6
Don't know	0	0.0	0	0.0	0	0.0
Missing	1	0.2	1	0.2	1	0.2

	Respondent's expectations of child					
	Expects child to get good grades in math		Believes child will perform well in math in future grades		Believes math plays an important role in child's future	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Not true	2	0.4	0	0.0	0	0.0
Slightly true	12	2.5	13	2.7	7	1.4
True half the time	20	4.1	35	7.2	10	2.1
Mostly true	108	22.3	140	28.9	72	14.8
Completely true	342	70.5	296	61.0	391	80.6
Don't know	0	0.0	0	0.0	4	0.8
Missing	1	0.2	1	0.2	1	0.2

A principal components factor analysis was performed with six items from the parent interview. Results identified 2 components and explained 63% of the variance. Factor loadings ranged from .769-.813 for the first component and .510-.682 for the second component. Individual item frequencies are displayed below. Scores of these items were averaged to create two subscale scores, also presented below for the whole sample and separate by experimental condition.

Average subscale scores

	N	Min	Max	Mean	SD
Whole Sample					
Parent Math Skills	484	1.0	5.0	3.43	1.08
Parent Expectations	480	2.3	5.0	4.62	0.50
Control					
Parent Math Skills	184	1.0	5.0	3.29	1.07
Parent Expectations	182	3.0	5.0	4.60	0.49
Treatment					
Parent Math Skills	300	1.0	5.0	3.51	1.08
Parent Expectations	298	2.3	5.0	4.63	0.50

Correlations among selected variables

	1	2	3	4	5	6	7	8	9
1. Parent's own math skills									
2. Parent's expectations of student	.199								
3. Parent ratings of student's interest in math	.153	.366							
4. Parent ratings of student's performance in math	.121	.383	.629						
5. How informed parent is about math instruction	.169	.214	.321	.263					
6. Child ethnicity (nonblack vs. black)	.044	.016	.071	.030	.070				
7. Child ELL status (Not ELL vs. ELL)	-.041	.039	-.039	-.030	-.135	-.612			
8. Free or reduced lunch (No vs. Yes)	-.008	.019	.013	-.057	.013	.108	.044		
9. Pre-K system (MAC vs. MNPS)	.005	.034	.038	.041	.075	-.077	.082	-.212	
10. Pre-K Condition (Control vs. Treatment)	.101	.038	.066	.065	.064	.085	-.079	.004	-.191

Correlations among Parent Ratings, Teacher Ratings, and Direct Assessments

	Parent Interview Ratings						Teacher Ratings				
	Maternal Education	How often parent helps	Student Interest in Math	Student Performance	Parent Math Skills	Parent Beliefs	Works to best of ability	Skills compared to others	Interest compared to others	Prepared for next level	Self-reg. sum of items
KM Number (Age-Scaled)	.141	-.219	.322	.481	.066	.238	.304	.599	.425	.546	.434
KM Algebra (Age-Scaled)	.158	-.192	.310	.476	.058	.238	.352	.615	.427	.572	.459
KM Geometry (Age-Scaled)	.137	-.148	.243	.384	.026	.194	.288	.489	.351	.446	.344
WJ Quant. Cpts. (Std. Score)	.197	-.132	.252	.401	.028	.208	.282	.537	.365	.478	.405
Functions: Input	.147	-.206	.270	.389	.080	.185	.293	.546	.372	.500	.373
Functions: Output	.084	-.206	.244	.370	.022	.197	.290	.493	.347	.453	.367
Functions: Rule	.113	-.193	.254	.434	.028	.189	.292	.548	.380	.487	.382
Functions: Total	.126	-.221	.281	.436	.048	.208	.320	.581	.402	.527	.410
TIMSS (Total)	-.028	-.118	.283	.261	.064	.142	.303	.361	.329	.398	.302
Number: Accuracy	.106	-.037	.152	.250	.030	.186	.161	.311	.220	.271	.297
Number: Correct RT	.026	.067	-.031	-.074	.002	-.024	.006	-.073	-.020	-.055	-.001
Color Dots: Accuracy	.096	-.003	.082	.157	.091	.135	.102	.098	.077	.136	.128
Color Dots: Correct RT	.062	.058	.022	-.015	.056	.047	.004	.017	.057	.005	.023
Mapping: Accuracy	.083	.042	.074	.137	-.004	.119	-.038	.103	.074	.071	.081
Mapping: Correct RT	.056	.075	.019	.029	.019	.038	.008	.035	.064	.021	.012
Corsi: Highest span	.050	-.117	.187	.242	.030	.133	.168	.312	.244	.285	.233
HAF: Accuracy (Congruent)	.053	-.053	.088	.166	.009	.060	.076	.148	.111	.143	.174
HAF: RT (Congruent)	-.095	.055	-.112	-.168	.036	-.058	-.063	-.100	-.088	-.115	-.090
HAF: Accuracy (Incong.)	.054	-.117	.104	.214	.024	.124	.230	.292	.231	.270	.260
HAF: RT (Incongruent)	-.074	.128	-.189	-.265	-.040	-.150	-.205	-.203	-.178	-.204	-.226
HAF: Accuracy (Mixed)	.038	-.110	.165	.285	.021	.196	.218	.344	.264	.317	.290
HAF: RT (Mixed)	-.023	.046	-.005	-.075	.023	.104	.049	.037	.044	.040	.106

Correlations among Parent Ratings and Teacher Ratings

		Parent Ratings (Parent Interview)				
Teacher Ratings (TSSR)		Student interest in math	Student performance in math	Expects students to get good grades in math	Believes student will perform well in future math	Believes math plays important role in student's future
	Works to best of ability	.233	.262	.067	.140	.023
	Skills compared to others	.338	.483	.198	.241	.054
	Interest compared to others	.217	.254	.085	.104	-.017
	Prepared for next level	.311	.471	.191	.234	.045
	Self-reg. sum of items	.286	.377	.157	.168	.064

Performance and Parent Ratings by School Type

Direct Assessment Outcomes by School Type								
	CHARTER		*IZONE*		*MIDDLE*		*OTHER*	
	N	Mean	N	Mean	N	Mean	N	Mean
KM Number (age scaled)	123	8.11	75	7.23	310	7.85	5	7.40
KM Algebra (age scaled)	123	8.54	75	7.84	310	8.06	5	8.60
KM Geometry (age scaled)	123	7.88	75	7.41	310	7.78	5	8.20
WJ Quant. Cpts. (standard score)	123	90.07	75	84.89	310	90.53	5	86.80
WJ Quant. Cpts. (W score)	123	506.77	75	500.93	310	507.15	5	503.20
Functions: Total	123	8.35	75	7.52	310	8.08	5	8.80
Number: Accuracy	123	0.92	75	0.90	310	0.90	5	0.91
Number: Correct RT	123	908.80	75	879.75	310	868.50	5	954.27
Color Dots: Accuracy	123	0.75	75	0.74	310	0.75	5	0.74
Color Dots: Correct RT	123	870.95	75	848.30	310	825.19	5	848.74
Mapping: Accuracy	123	0.70	75	0.68	310	0.69	5	0.65
Mapping: Correct RT	121	898.79	74	870.82	307	859.21	5	854.13
HAF: Accuracy (congruent)	123	0.98	75	0.97	309	0.97	5	0.95
HAF: RT (congruent)	123	363.11	75	380.29	309	366.06	5	441.57
HAF: Accuracy (incongruent)	123	0.91	75	0.90	308	0.91	5	0.75
HAF: RT (incongruent)	122	429.47	75	445.85	306	422.20	5	503.60
HAF: Accuracy (mixed)	123	0.74	75	0.71	308	0.74	5	0.74
HAF: RT (mixed)	123	558.00	75	565.09	308	551.17	5	579.57
Corsi: Highest span	123	4.75	75	4.58	310	4.73	5	3.80

Parent Ratings and Student Feelings by School Type								
	CHARTER		*IZONE*		*MIDDLE*		*OTHER*	
	N	Mean	N	Mean	N	Mean	N	Mean
PI: Student interest in math	115	3.29	71	3.46	294	3.40	5	3.60
PI: Student performance in math	115	3.13	71	3.25	294	3.36	5	3.20
PI: Parent Math Skills Average	115	3.46	71	3.36	293	3.42	5	3.73
PI: Parent Beliefs Average	113	4.63	71	4.62	291	4.61	5	4.80
TIMSS: Confidence	123	3.22	74	3.27	310	3.20	5	3.45
TIMSS: Value	123	3.55	75	3.60	310	3.54	5	3.73
TIMSS: Liking	123	3.44	75	3.38	310	3.34	5	3.70
TIMSS: Total	123	87.46	75	87.64	310	86.39	5	93.40

Note. Izone schools are “Innovation Schools” run by the school system but given independence and freedom to create their own programs. Schools are low performing.

Looking at Low-Scoring Students

*We selected students who were below a fourth-grade level this past year on all 3 KeyMath subscales.

