VANDERBILT PEABODY COLLEGE

PEABODY research institute

TCAP/TNREADY Scores and Individually Assessed Math Competence for 500 MNPS Students from Very Low Income Families

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Presentation to MNPS/TDOE

March 29, 2018

Middle School Math Follow-Up

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Middle School Math Follow-Up

Project Background, Measures, and Sample

Original Building Blocks Scale-Up Study

- The *Building Blocks for Math Pre-K Curriculum* (Clements & Sarama, 2007) was designed to help young children learn math

- Nashville was 1 location of a multi-site scale-up study
  - 2006-2007 Training year for teachers
  - 2007-2008 Children attended Pre-K, Full Implementation

Original Building Blocks Scale-Up Sample

- 20 schools randomly assigned to conditions
  - 16 Metropolitan Public schools
  - 4 Head Start centers
- 57 classrooms
  - 31 treatment classrooms (16 public, 15 Head Start)
  - 26 control classrooms (17 public, 9 Head Start)
- Approximately 680 children with PK pre- and post-data
    - Sample was predominantly Black and from low-income households

Follow Up Sample

- 771 consented students originally
  - 16 withdrew in 1st grade
  - 29 no longer in Tennessee
  - 45 students not located in state data base

  90 Students unrecoverable
  - 53 in Tennessee but not in Nashville
  - **33 students' Nashville parents declined**
  - 72 students located but never responded (backpacks!)
- 521 students re-consented – all from Metro Nashville Public Schools (77% retained; 5% declined)
  - 316 BB treatment children (70% of original group)
  - 205 Control children (64% of original group)

Demographics in 5th Grade

	N	Min	Max	Mean	SD
Age at Time of Testing (in years)	521	10.4	12.5	11.1	.325
PK Treatment Condition	316	10.4	12.5	11.0	.320
PK Control Condition	205	10.4	12.3	11.1	.327

	Overall		PK Treatment		PK Control	
	Freq	Pct	Freq	Pct	Freq	Pct
Ethnicity						
Black	411	79%	259	82%	152	74%
White	46	9%	23	7%	23	11%
Hispanic	42	8%	20	6%	22	11%
Other	22	4%	15	5%	7	4%
Gender						
Male	228	44%	140	44%	88	43%
Female	293	56%	176	56%	117	57%
Pre-K School System						
MAC	210	40%	152	48%	58	28%
MNPS	311	60%	164	52%	147	72%

Demographics (con't.)

	Overall		PK Treatment		PK Control	
	Freq	Pct	Freq	Pct	Freq	Pct
FRPL Eligibility (from last year)						
Reduced Price Lunch	21	4%	18	6%	3	1%
Free Lunch	454	87%	278	88%	176	86%
Non-subsidized Lunch	39	8%	19	6%	20	10%
Missing	7	1%	1	<1%	6	3%
Special Education Designation (from last year)						
Speech/Language	10	2%	7	2%	3	1%
Physical Impairment	16	3%	5	2%	11	5%
Delay/Learning Disability	50	10%	26	8%	24	12%
Other	5	1%	3	1%%	2	1%
None	440	84%	275	87%	165	80%

KeyMath 3 Diagnostic

1. *Numeration* - The Numeration subtest measures an individual's understanding of whole and rational numbers.
2. *Algebra* - The Algebra subtest measures an individual's understanding of pre-algebraic and algebraic concepts.
3. *Geometry* - The Geometry subtest measures an individual's ability to analyze, describe, compare, and classify two- and three-dimensional shapes. It also covers topics such as spatial relationships and reasoning, coordinates, symmetry, and geometric modeling.

Woodcock Johnson Achievement Battery III

(carryover from original)

Quantitative Concepts

Assesses students' knowledge of mathematical concepts, symbols, and vocabulary, including numbers, shapes, and sequences; it measures aspects of quantitative math knowledge and recognition of patterns in a series of numbers.

