Illinois Accountability Technical Advisory Committee (TAC)

March 6, 2018

Academic Growth: Additional Analyses and Recommendations

Center for Assessment

Introduction

- At the December meeting the TAC discussed priorities and criteria to guide evaluation of growth approaches
- At the January webinar the TAC reviewed analyses to inform some of these criteria.
  - Analyses covered regression and value tables
  - Analyses focused on evaluation of growth outcomes on factors to include:
    - Prior year status
    - N-size
    - Key subgroups
- Today we are going to present the results of the same set of analyses for student growth percentiles
- We will also follow-up on one of the TAC's recommendations to evaluate the 'sensitivity' of the value table model (i.e. how would a differently specified model perform?)

Growth Model Priorities (from December 2017 Meeting)

- The state should value approaches that:
  - are relatively straightforward to understand and implement
  - teachers perceive as something they can directly influence
  - minimize school level instability due to n-size
  - minimize correlations with prior year status
  - demonstrate availability of the full distribution of growth outcomes to schools of various demographic compositions (e.g., poverty, SWD, and ELL)
  - are sensitive to changes in student achievement, particularly for students at the low end of the test-score distribution
  - minimize ceiling and floor effects
  - are reliable (i.e., provide for stable results across years in cases where the underlying performance of a school is not changing)
  - minimize punitive aspects
  - detect (not mask) important school level effects
  - are robust to changes in state assessment and differences in test characteristics

It is important to note that the goal of accountability systems is to induce desired change which can promote lack of stability from year to year for low performing schools.

Student Growth Percentiles

Review of SGP

- Student Growth Percentiles (SGP) is a regression based measure of growth that works by conditioning current achievement on prior achievement and describing performance relative to other students with identical prior achievement histories.
- This provides a familiar basis to interpret performance – the percentile - which indicates the probability of that outcome given the student's starting point.
- This can be used to gauge whether or not the student's growth was atypically high or low

Betebenner, D. W. (2009). Norm and criterion-referenced student growth. Educational Measurement: Issues and Practice, 28(4):42–51.

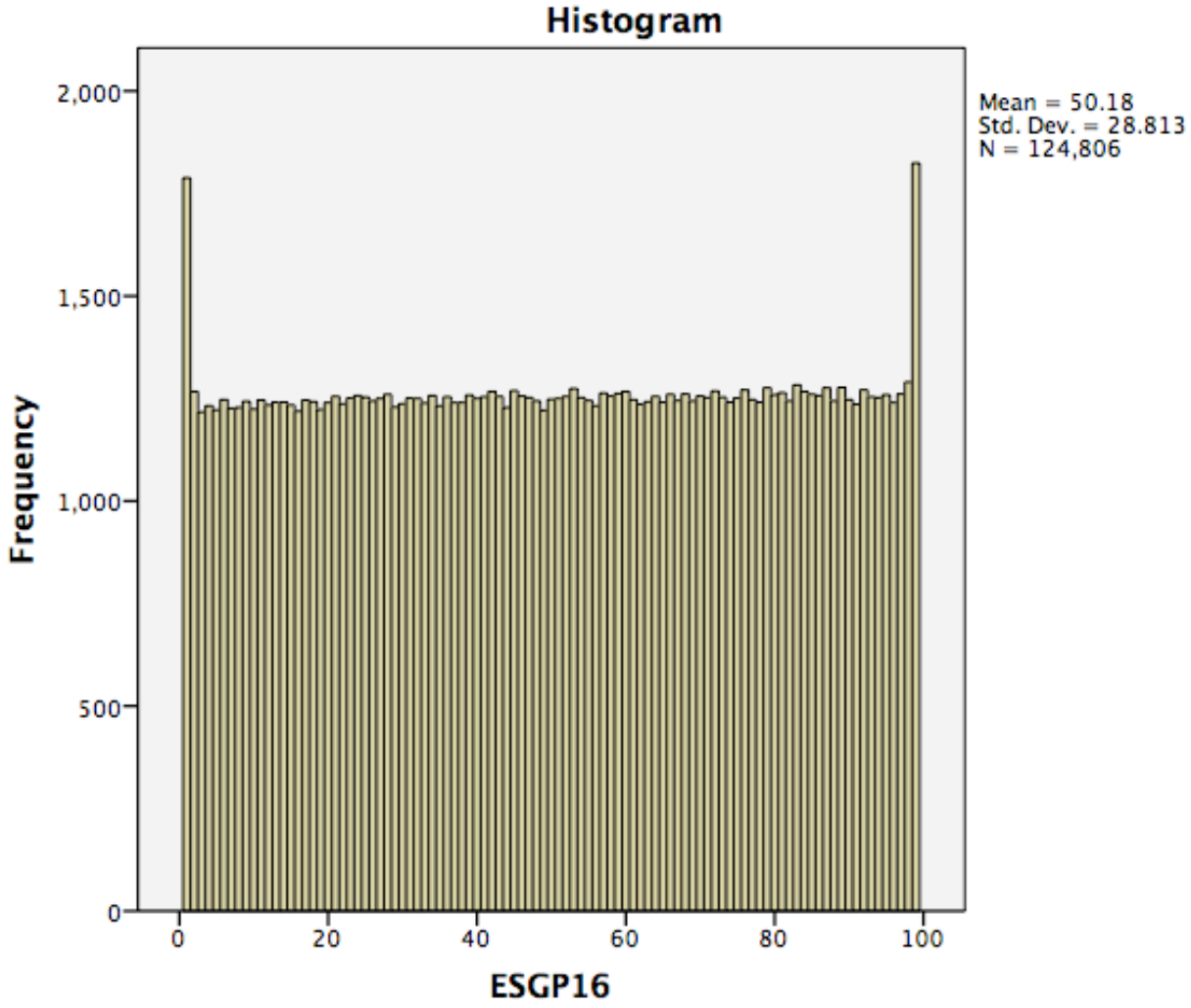
Overview

- Data file included:
  - Grade 3, 2015 – ELA and Math
  - Grade 4, 2016 – ELA and Math
  - Grade 5, 2017 – ELA and Math
- Valid cases:
  - Valid PARCC score in both years
  - Full academic year in year 2 (outcome year)
  - School analyses include schools with 20 or more cases