Descriptive Statistics										
	At or Above 4th-grade level on Key Math					Below 4th-grade level on Key Math				
	N	Min	Max	Mean	SD	N	Min	Max	Mean	SD
WJ Quant. Cpts. (Std Score)	399	59	132	93.21	10.600	114	35	120	76.75	13.217
Functions: Input	399	0	6	2.66	1.869	114	0	5	0.49	0.895
Functions: Output	399	0	6	3.65	1.623	114	0	6	2.05	1.590
Functions: Rule	399	0	6	3.06	1.715	114	0	6	0.96	1.306
Functions: Total	399	0	18	9.38	4.740	114	0	16	3.50	3.026
TIMSS (Total)	399	46	104	88.14	11.061	114	42	104	82.56	12.542
Number: Accuracy	399	.61	1.00	0.92	0.058	114	.46	1.00	0.86	0.101
Number: Correct RT	399	581.73	1798.86	872.62	226.401	114	584.77	1925.82	908.74	232.614
Color Dots: Accuracy	399	.56	.91	0.75	0.053	114	.49	.84	0.73	0.059
Color Dots: Correct RT	399	559.26	1885.32	842.82	223.325	114	495.48	1744.56	829.12	211.849
Mapping: Accuracy	399	0.00	.93	0.70	0.098	114	0.00	.86	0.66	0.137
Mapping: Correct RT	396	544.15	2014.86	870.45	220.366	111	506.56	1834.59	869.77	209.424
HAF: Accuracy (Congruent)	399	.50	1.00	0.98	0.053	113	.75	1.00	0.96	0.062
HAF: RT (Congruent)	399	261.50	679.08	364.33	64.518	113	260.18	645.25	381.73	68.863
HAF: Accuracy (Incong.)	398	.17	1.00	0.93	0.119	113	0.00	1.00	0.83	0.230
HAF: RT (Incongruent)	398	268.45	836.00	417.21	80.671	110	281.91	1059.00	468.15	113.054
HAF: Accuracy (Mixed)	398	.40	1.00	0.76	0.136	113	.35	1.00	0.64	0.145
HAF: RT (Mixed)	398	324.92	783.17	557.05	68.930	113	311.32	824.97	548.39	93.404
Corsi: Highest span	395	0	8	4.95	1.378	111	0	7	3.87	1.722

Comparing Lowest Groups This Year and Last Year

		Last Year			
		Not in Lowest Group	In Lowest Group	Not Assessed Last Year	Total
This Year	Not in Lowest Scoring Group	388	10	1	399
	Lowest Scoring Group	62	51	1	114
Total		450	61	2	513

*Low scorers this year are fairly evenly split between PK treatment conditions (53, or 46% in the Control group; 61, or 54%, in the treatment group)

KEY MATH GRADE EQUIVALENCE SCORES THIS YEAR			
		Lowest Scoring Group Last Year	
Lowest Scoring Group This Year		Not in Lowest Group	In Lowest Group
Not in Lowest Scoring Group	Number		3.03
	Algebra		3.58
	Geometry		4.39
Lowest Scoring Group	Number	2.91	2.22
	Algebra	3.21	2.35
	Geometry	2.74	2.23
KEY MATH GRADE EQUIVALENCE SCORES LAST YEAR			
		Lowest Scoring Group Last Year	
Lowest Scoring Group This Year		Not in Lowest Group	In Lowest Group
Not in Lowest Scoring Group	Number		2.14
	Algebra		2.02
	Geometry		1.56
Lowest Scoring Group	Number	2.78	1.71
	Algebra	3.18	1.70
	Geometry	3.08	1.46

Looking at Early Correlates of Later Skills

Zero-Order Correlations: All Students

	Fall PK QC	Spring PK QC	Spring K QC	Spring G1 QC	Fall PK AP	Spring PK AP	Spring K AP	Spring G1 AP	Fall PK REMA NUM	Spring PK REMA NUM	Spring K REMA NUM	Spring G1 REMA NUM	Fall PK REMA GEO	Spring PK REMA GEO	Spring K REMA GEO	Spring G1 REMA GEO
KM Number (Age-Scaled)	.436	.550	.547	.573	.376	.506	.565	.624	.386	.542	.612	.621	.298	.467	.427	.429
KM Algebra (Age-Scaled)	.429	.503	.539	.559	.343	.465	.532	.596	.362	.490	.572	.580	.260	.422	.380	.371
KM Geometry (Age-Scaled)	.408	.514	.514	.548	.354	.487	.512	.550	.353	.430	.521	.521	.304	.409	.379	.438
WJ Quant. Cpts. (Std Score)	.435	.534	.576	.584	.366	.459	.541	.573	.348	.463	.589	.610	.252	.409	.387	.377
Functions: Input	.278	.383	.341	.401	.235	.352	.339	.445	.324	.408	.453	.479	.240	.355	.283	.335
Functions: Output	.281	.297	.304	.355	.194	.299	.324	.374	.300	.353	.394	.448	.237	.311	.291	.247
Functions: Rule	.337	.388	.370	.428	.273	.360	.378	.466	.346	.430	.458	.501	.272	.360	.307	.321
Functions: Total	.326	.392	.371	.433	.257	.370	.380	.471	.355	.436	.477	.522	.274	.376	.321	.332
TIMSS (Total)	.030	.069	.166	.183	.024	.087	.198	.208	.059	.110	.146	.189	-.008	.086	.079	.084
Number: Accuracy	.186	.233	.288	.279	.154	.258	.251	.306	.220	.268	.322	.317	.104	.245	.228	.182
Number: Correct RT	-.013	-.082	-.032	-.098	-.055	-.114	-.096	-.105	-.015	-.059	-.023	-.147	-.016	-.034	-.008	.011
Color Dots: Accuracy	.119	.152	.126	.132	.049	.146	.106	.146	.139	.120	.139	.115	.108	.164	.082	.139
Color Dots: Correct RT	-.003	-.027	.033	-.036	-.053	-.087	-.057	-.050	-.029	-.066	.016	-.083	-.013	-.069	.009	.005
Mapping: Accuracy	.051	.016	.041	.091	.090	.068	.020	.111	.104	.062	.130	.141	.044	.059	-.006	.109
Mapping: Correct RT	.023	-.035	.039	-.008	-.041	-.086	-.073	-.044	-.011	-.055	.005	-.091	.010	-.073	-.026	.001
HAF: Accuracy (Congruent)	.098	.118	.160	.113	.000	.101	.135	.108	.080	.120	.108	.098	.061	.134	.123	.086
HAF: RT (Congruent)	-.031	-.107	-.106	-.079	-.001	-.099	-.072	-.099	-.084	-.086	-.086	-.106	-.082	-.123	-.066	-.024
HAF: Accuracy (Incong.)	.162	.204	.229	.188	.166	.203	.218	.195	.190	.228	.267	.271	.113	.153	.177	.165
HAF: RT (Incongruent)	-.109	-.234	-.225	-.182	-.077	-.202	-.198	-.206	-.208	-.242	-.291	-.312	-.153	-.267	-.224	-.159
HAF: Accuracy (Mixed)	.251	.282	.292	.287	.229	.244	.307	.341	.280	.324	.382	.421	.187	.232	.223	.219
HAF: RT (Mixed)	-.030	.000	.030	.035	.066	.036	.013	.006	-.018	.011	.005	-.040	-.071	-.056	-.044	.034
Corsi: Highest span	.159	.249	.221	.247	.166	.253	.241	.277	.180	.287	.344	.313	.176	.325	.249	.263

*Red cells indicate correlations >=.20, Green cells indicate correlations <=-.20

Analysis of Condition Effects on 5th and 6th Grade Traditional Math Outcomes

Using data from a three-year longitudinal scale-up evaluation of a model that involved the implementation of a pre-kindergarten math curriculum, *Building Blocks* (Clements & Sarama, 2006), we examined the effects of pre-kindergarten curriculum condition on later math outcomes. From the early study, 31 classrooms implemented the math curriculum and 26 practiced business-as-usual instruction and the final analytic sample for the original scale-up study included 771 children (452 in the treatment group and 319 in the control group). In the current follow-up study, we located 628 students and were able to contact and consent 519 students (317 from the treatment group during pre-k and 202 from the control group during pre-k).

- For the analysis of condition effects, we first looked at a General Math Factor (created from the 3 KeyMath subscale scores, WJ QC standard scores, and Functional Thinking total scores)
- *We used mean value imputation to substitute values for missing data from the beginning of pre-k scores (time 1 Quantitative Concepts, Applied Problems, REMA Number, and REMA Geometry scores)*
- Regression models controlled for:
    - Gender
    - Ethnicity (black vs. nonblack)
    - Age at posttest
    - WJ QC pretest W-scores
    - WJ AP pretest W-scores
    - REMA Number and Geometry pretest scores
    - PK system (MAC v. MNPS)
- Children were nested in their PK classrooms and schools

- We tested for interactions of condition with gender, ethnicity, PK system, and REMA Number pretest Z-scores. **Only the ethnicity x condition interaction was significant**. When only that ethnicity x condition interaction was included in the main effects models, we see the following results.
    - 5th Grade Scores:
        - Adjusted means=.601 (non-black control), -.022 (black control), .066 (non-black treatment) and -.128 (black treatment). Significant difference by condition only for non-black students.
    - 6th Grade Scores:

    - Adjusted means=.596 (non-black control), -.077 (black control), .006 (non-black treatment) and -.099 (black treatment). Significant difference by condition only for non-black students.
- To get a better picture of what was happening, we looked at individual measures in addition to the general math factor (following pages).

Overall Group Condition Differences on Individual Measures

- These 3-level regressions nested children in their PK classrooms and schools. Covariates included gender, ethnicity, age at posttest, QC pretest scores, AP pretest scores, REMA Number and Geometry pretest scores, PK system, and the interaction of ethnicity x condition.
- Outcomes were KeyMath raw scores, Functional Thinking raw total, WJ-QC standard scores, or General Math Factor scores.
- Covariate-adjusted means by condition are shown below, and statistically significant differences are highlighted. The control group mean was consistently higher than the treatment group mean across all measures in both years. Statistically significant differences exist in the 5th grade year on KeyMath Number, KeyMath Algebra, and Functional Thinking, and General Math Factor and in the 6th grade year on Functional Thinking and Quantitative Concepts.