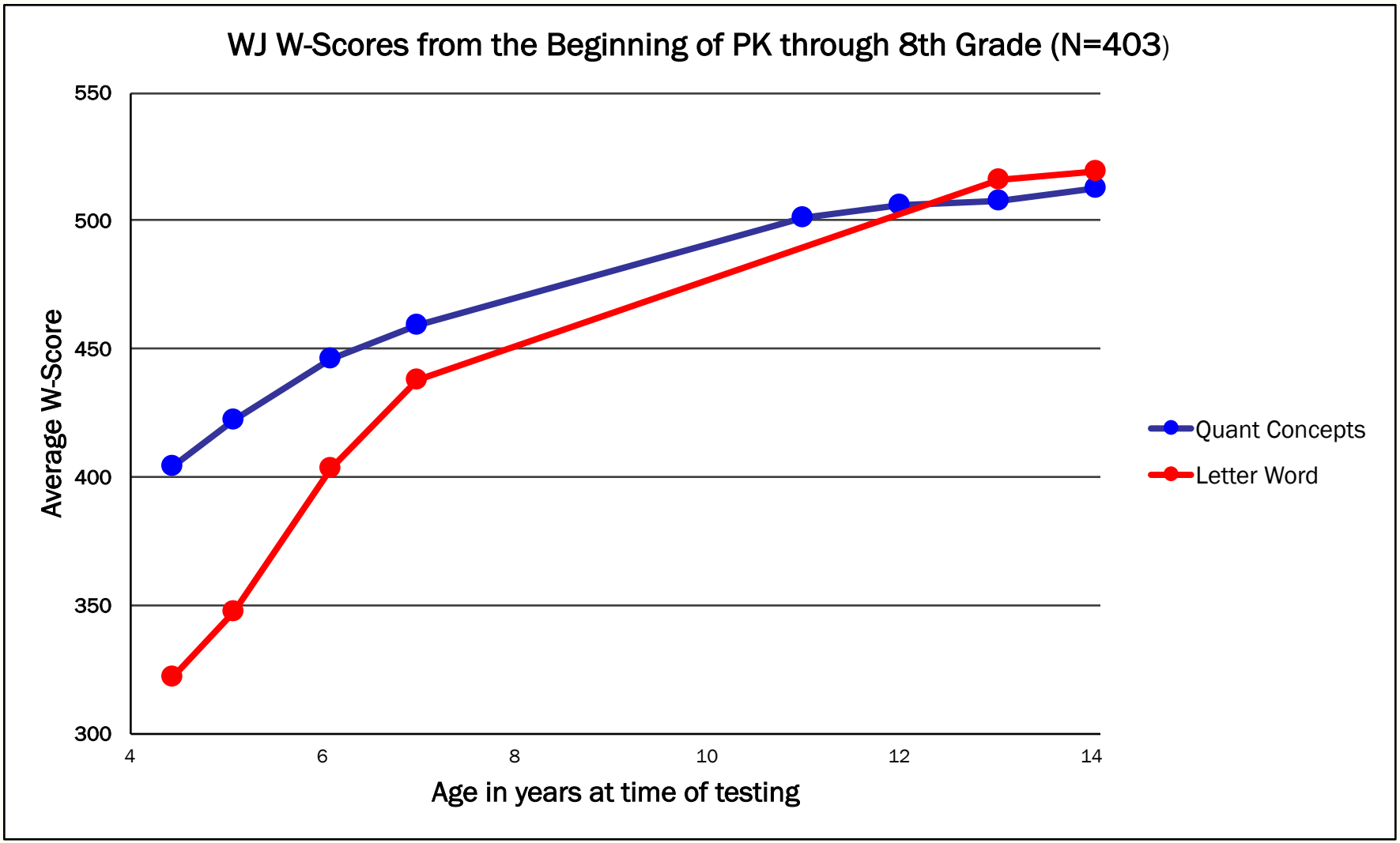
Letter Word Identification

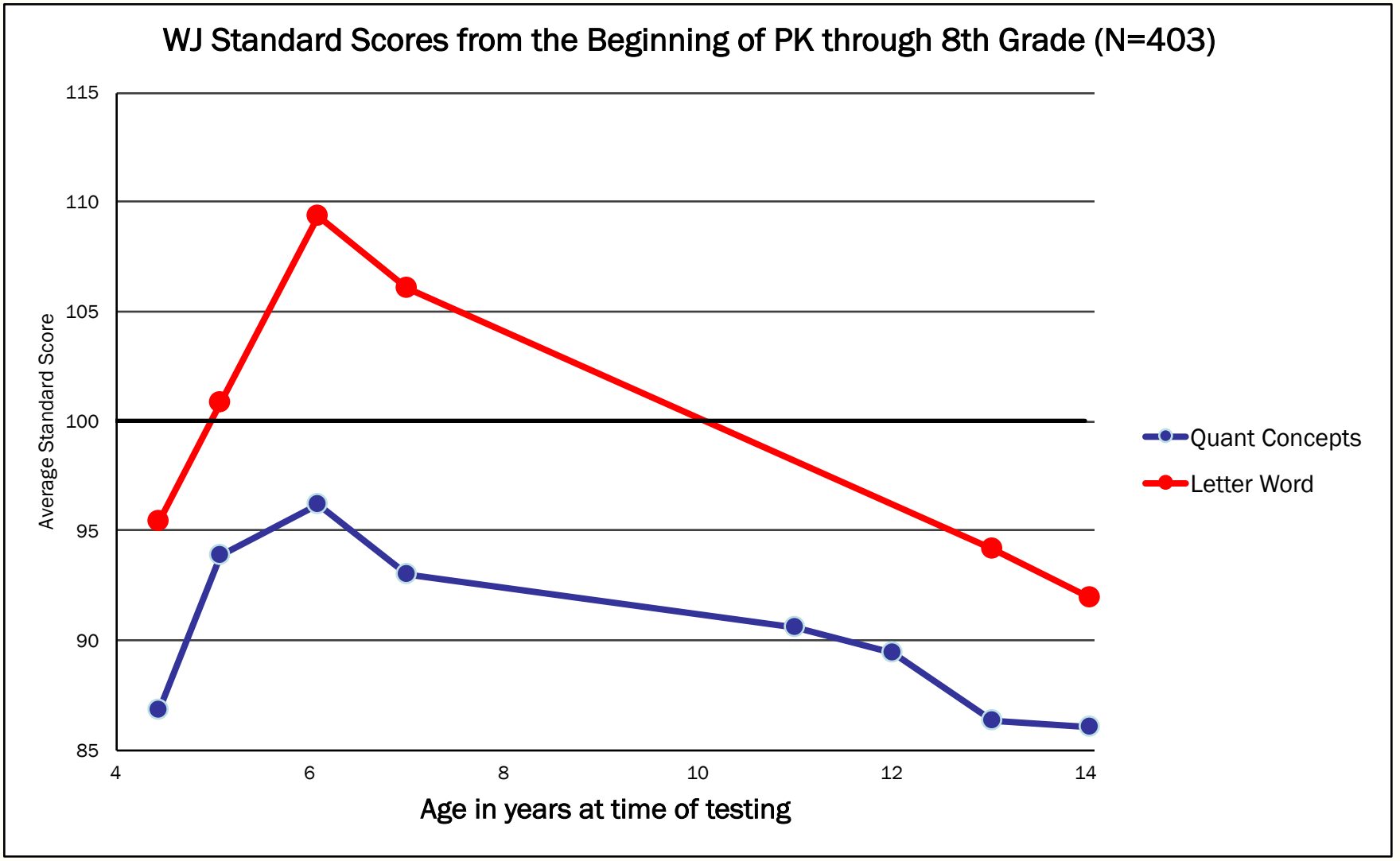
Assesses student knowledge of letters and increasingly complex words. (Re-administered in 7th and 8th grade)

ANALYSES

KeyMath Scores 5th-8th Grade

Year	Mean Grade	Test	N	M	SD	Difference Between Actual and Expected Mean
Year 1	5.83	Numeration	517	4.20	1.98	-1.63
		Algebra	517	4.31	1.84	-1.52
		Geometry	517	3.90	1.97	-1.93
Year 2	6.84	Numeration	508	4.97	2.15	-1.87
		Algebra	508	5.20	2.24	-1.64
		Geometry	508	4.79	2.05	-2.05
Year 3	7.84	Numeration	483	5.35	2.54	-2.49
		Algebra	483	5.68	2.64	-2.16
		Geometry	483	5.10	2.28	-2.74
Year 4	8.85	Numeration	459	6.01	2.56	-2.84
		Algebra	459	6.21	2.61	-2.64
		Geometry	459	5.92	2.49	-2.93


WJ W-Scores from the Beginning of PK through 8th Grade (N=403)
Average W-Score
550
500
450
400
350
300
4
6
8
10
12
14
Age in years at time of testing
Quant Concepts
Letter Word


WJ Standard Scores from the Beginning of PK through 8th Grade (N=403)
Average Standard Score
115
110
105
100
95
90
85
4
6
8
10
12
14
Age in years at time of testing
Quant Concepts
Letter Word