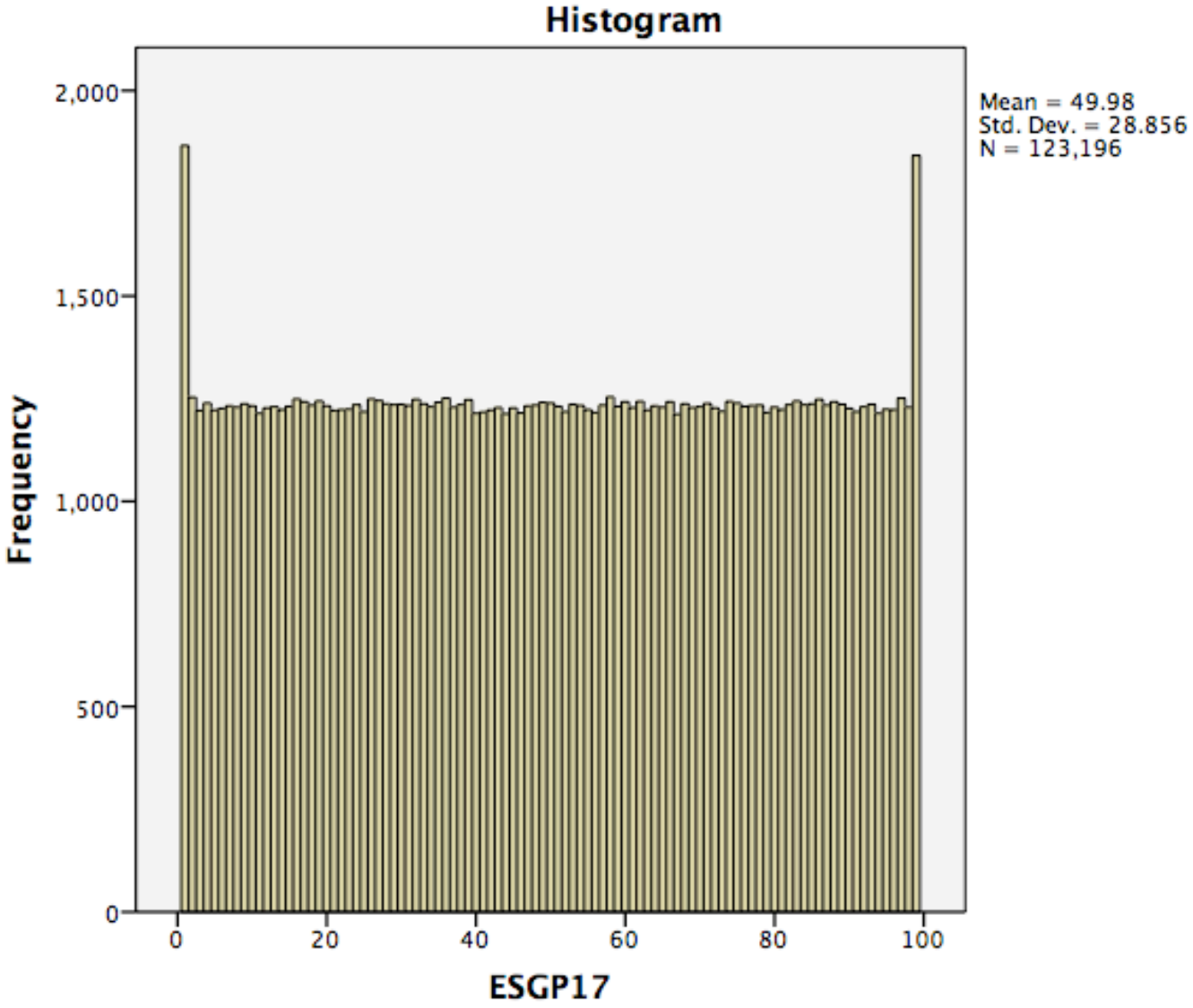
SGP – Student Level Descriptives

	N	Minimum	Maximum	Mean	Std. Deviation
Grade 4 ELA 2016	124806	1	99	50.18	28.8
Grade 5 ELA 2017	123196	1	99	49.98	28.9
Grade 4 Math 2016	124807	1	99	50.2	28.8
Grade 5 Math 2017	122931	1	99	50.1	28.8