	BB	Control
KM NUM (raw) Y5*	20.30	21.85
KM NUM (raw) Y6	23.58	24.04
KM ALG (raw) Y5*	15.02	16.29
KM ALG (raw) Y6	17.56	18.37
KM GEO (raw) Y5	17.20	17.57
KM GEO (raw) Y6	19.32	19.94
FUN (raw) Y5*	6.39	7.57
FUN (raw) Y6†	7.55	8.61
WJ QC (standard) Y5	89.81	91.42
WJ QC (standard) Y6†	88.40	90.72
GMF (factor score) Y5*	-.085	.115
GMF (factor score) Y6	-.083	.075

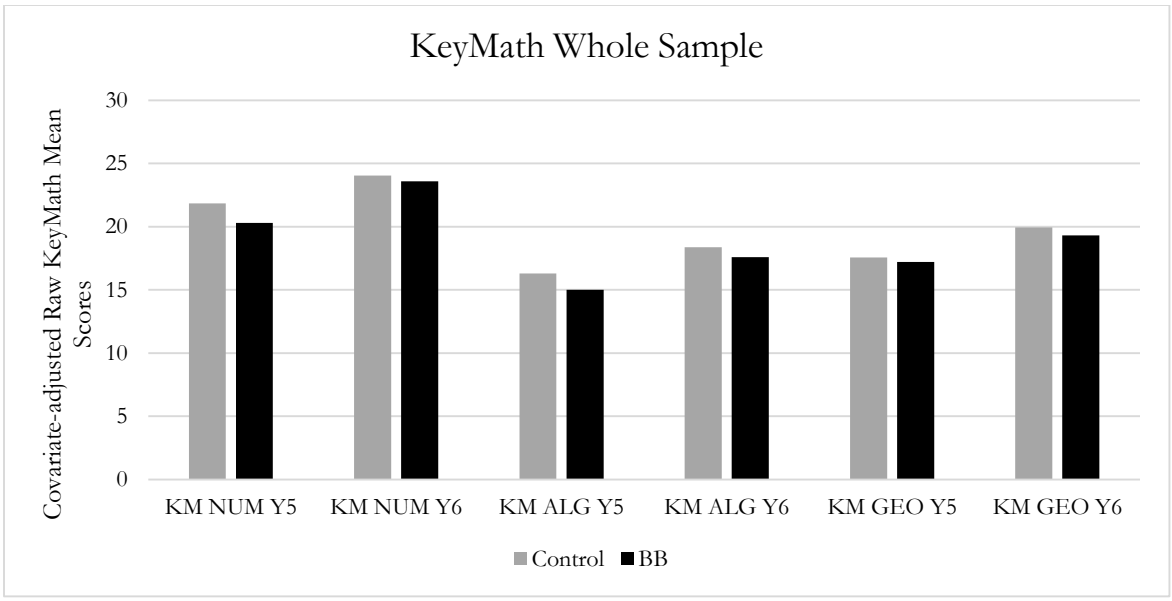
*$p<.05$, †$p<.10$

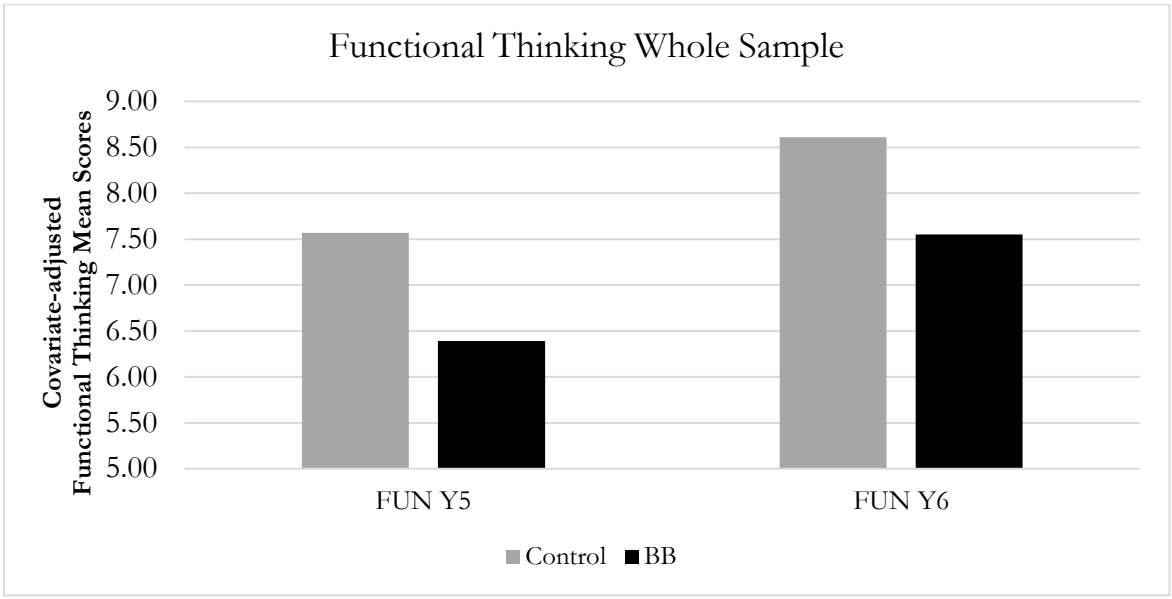
- When we look at differences by condition and ethnicity (black v. nonblack), we see greater differences. Significant condition differences exist ONLY for the Nonblack students in both years, favoring the control group.
- Remember:
    - The model controls for gender, age at posttest, beginning of pre-k scores (QCW, APW, REMA Number, and REMA Geometry), and pre-k system (MAC or MNPS)
    - Children were nested in their pre-k classrooms and schools
    - We used mean value imputation to substitute values for missing data from the beginning of pre-k scores (WJ QC, QJ AP, REMA Number, and REMA Geometry scores)

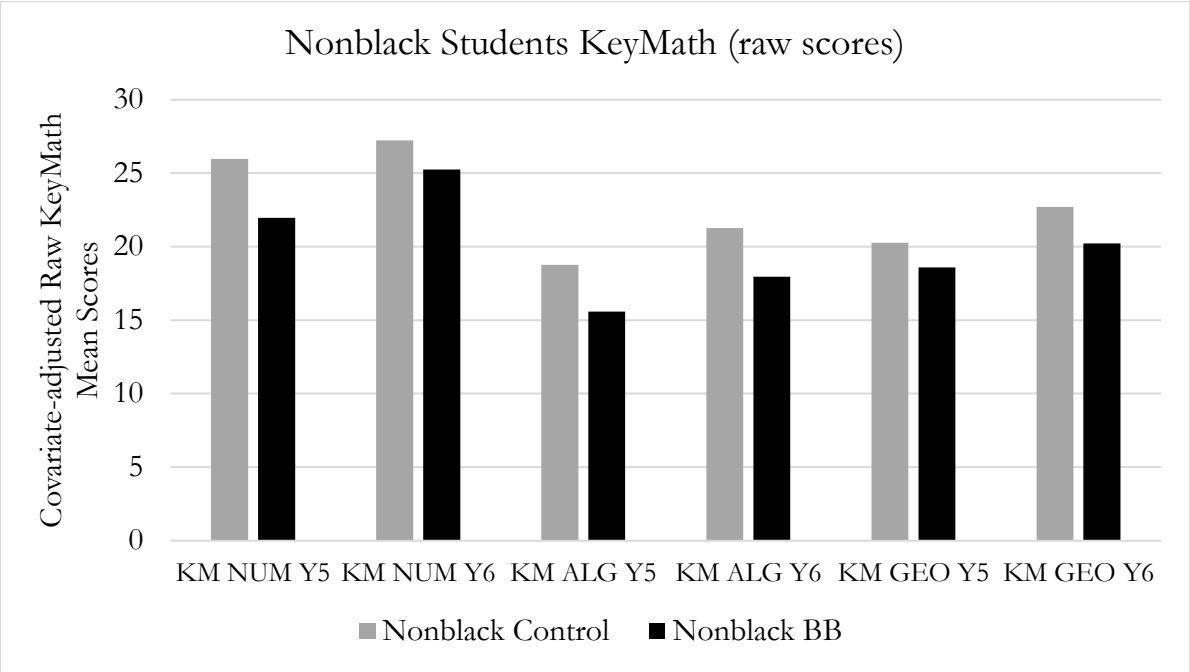
	Nonblack		Black	
	BB	Control	BB	Control
KM NUM (raw) Y5*	21.96	25.96	19.93	20.77
KM NUM (raw) Y6	25.25	27.23	23.17	23.24
KM ALG (raw) Y5*	15.57	18.76	14.91	15.61
KM ALG (raw) Y6*	17.96	21.27	17.53	17.57
KM GEO (raw) Y5†	18.59	20.25	16.83	16.57
KM GEO (raw) Y6*	20.23	22.70	19.12	19.18
FUN (raw) Y5*	7.01	9.14	6.24	7.15
FUN (raw) Y6*	7.58	11.08	7.61	7.91
WJ QC (standard) Y5	90.70	94.64	89.58	90.50
WJ QC (standard) Y6*	88.06	95.66	88.50	89.24
GMF (factor score) Y5*	.066	.601	-.128	-.022
GMF (factor score) Y6*	.006	.596	-.099	-.077