TNReady: 8th Grade Performance

	Reading/Language Arts				Math			
	District		Sample		District		Sample	
Perf. Level	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Below	1330	24.6	150	35.0	2605	46.6	234	54.7
Approaching	2845	52.6	225	52.6	1677	30.0	126	29.4
On-Track	1038	19.2	51	11.9	992	17.7	63	14.7
Mastered	191	3.5	2	0.5	317	5.7	5	1.2
Total	5404	100.0	428	100.0	5591	100.0	428	100.0

Correlations Among TCAP/TNReady MATH Scores across Years

	I. TCAP Math (2013-2014)	II. TCAP Math (2014-2015)
I. TCAP Math Scale Score (2013-2014)		
II. TCAP Math Scale Score (2014-2015)	.66**	
III. TNReady Math Scale Score (2016-2017)	.58**	.64**

Correlations among Direct Assessments Across Time

	KeyMath Raw Scores									WJ Quant Concepts W Scores	
	I. Num Y5	II. Num Y6	III. Num Y8	IV. Alg Y5	V. Alg Y6	VI. Alg Y8	VII. Geo Y5	VIII. Geo Y6	IX. Geo Y8	X. WJQC Y5	XI. WJQC Y6
I. KeyMath Numeration Y5											
II. KeyMath Numeration Y6	.85**										
III. KeyMath Numeration Y8	.84**	.89**									
IV. KeyMath Algebra Y5	.83**	.79**	.78**								
V. KeyMath Algebra Y6	.80**	.85**	.84**	.81**							
VI. KeyMath Algebra Y8	.77**	.81**	.87**	.77**	.84**						
VII. KeyMath Geometry Y5	.69**	.61**	.62**	.66**	.60**	.62**					
VIII. KeyMath Geometry Y6	.68**	.74**	.71**	.65**	.72**	.69**	.65**				
IX. KeyMath Geometry Y8	.67**	.69**	.76**	.64**	.67**	.74**	.66**	.72**			
X. WJ Quant Concepts Y5	.67**	.69**	.70**	.69**	.73**	.70**	.54**	.59**	.60**		
XI. WJ Quant Concepts Y6	.70**	.73**	.74**	.72**	.76**	.73**	.53**	.62**	.61**	.73**	
XII. WJ Quant Concepts Y8	.73**	.77**	.80**	.73**	.80**	.810**	.55**	.68**	.66**	.76**	.80**