Grade 4 ELA 2016

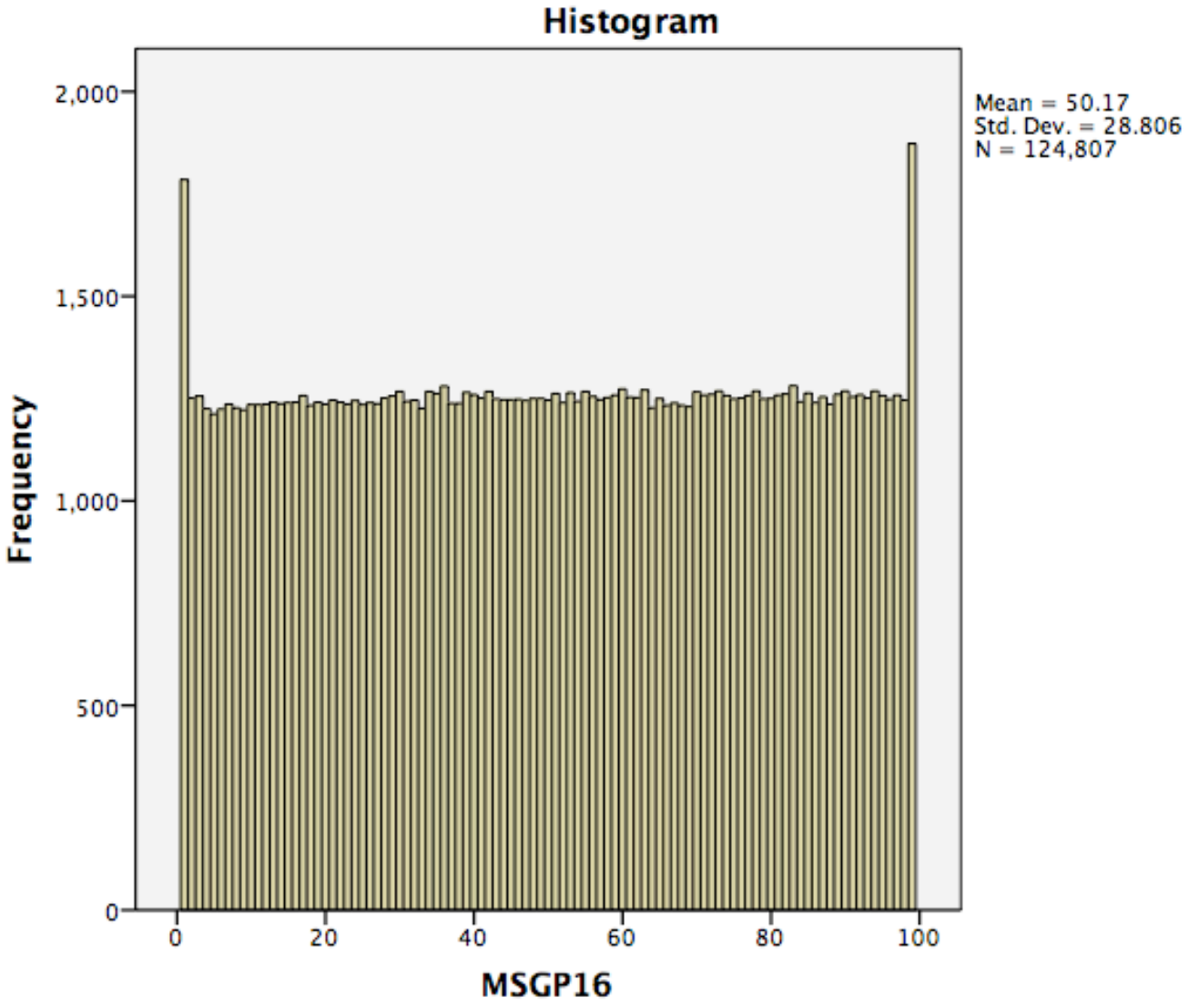


Grade 5 ELA 2017

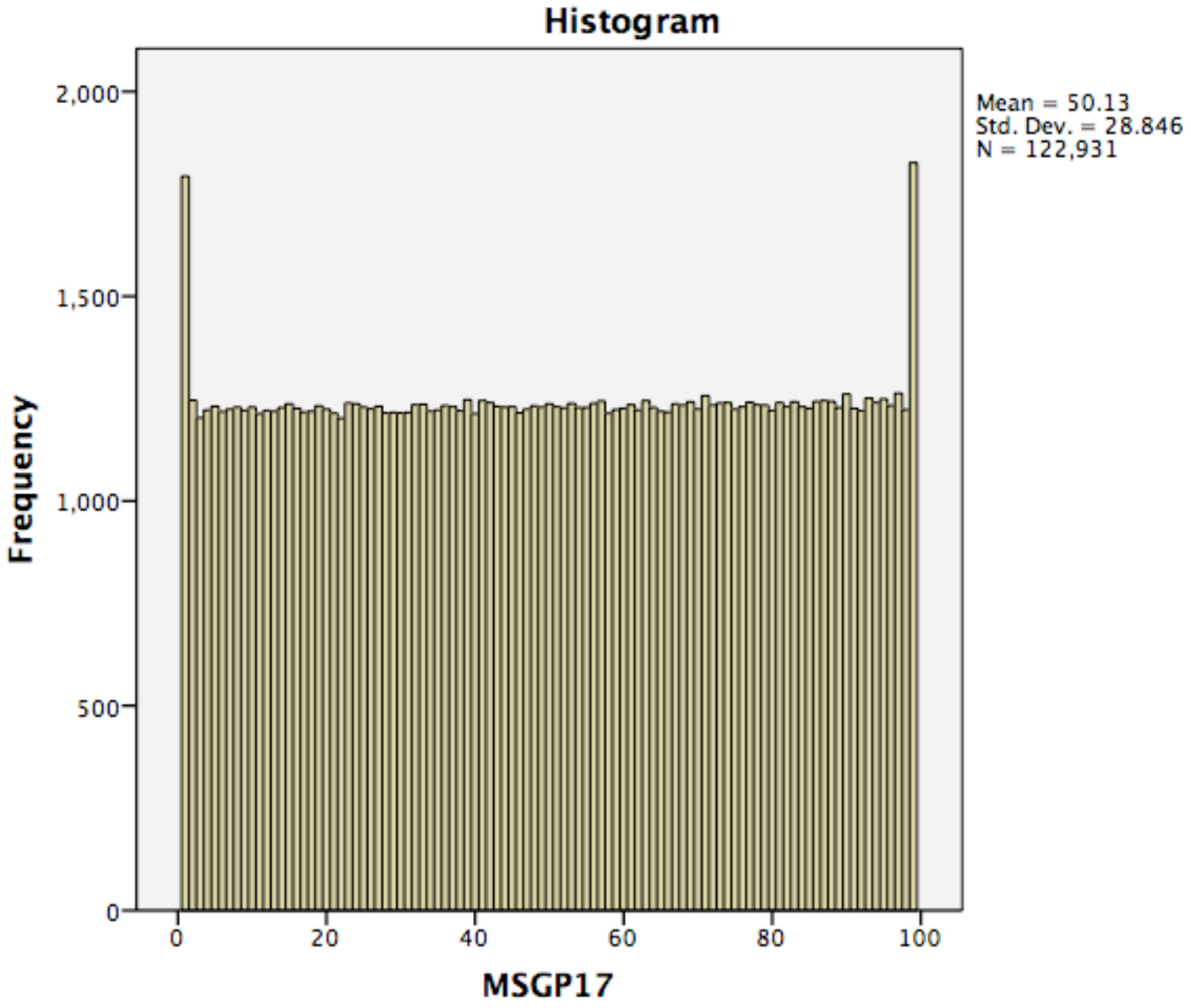


Cent Assessment

Grade 4 Math 2016

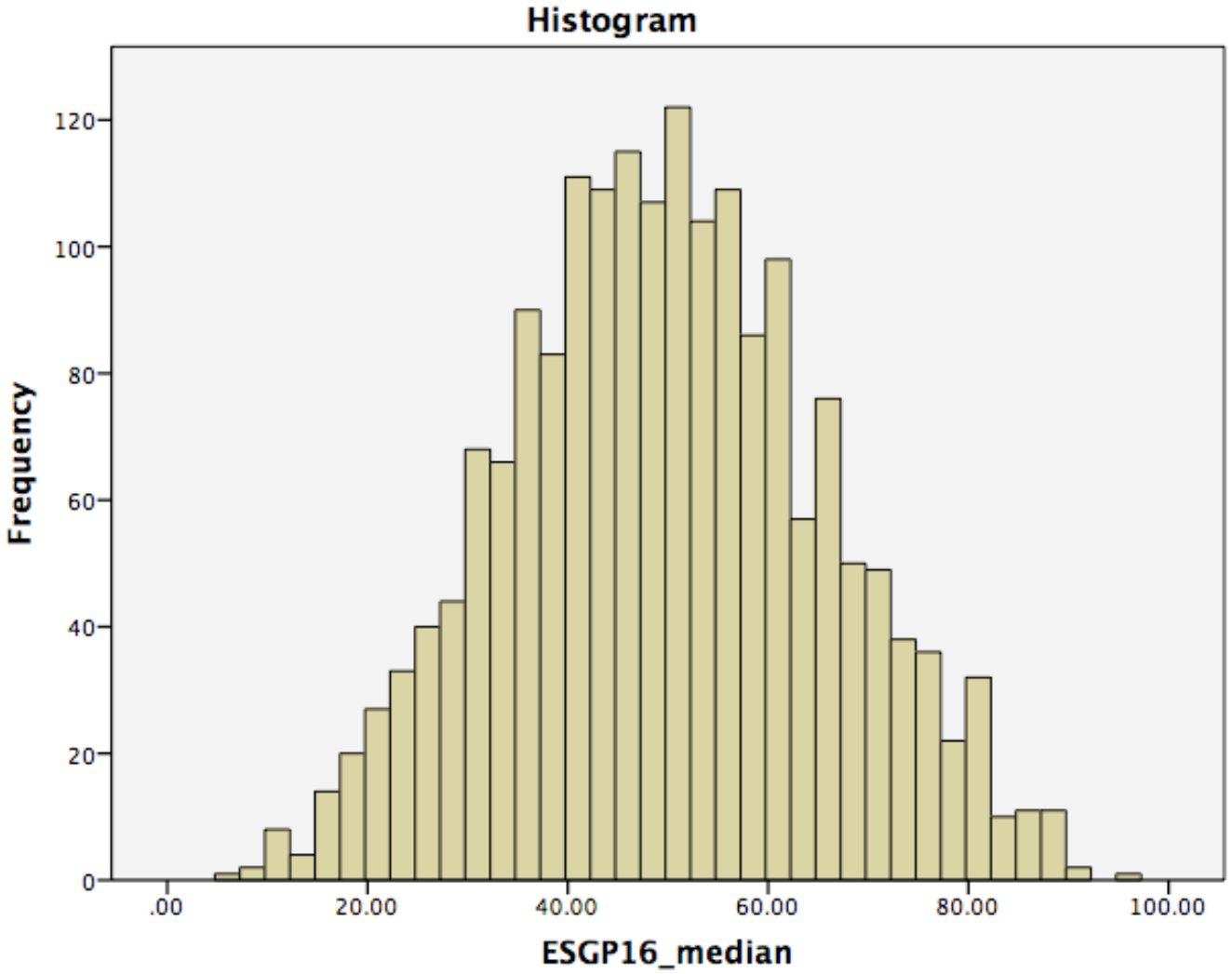


Grade 5 Math 2017