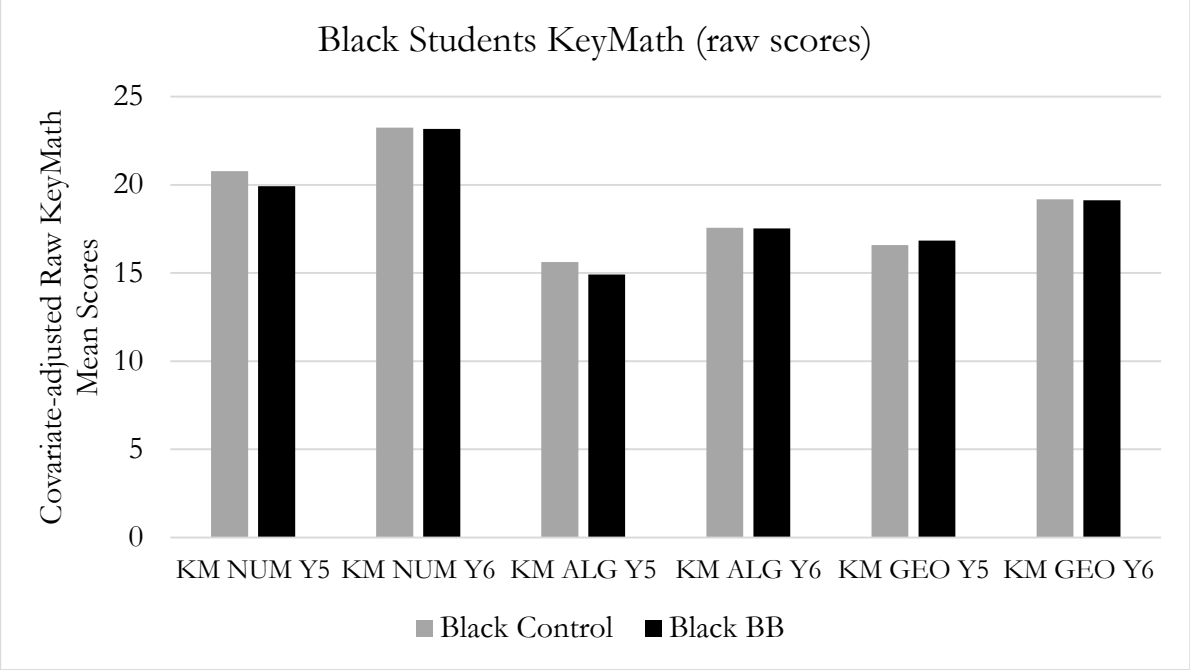
*$p<.05$, †$p<.10$

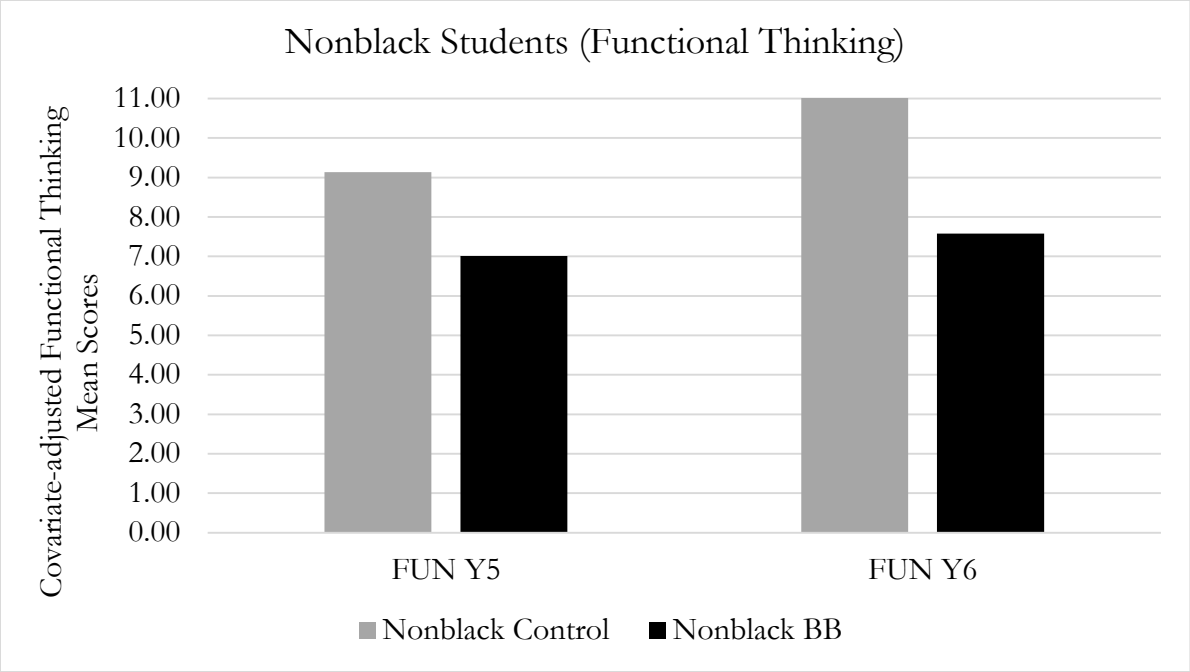
Note. N's for Grade 5 are as follows: Nonblack control (N = 51), Nonblack BB (N = 58), Black control (N = 149), and Black BB (N = 258). N's for Grade 6 are as follows: Nonblack control (N = 48), Nonblack BB (N = 58), Black control (N = 150), Black BB (N = 256). One assessed child is not included in these analyses because ethnicity was not provided.

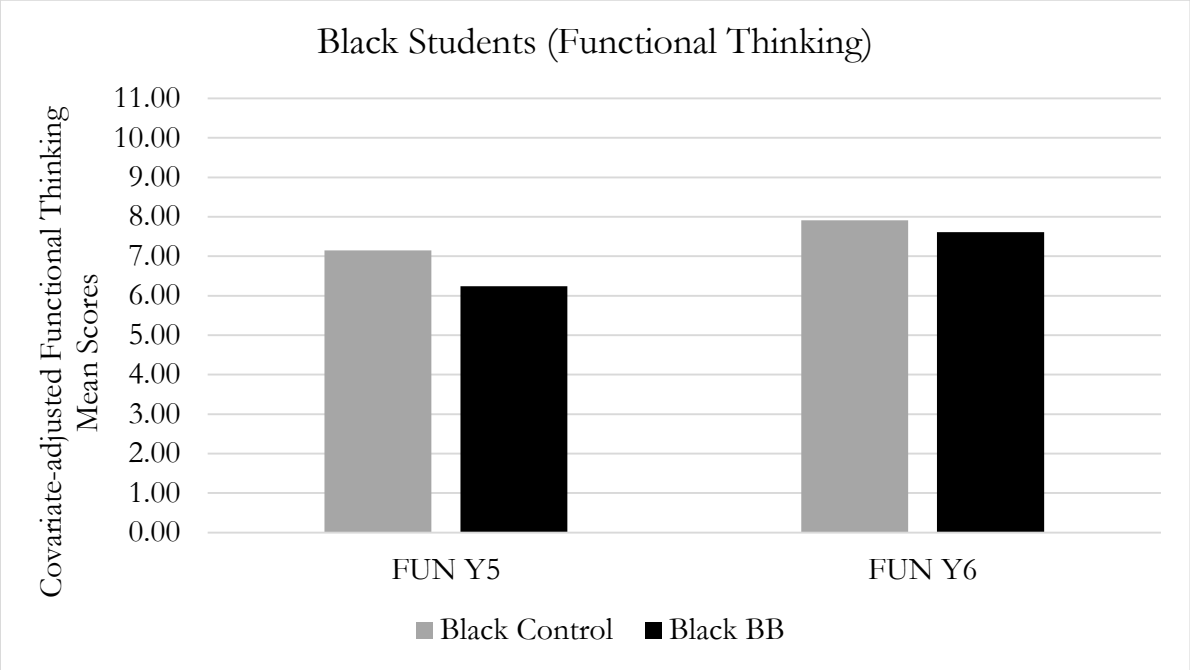

KeyMath Whole Sample
Covariate-adjusted Raw KeyMath Mean Scores
30
25
20
15
10
5
0
KM NUM Y5
KM NUM Y6
KM ALG Y5
KM ALG Y6
KM GEO Y5
KM GEO Y6
Control
BB


Functional Thinking Whole Sample
Covariate-adjusted Functional Thinking Mean Scores
9.00
8.50
8.00
7.50
7.00
6.50
6.00
5.50
5.00
FUN Y5
FUN Y6
Control
BB

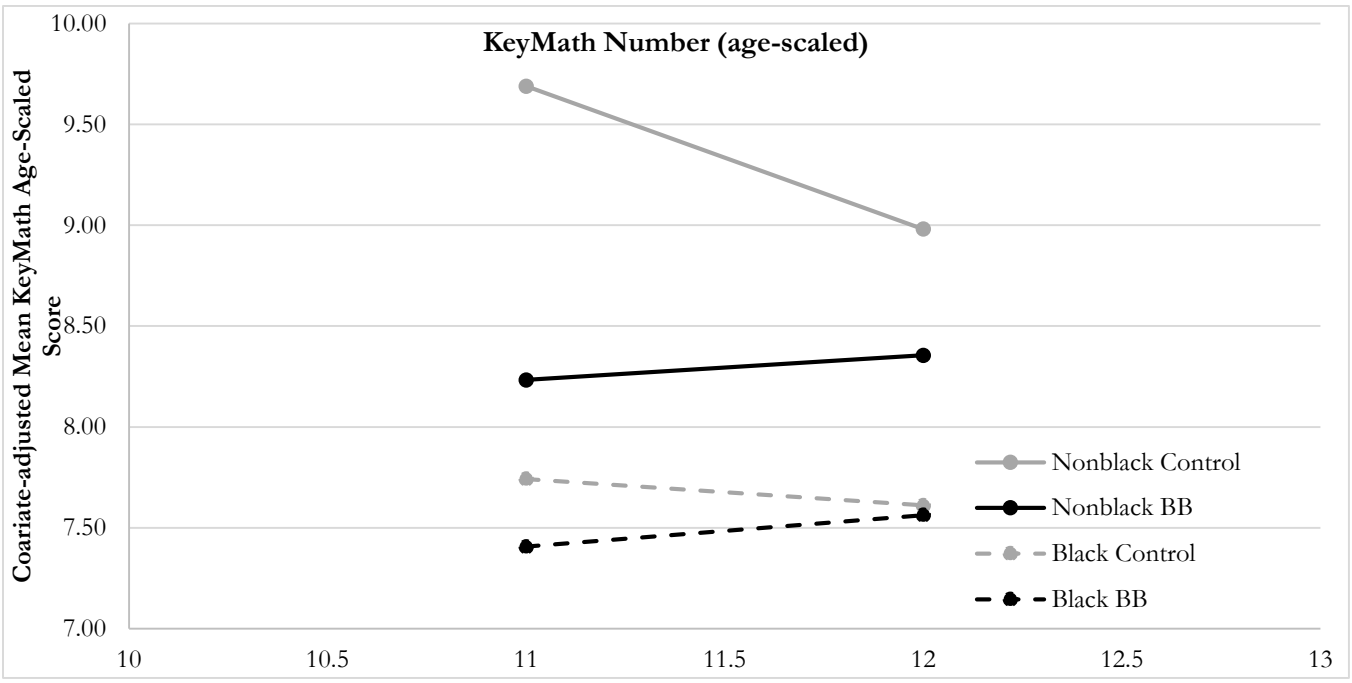

Nonblack Students KeyMath (raw scores)
Covariate-adjusted Raw KeyMath Mean Scores
30
25
20
15
10
5
0
KM NUM Y5
KM NUM Y6
KM ALG Y5
KM ALG Y6
KM GEO Y5
KM GEO Y6
Nonblack Control
Nonblack BB