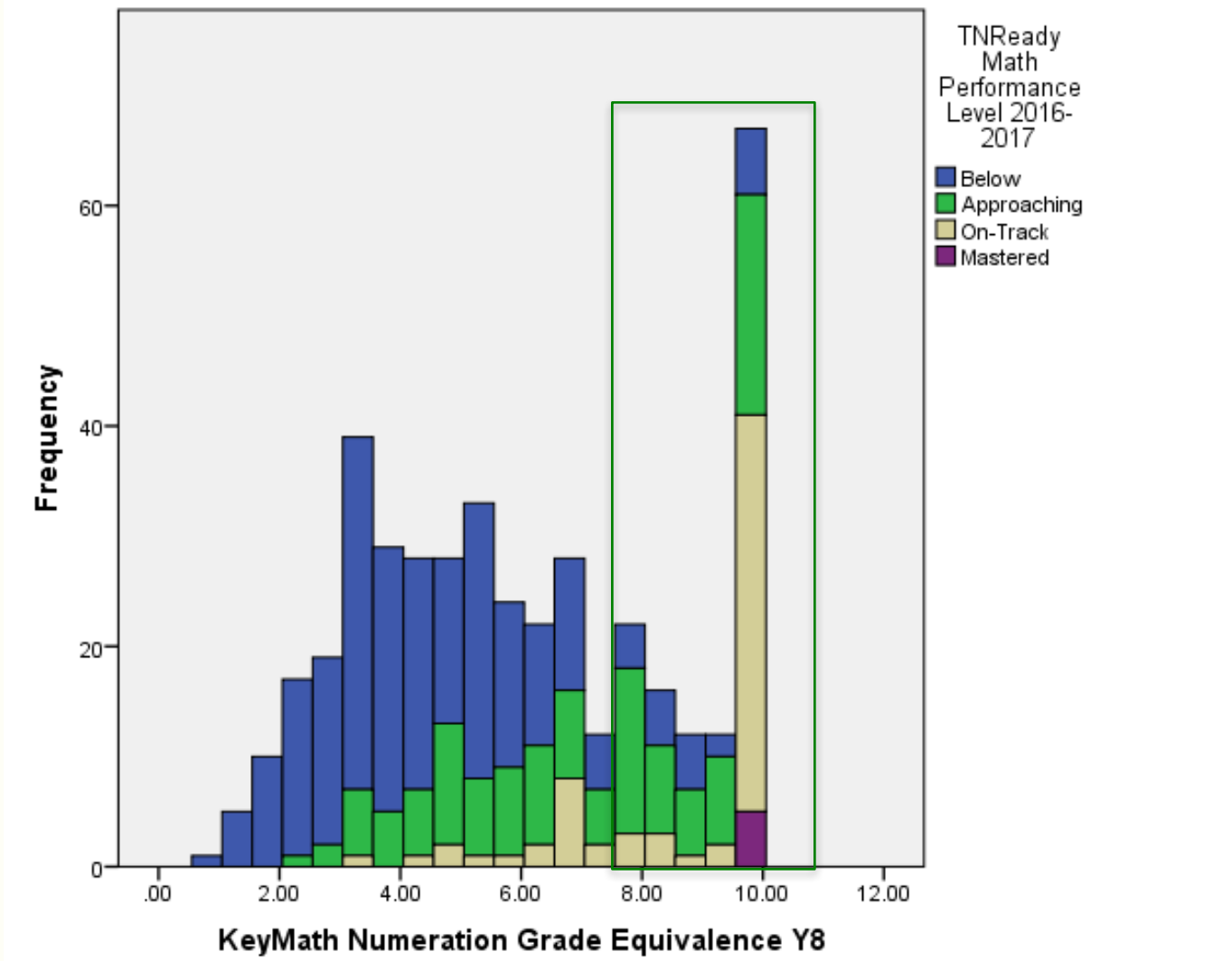
Correlations Among Student Direct Assessment Scores & TCAP/TNReady Scores across Years