School Level Results
Grade 4 ELA 2016

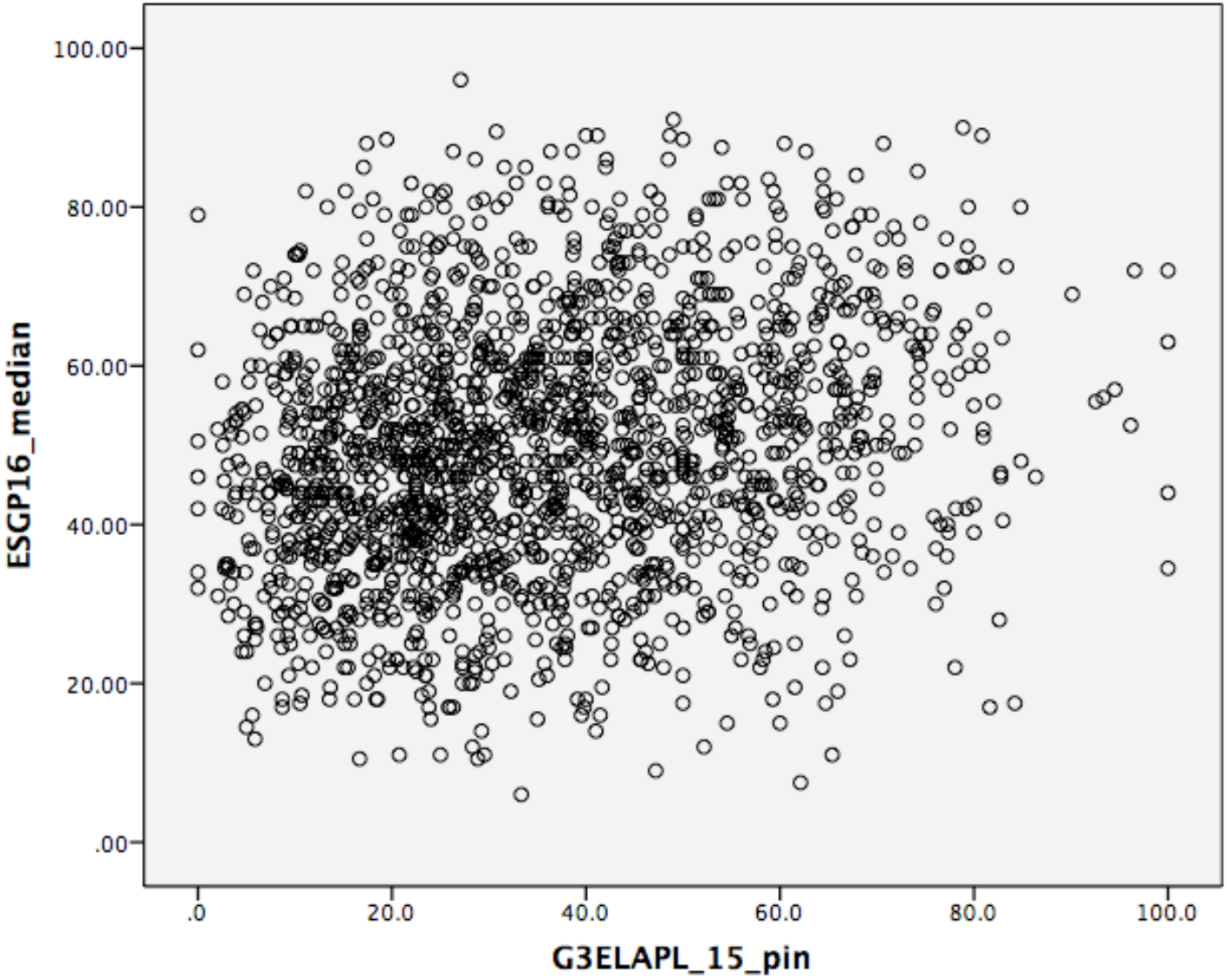
School Level Scores – Grade 4 ELA



Number of Schools: 1855

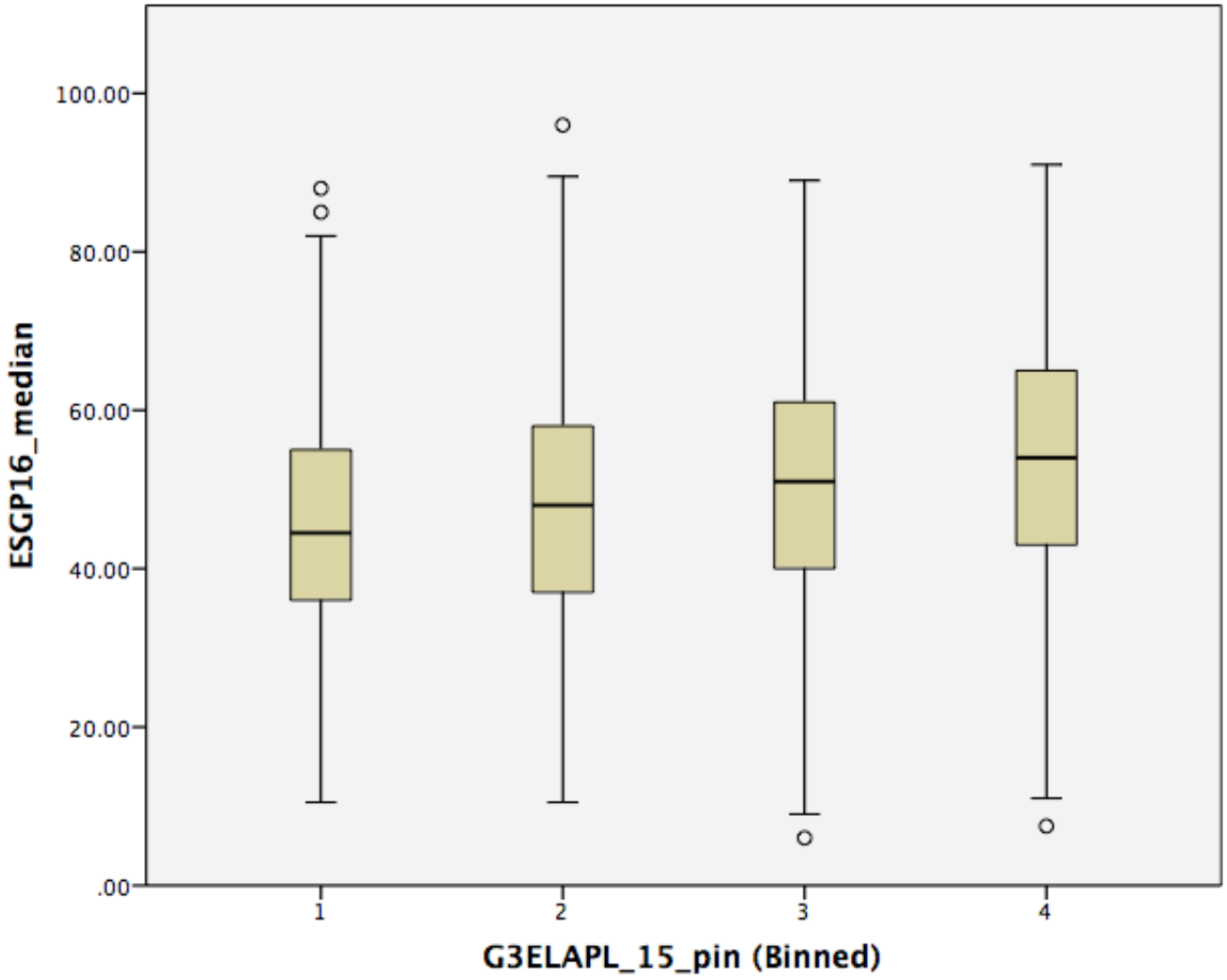
Min: 6
Max: 96
Median: 49
Mean: 49.7
SD: 15.87