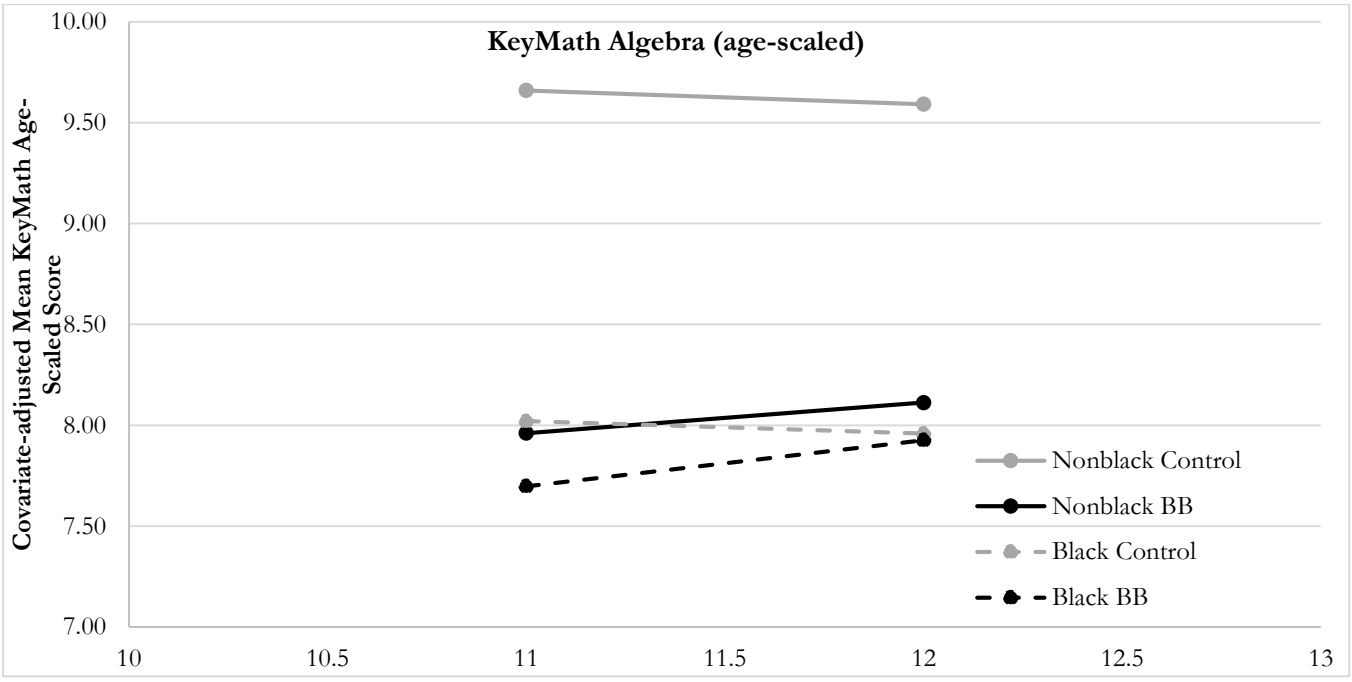

Black Students KeyMath (raw scores)
Covariate-adjusted Raw KeyMath Mean Scores
25
20
15
10
5
0
KM NUM Y5
KM NUM Y6
KM ALG Y5
KM ALG Y6
KM GEO Y5
KM GEO Y6
Black Control
Black BB

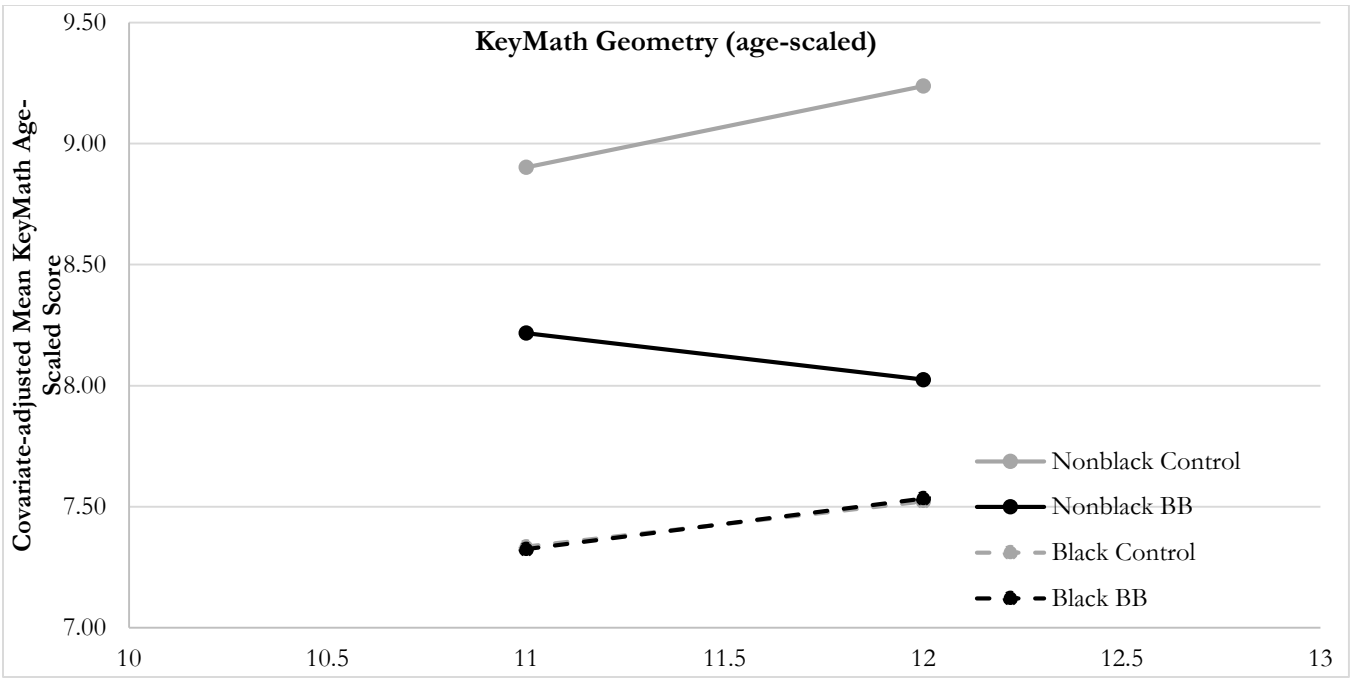

Nonblack Students (Functional Thinking)
Covariate-adjusted Functional Thinking Mean Scores
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
FUN Y5
FUN Y6
Nonblack Control
Nonblack BB

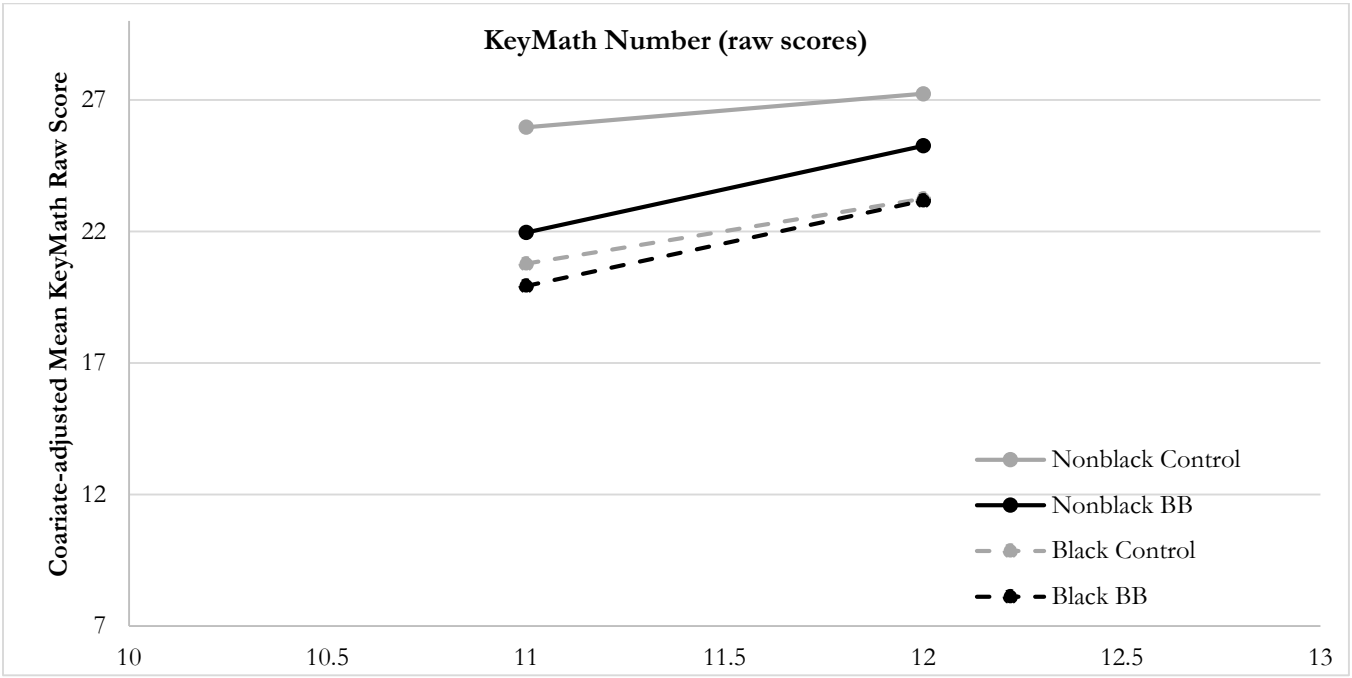

Black Students (Functional Thinking)
Covariate-adjusted Functional Thinking Mean Scores
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
FUN Y5
FUN Y6
Black Control
Black BB