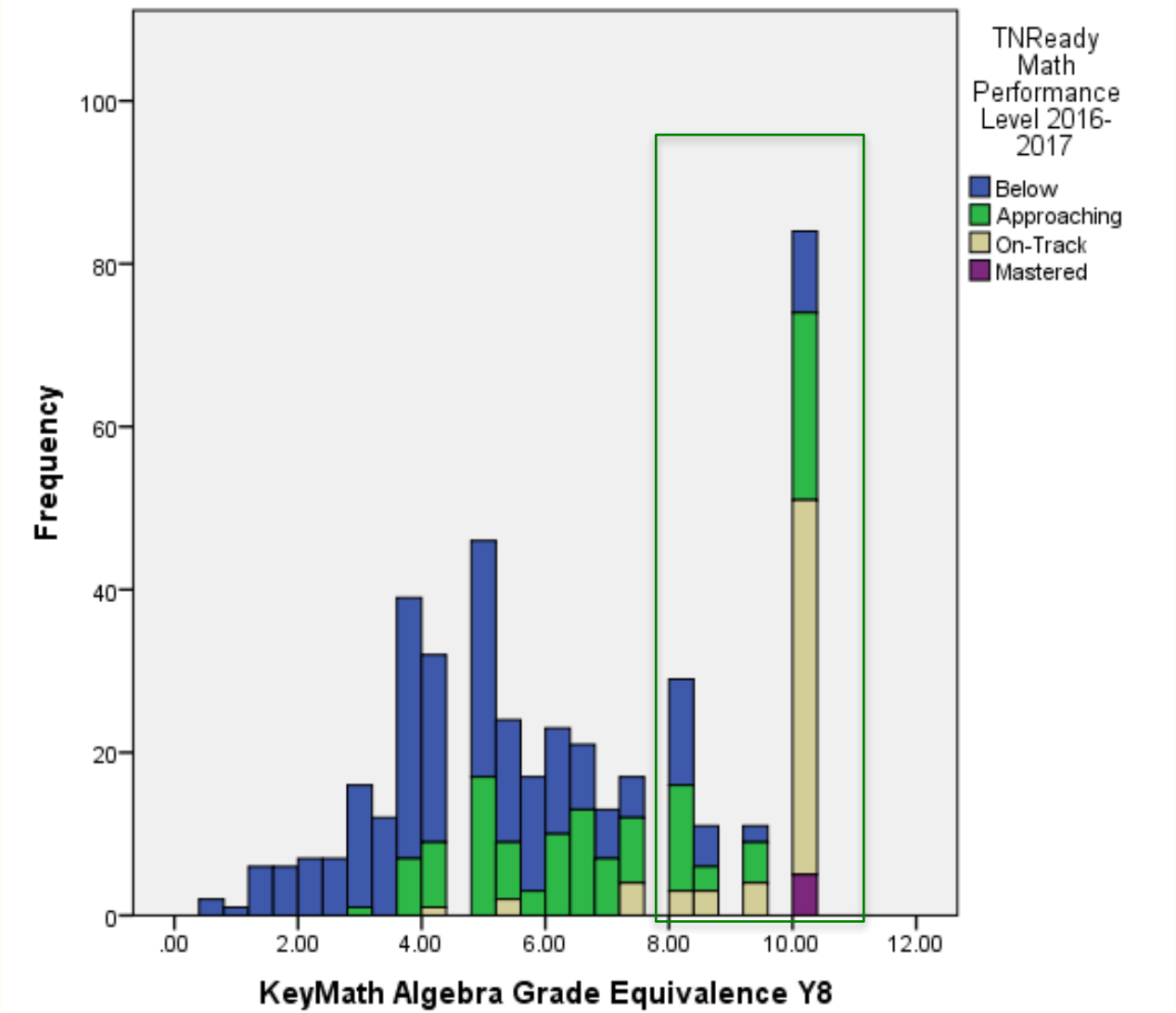
	Key Math Raw Scores									WJ Quant Concepts W Scores		
	Num Y5	Num Y6	Num Y8	Alg Y5	Alg Y6	Alg Y8	Geo Y5	Geo Y6	Geo Y8	WJQC Y5	WJQC Y6	WJQC Y8
TCAP Math Scale Score 2013-2014 (5th)	.63**	.69**	.69**	.62**	.66**	.69**	.45**	.56**	.56**	.57**	.60**	.64**
TCAP Math Scale Score 2014-2015 (6th)	.61**	.66**	.68**	.60**	.67**	.70**	.49**	.57**	.58**	.55**	.60**	.66**
TNReady Math Scale Score 2016-2017 (8th)	.60**	.65**	.69**	.60**	.63**	.70**	.50**	.58**	.60**	.51**	.56**	.66**

TNReady Levels and KeyMath Grade Levels

		KeyMath: Numeration Grade Equivalence Score			
Perf. Level	**N**	**Min**	**Max**	**Mean**	**SD**
Below	231	0.80	10.00	4.69	2.03
Approaching	125	2.50	10.00	6.98	2.16
On-Track	63	3.10	10.00	8.69	1.80
Mastered	5	10.00	10.00	10.00	0.00

		KeyMath: Algebra Grade Equivalence Score			
Perf. Level	**N**	**Min**	**Max**	**Mean**	**SD**
Below	231	0.40	10.00	4.90	2.14
Approaching	125	2.80	10.00	6.91	2.07
On-Track	63	4.20	10.00	9.42	1.26
Mastered	5	10.00	10.00	10.00	0.00


TNReady Math Performance Level 2016-2017
Below
Approaching
On-Track
Mastered
Frequency
0
20
40
60
.00
2.00
4.00
6.00
8.00
10.00
12.00
KeyMath Numeration Grade Equivalence Y8


TNReady Math Performance Level 2016-2017
Below
Approaching
On-Track
Mastered
Frequency
100
80
60
40
20
0
.00
2.00
4.00
6.00
8.00
10.00
12.00
KeyMath Algebra Grade Equivalence Y8

Summary

- Very low income sample, educated in MNPS middle schools, performing very poorly in math
  - In 5th grade the students were 1.8 grade levels behind in Algebra
  - They lost ground in middle school
  - By the end of 8th grade they were 2.6 grade levels behind in Algebra and their Woodcock Johnson scores were lower than the beginning of pre-k.
- Direct assessments are highly correlated across time with themselves
- Direct assessments are moderately correlated with TCAP and TNReady
- Concern is for the false negatives in TNReady.
  - All children who score as Mastery are scoring at 10th grade level in KeyMath
  - But many students who also score at 10th grade level are placed in much lower categories in TNReady
  - This is a consequential test – how do we make it more valid?