Correlation with prior-year percent proficient

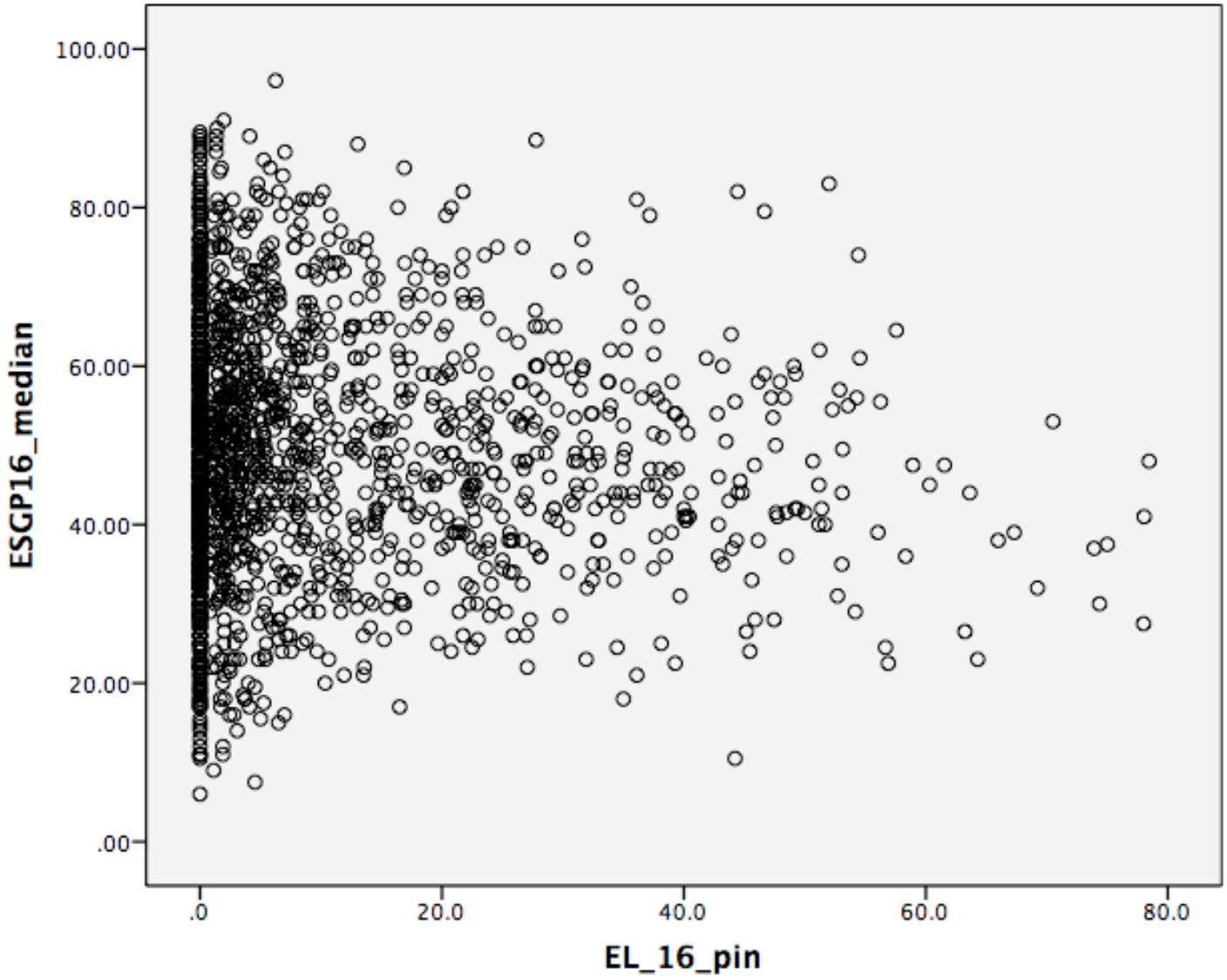


r= .206

Distribution by Prior Proficient Quartile