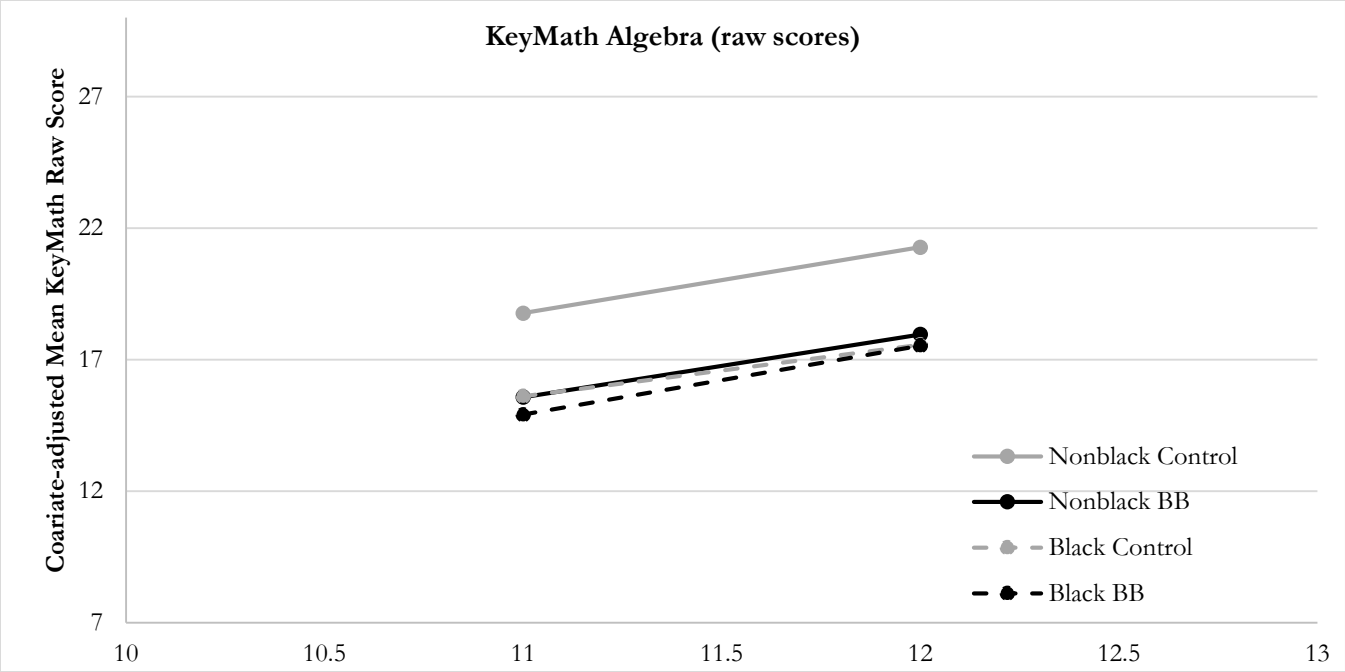
We can also look at these same means in line graphs that might better show growth for the 4 groups on KeyMath and Functional Thinking.

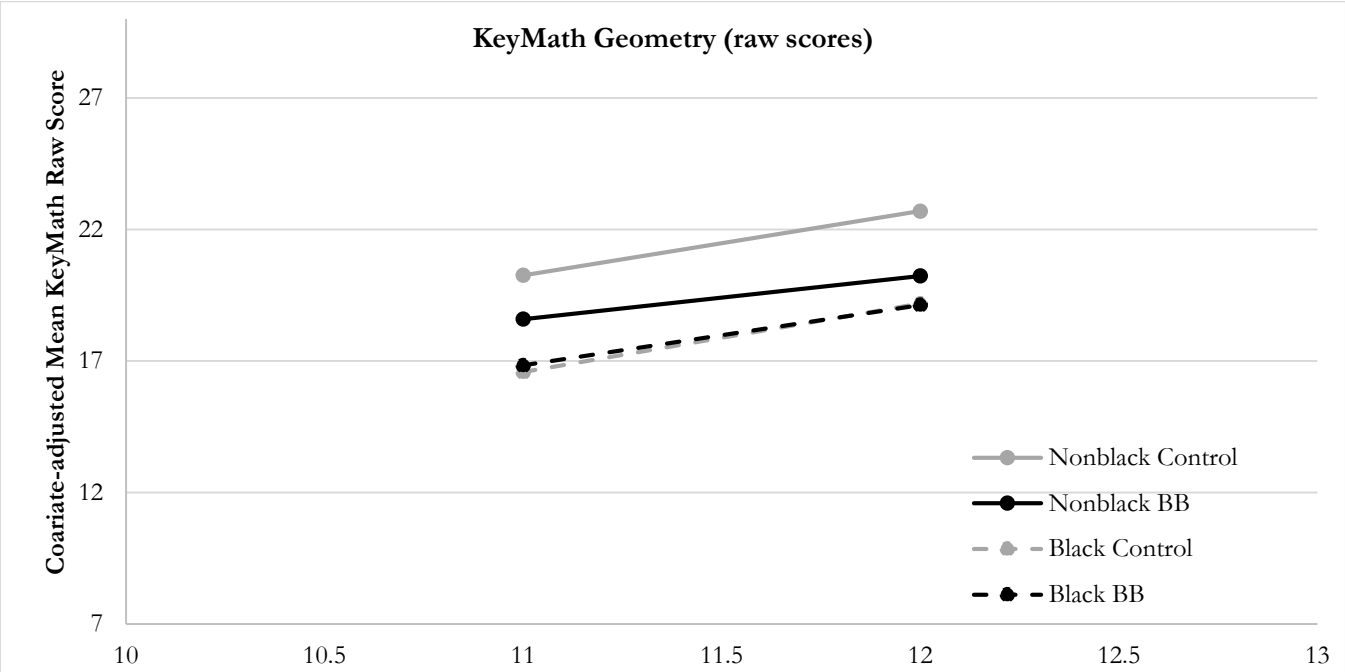


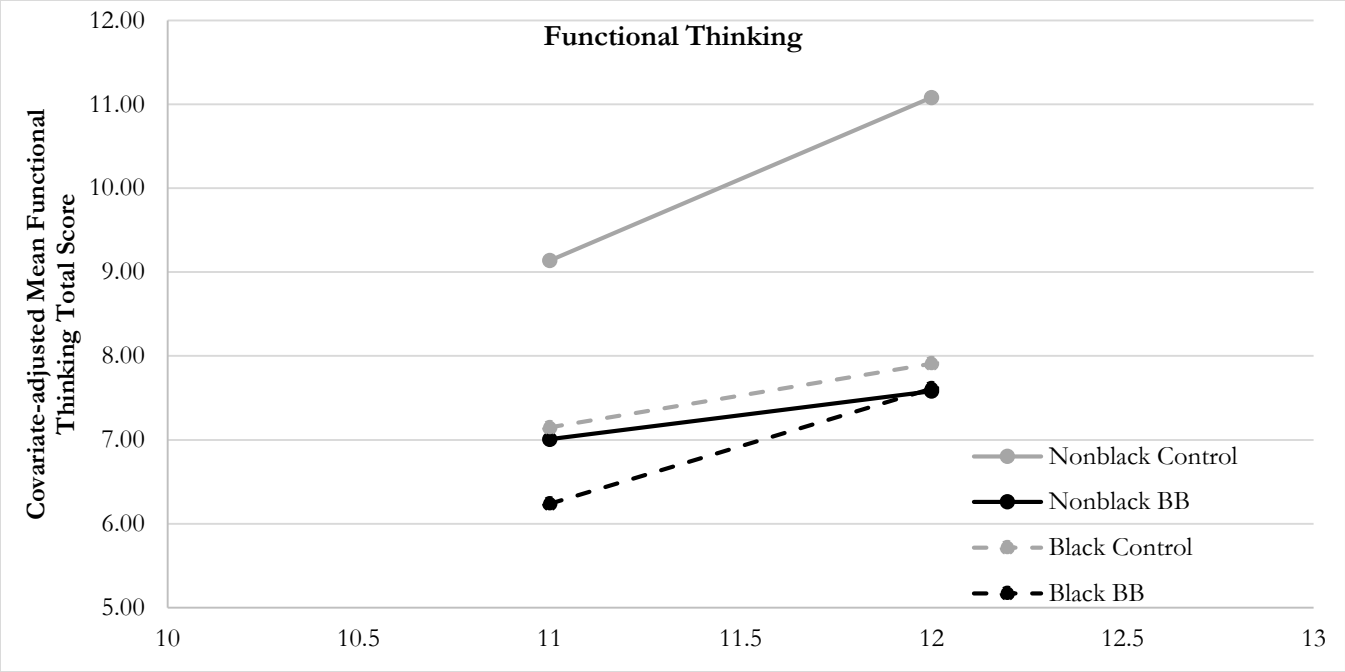



KeyMath Geometry (age-scaled)
Covariate-adjusted Mean KeyMath Age-Scaled Score
9.50
9.00
8.50
8.00
7.50
7.00
10
10.5
11
11.5
12
12.5
13
Nonblack Control
Nonblack BB
Black Control
Black BB