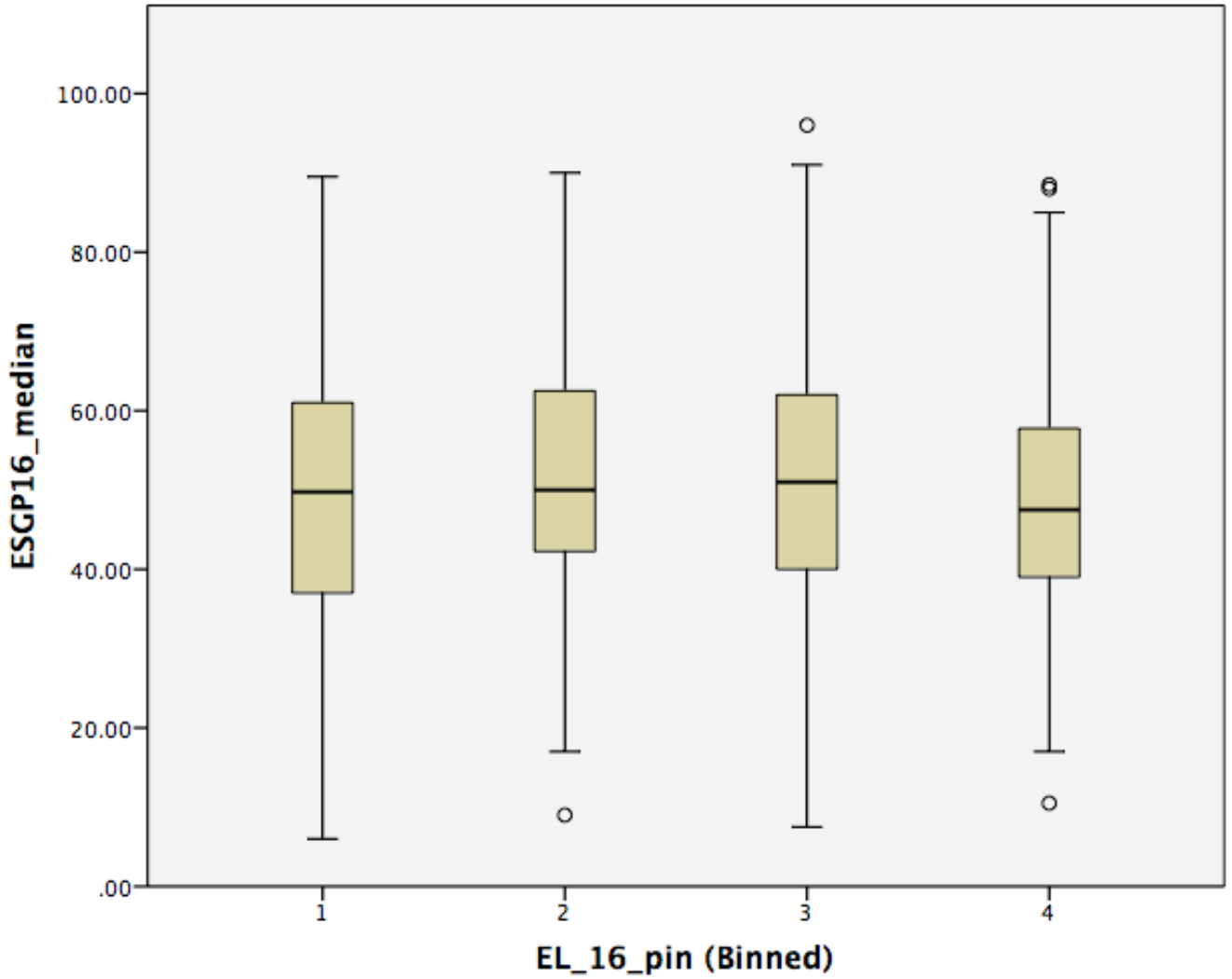


Relationship with percent EL

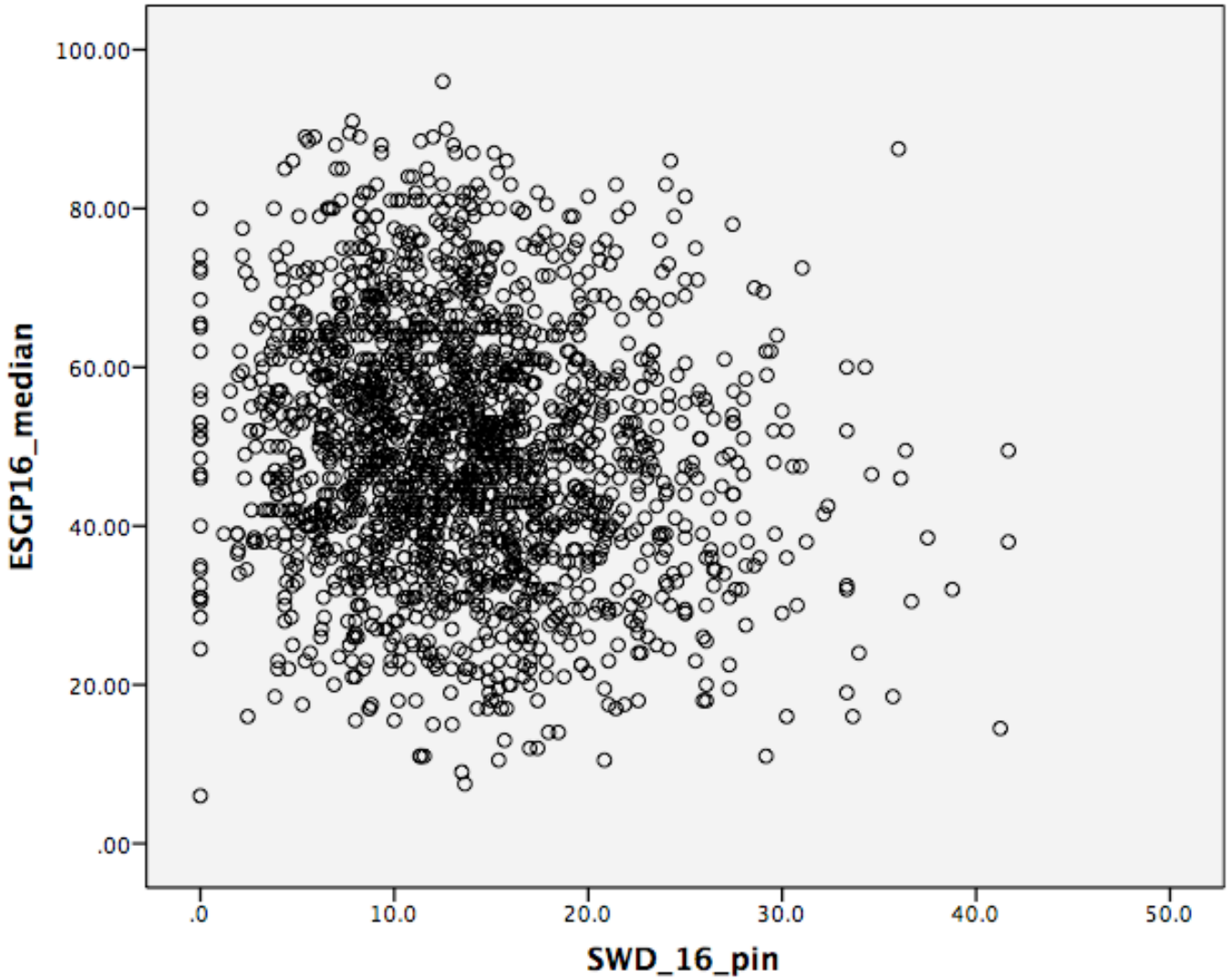


r= .-.06

Distribution by EL Quartile

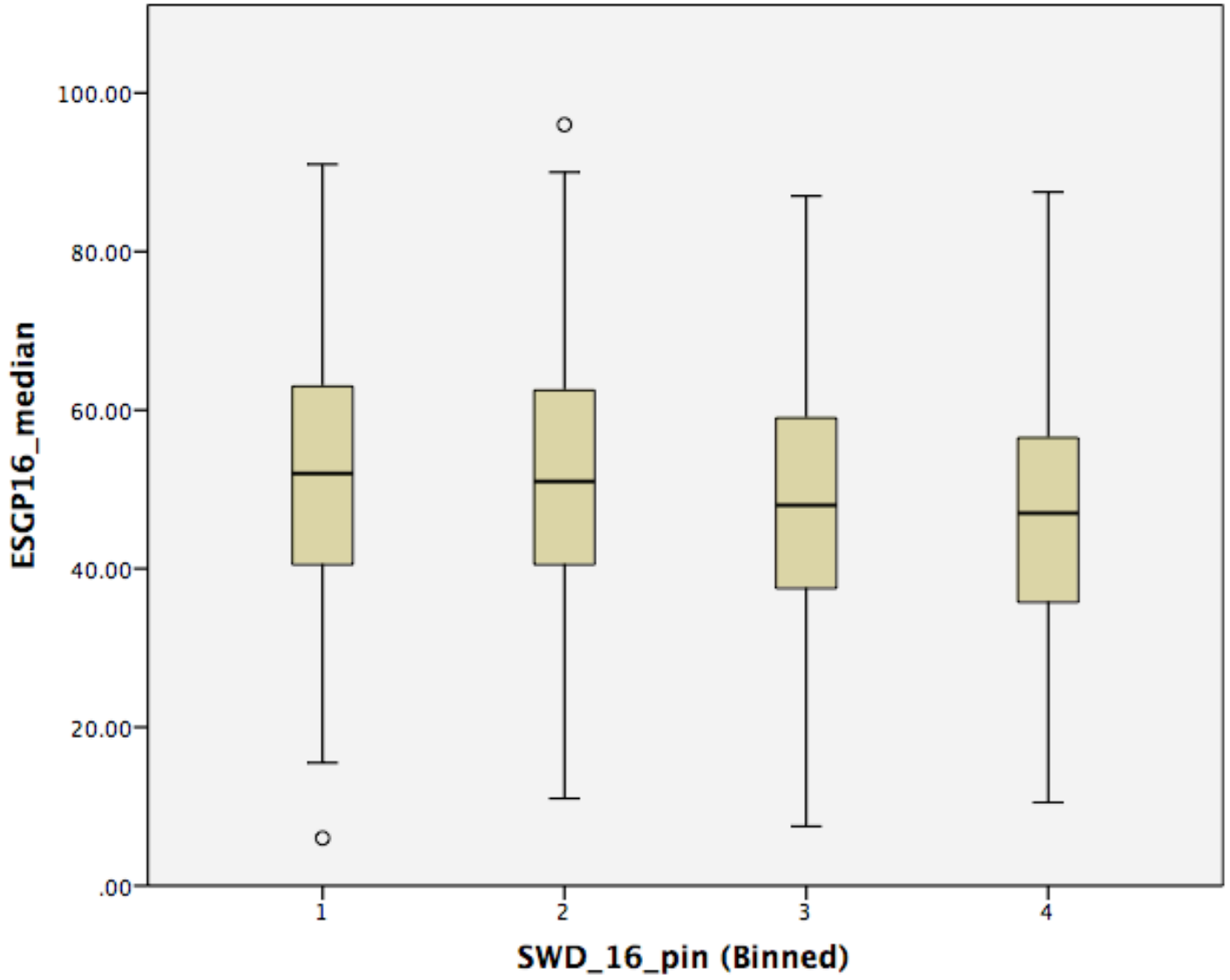


Relationship with Percent SWD

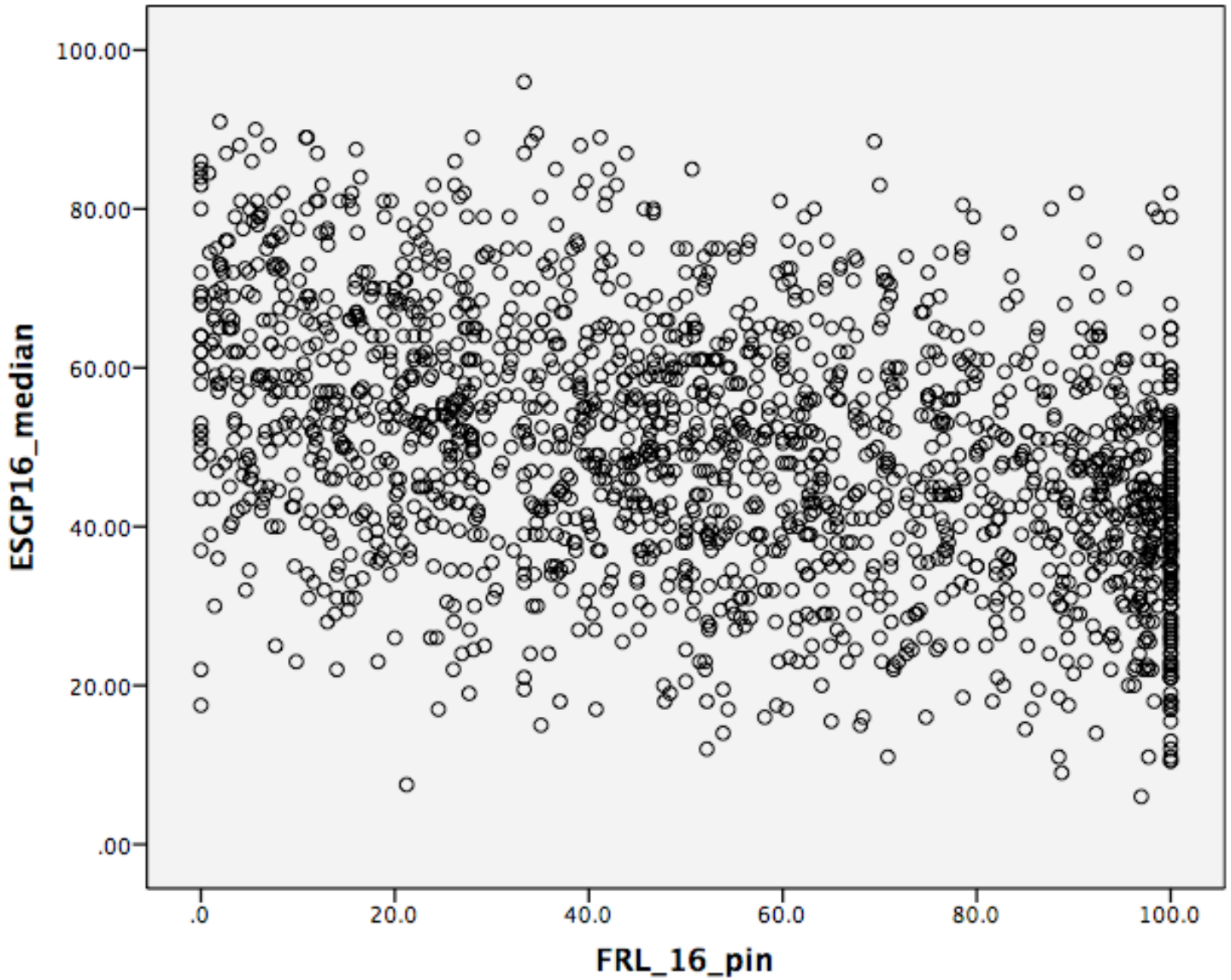


r= -.133

Distribution by SWD Quartile