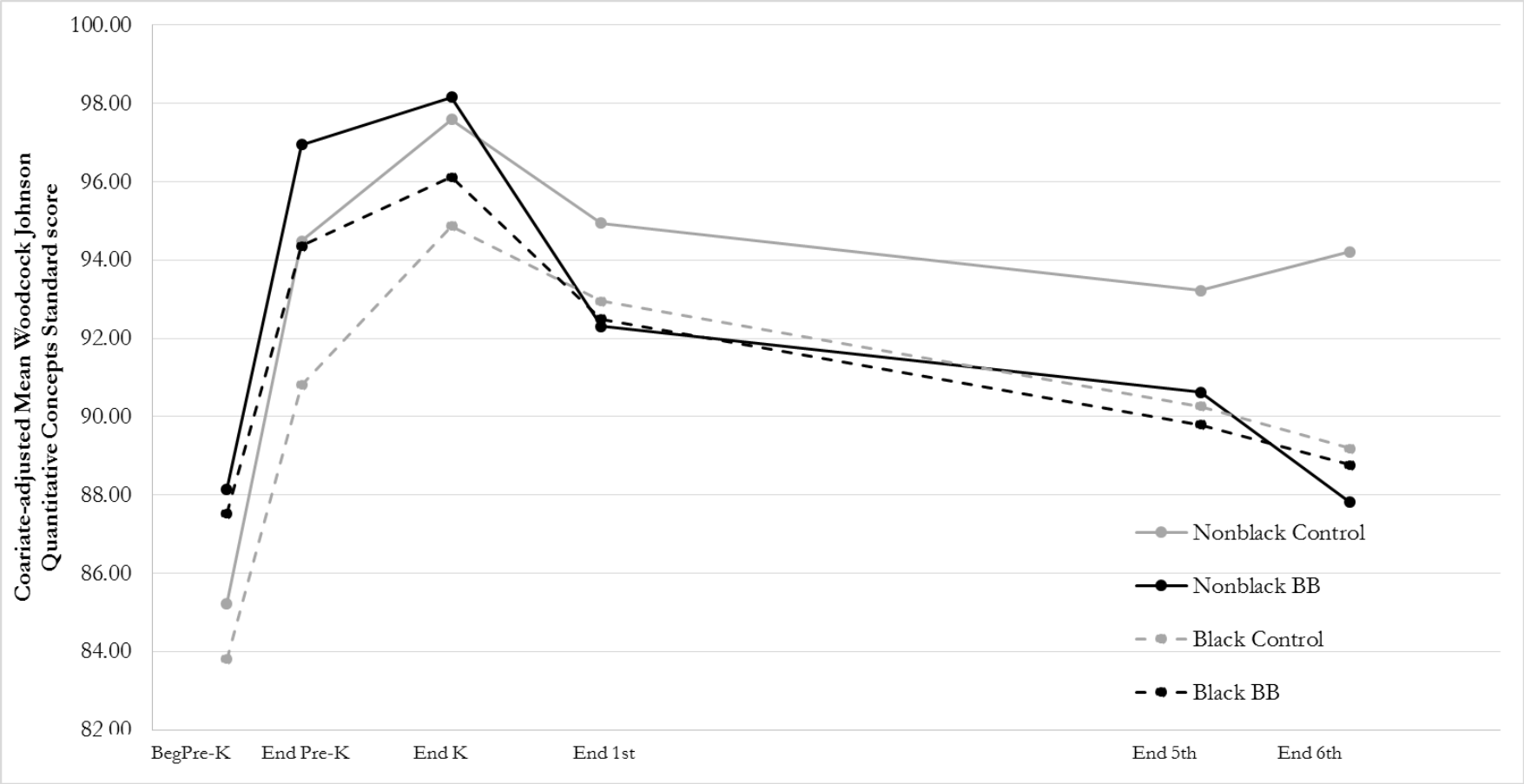

KeyMath Number (raw scores)
Coariate-adjusted Mean KeyMath Raw Score
27
22
17
12
7
10
10.5
11
11.5
12
12.5
13
Nonblack Control
Nonblack BB
Black Control
Black BB


KeyMath Algebra (raw scores)
Coariate-adjusted Mean KeyMath Raw Score
27
22
17
12
7
10
10.5
11
11.5
12
12.5
13
Nonblack Control
Nonblack BB
Black Control
Black BB

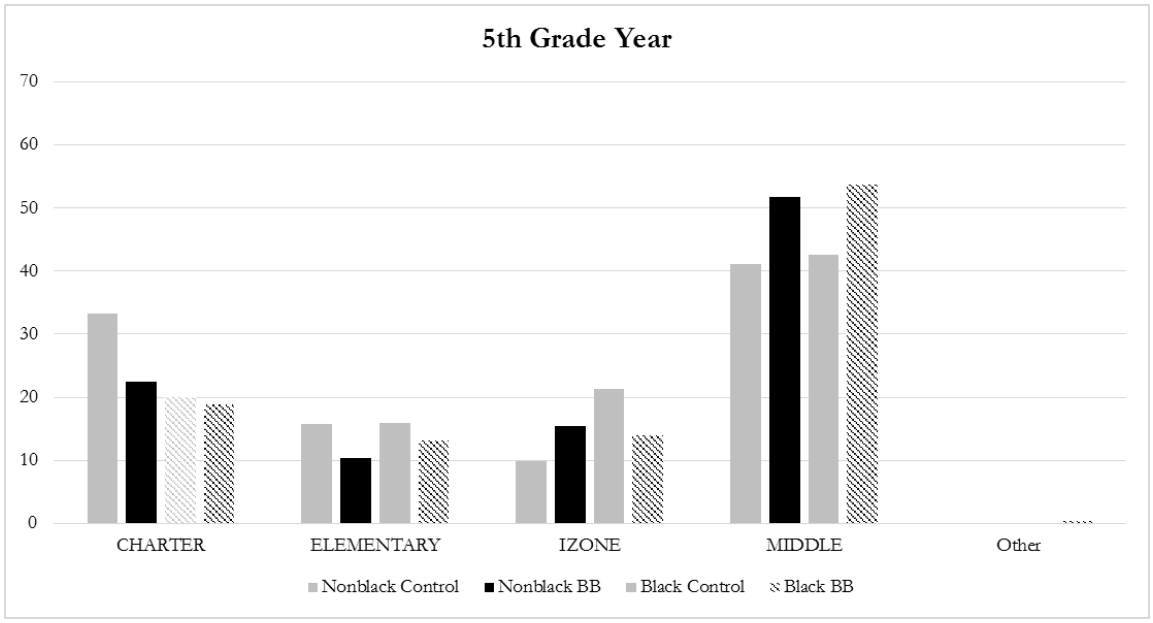

KeyMath Geometry (raw scores)
Coariate-adjusted Mean KeyMath Raw Score
27
22
17
12
7
10
10.5
11
11.5
12
12.5
13
Nonblack Control
Nonblack BB
Black Control
Black BB

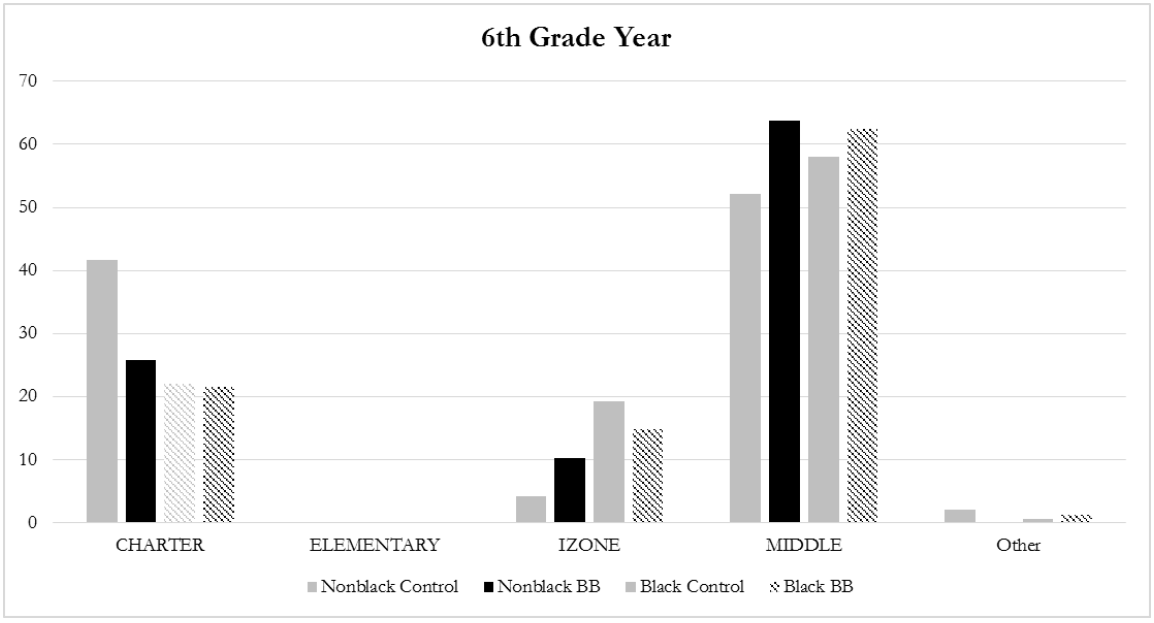

Functional Thinking
Covariate-adjusted Mean Functional Thinking Total Score
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
10
10.5
11
11.5
12
12.5
13
Nonblack Control
Nonblack BB
Black Control
Black BB

Woodcock Johnson scores are unique in that we administered the Quantitative Concepts subtest each year of the study including the earlier years. As such, we can look at a much broader span of time over which standard scores fluctuated for all groups. Of particular notice here is the difference between nonblack Control and nonblack Treatment groups between the end of 5th and the end of 6th grade. The following graph shows covariate-adjusted standard score means by condition and ethnicity grouping from the beginning of Pre-K through the 6th grade year. Though we only saw significant treatment differences for black students at the beginning and end of PK (favoring the treatment group), there were no other condition differences until this past year, when the only significant condition difference involved nonblack students, favoring the control group.



In thinking about why these differences between ethnicity groups and condition might occur, one of the things we looked at was the type of school that these groups attended in the 5th and 6th grade year. More nonblack control students went to charter schools than any of the other 3 groups (and, conversely, more nonblack treatment students went to Izone[1] schools than nonblack control students). The graphs below show the percentages within ethnicity group and condition by school type for each of the follow-up study years.





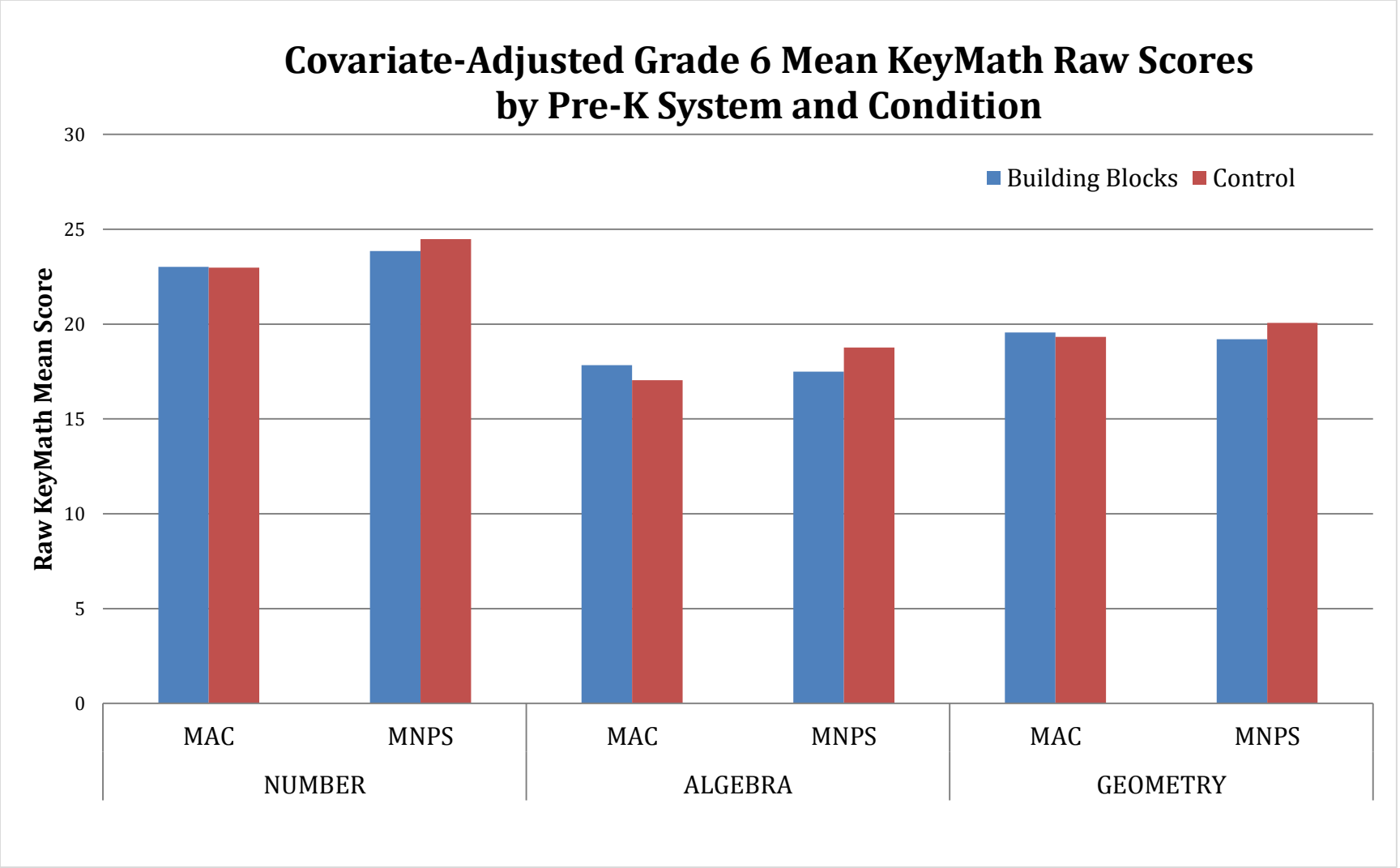
[1] Izone schools are "Innovation Schools" run by the school system but given independence and freedom to create their own programs. Schools are low performing.

Covariate-Adjusted Grade 6 Mean Scores by Pre-K Curriculum Condition

	Building Blocks (N=317)	Control (N=202)	Effect Size (Covariate-Adjusted)
Math Skills			
KM Number (raw)	23.56	24.05	-.06
KM Number (age-scaled)	7.72	7.89	-.06
KM Algebra (raw)	17.59	18.36	-.13
KM Algebra (age-scaled)	7.96	8.31	-.12
KM Geometry (raw)	19.31	19.93	-.12
KM Geometry (age-scaled)	7.62	7.89	-.11
WJ Quant. Cpts. (standard score)	88.52	90.75	-.17
Functions: Total	7.54	8.59	-.21
TIMSS (Total)	87.41	86.07	.11
Number: Accuracy	0.91	0.90	.08
Number: Correct RT	879.14	885.13	.03
Color Dots: Accuracy	0.75	0.75	.07
Color Dots: Correct RT	840.35	841.18	.00
Mapping: Accuracy	0.69	0.70	-.04
Mapping: Correct RT	867.05	876.92	.04
ALL: RT (Grouped)			
ALL: RT (Random)			
ALL: RT (Symbolic)			
Executive Function Skills			
HAF: Accuracy (Congruent)	0.98	0.97	.11
HAF: RT (Congruent)	368.08	369.17	.02
HAF: Accuracy (Incongruent)	0.91	0.90	.06
HAF: RT (Incongruent)	430.72	426.80	-.04
HAF: Accuracy (Mixed)	0.73	0.75	-.16
HAF: RT (Mixed)	563.57	542.03	-.29
Corsi: Highest Span	4.71	4.64	.05

Mean scores are adjusted for gender, ethnicity (Black or Nonblack), age at time of posttest, beginning of pre-k scores (WJ QC, WJ AP, REMA Number, and REMA Geometry), and pre-k system (MAC or MNPS). Students are nested in their classroom and school.

Note. A positive effect size favors the Building Blocks (treatment) group (meaning that the treatment group mean is higher than the control group mean or that the treatment group mean response time is lower/faster than the control group mean response time)



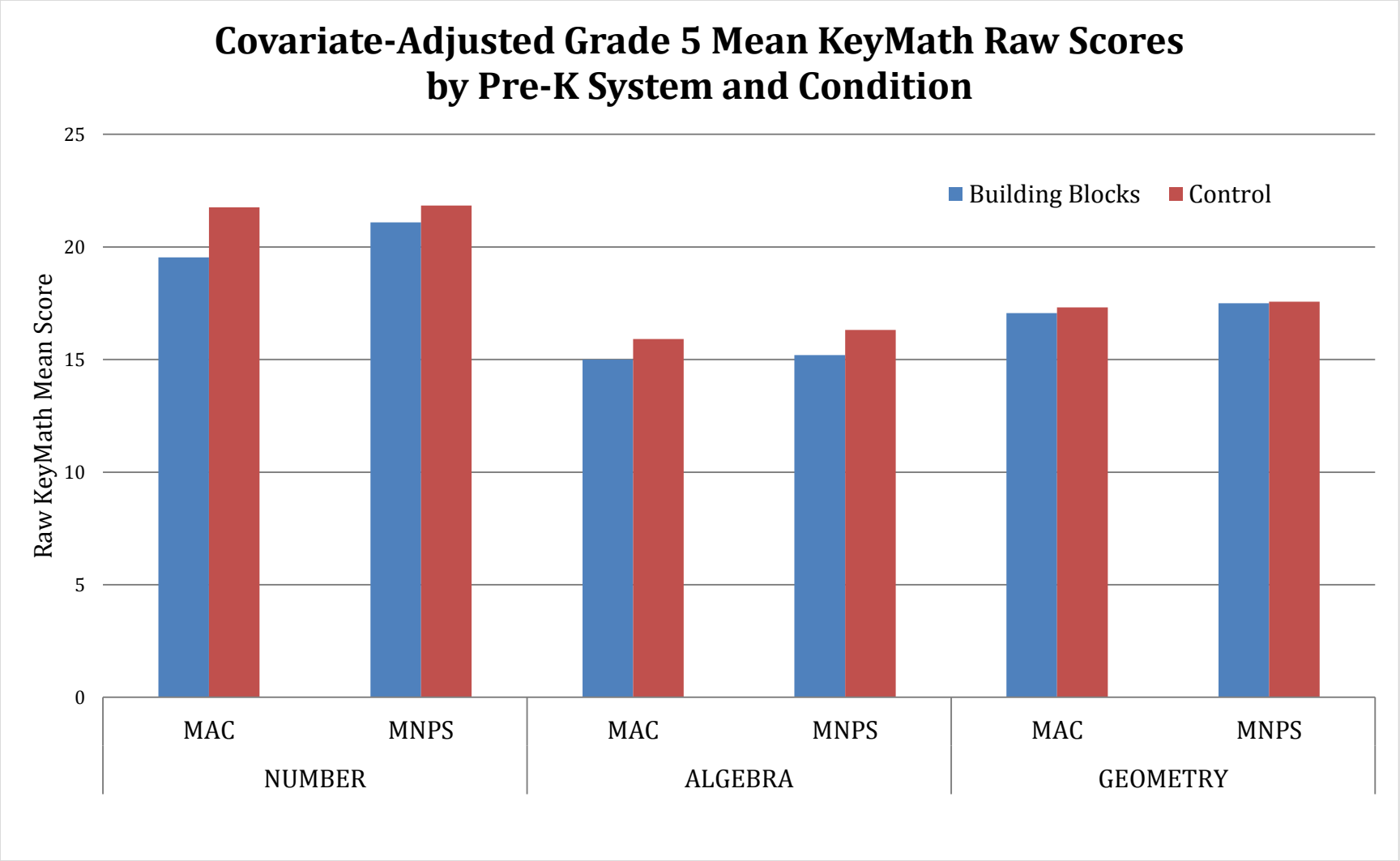
Note. Mean KeyMath raw scores are adjusted for gender, ethnicity (Black vs. Nonblack), age at time of KeyMath assessment, and beginning of pre-kindergarten scores (WJ QC, WJ AP, REMA Number and Geometry). Students are nested in their classroom and school.

Covariate-Adjusted Grade 5 Mean Scores by Pre-K Curriculum Condition

	Building Blocks (N=315)	Control (N=205)	Effect Size (Covariate-Adjusted)
Math Skills			
KM Number (raw)	20.47	21.81	-.18
KM Number (age-scaled)	7.63	8.13	-.18
KM Algebra (raw)	15.14	16.25	-.20
KM Algebra (age-scaled)	7.80	8.35	-.19
KM Geometry (raw)	17.26	17.53	-.05
KM Geometry (age-scaled)	7.35	7.64	-.11
WJ Quant. Cpts. (standard score)	89.98	91.41	-.11
Functions: Total	6.43	7.53	-.23
Feelings about Math (Total)	43.24	43.38	-.03
Number: Accuracy	0.95	0.96	-.12
Number: Correct RT	740.82	740.78	.00
Color Dots: Accuracy	0.75	0.75	.02
Color Dots: Correct RT	858.82	871.16	-.07
Dots: Accuracy	0.61	0.58	.24
Dots: Correct RT	822.67	826.14	.02
ALL: Subitizing Level	2.87	2.74	.24
Executive Function Skills			
HAF: Accuracy (Congruent)	0.97	0.96	.18
HAF: RT (Congruent)	383.68	384.06	.01
HAF: Accuracy (Incongruent)	0.87	0.88	-.06
HAF: RT (Incongruent)	456.44	449.16	-.08
HAF: Accuracy (Mixed)	0.66	0.68	-.15
HAF: RT (Mixed)	571.93	574.77	.03
Corsi: Highest Span	4.41	4.41	.01

Mean scores are adjusted for gender, ethnicity (Black or Nonblack), age at time of posttest, beginning of pre-k scores (WJ QC, WJ AP, REMA Number, and REMA Geometry), and pre-k system (MAC or MNPS). Students are nested in their classroom and school.

Note. A positive effect size favors the Building Blocks (treatment) group (meaning that the treatment group mean is higher than the control group mean or that the treatment group mean response time is lower/faster than the control group mean response time)



Note. Mean KeyMath raw scores are adjusted for gender, ethnicity (Black vs. Nonblack), age at time of KeyMath assessment, and beginning of pre-kindergarten scores (WJ QC, WJ AP, REMA Number and Geometry). Students are nested in their classroom and school.