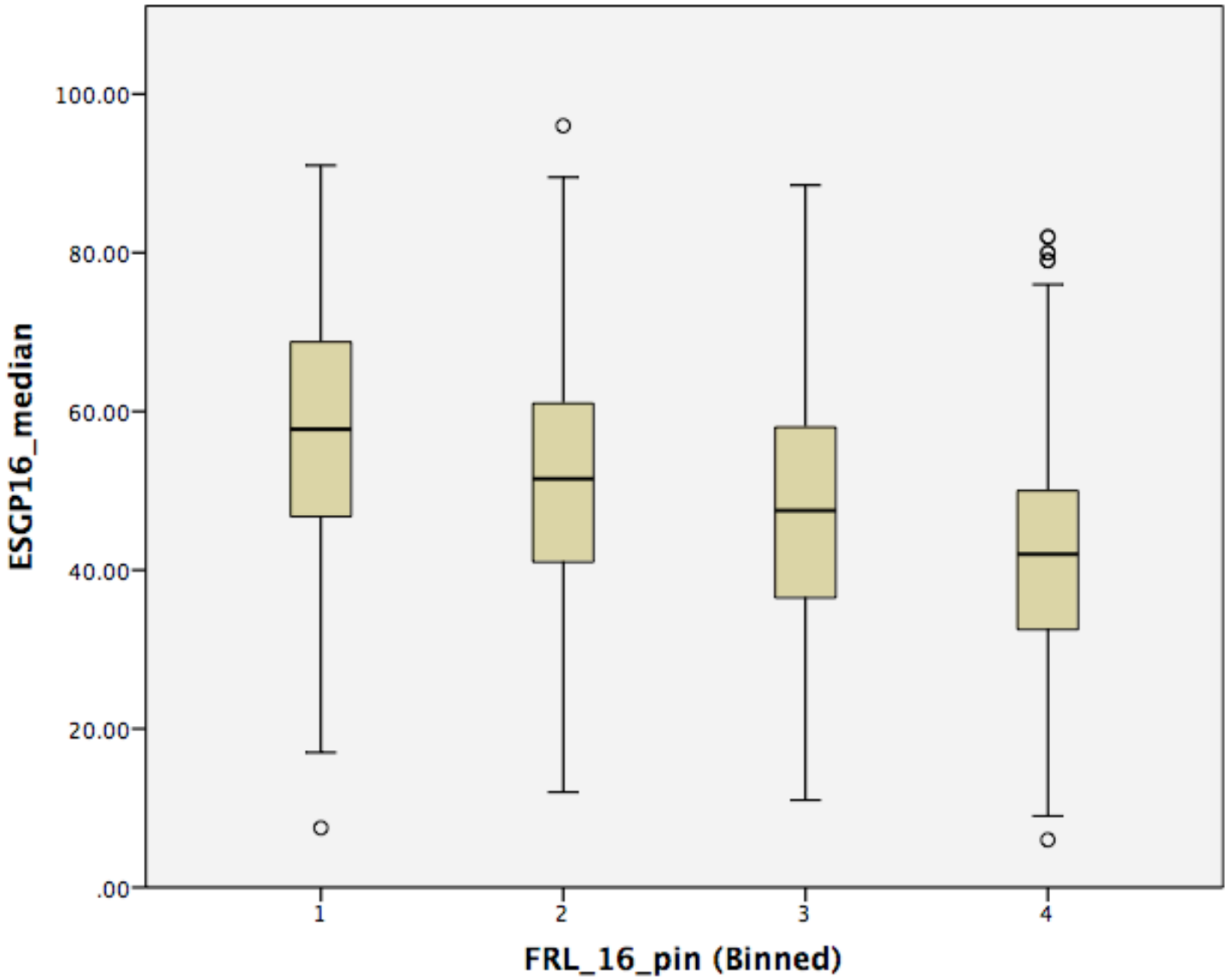


Relationship with percent FRL eligible

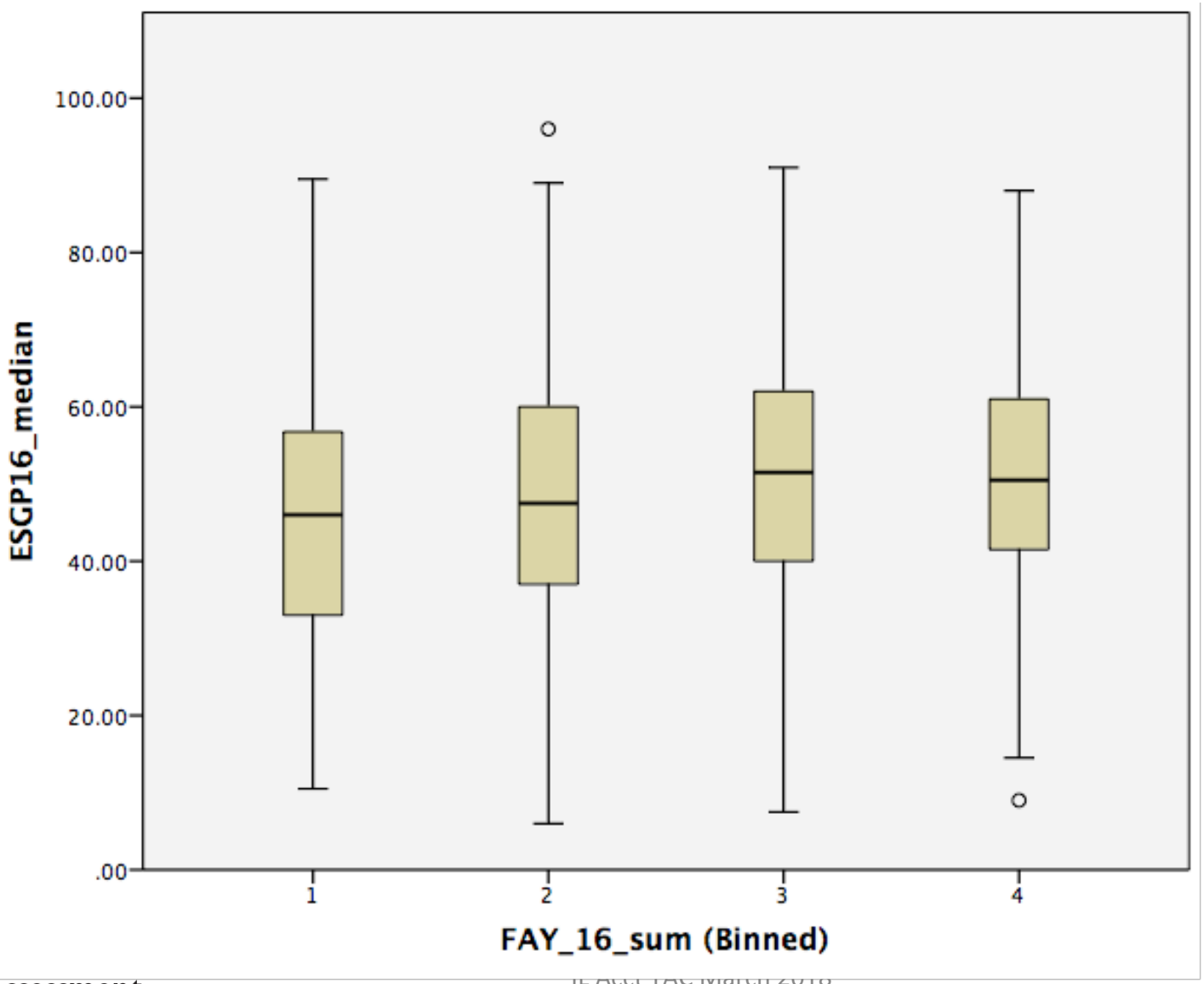


r= -.386

Distribution by FRL Quartile

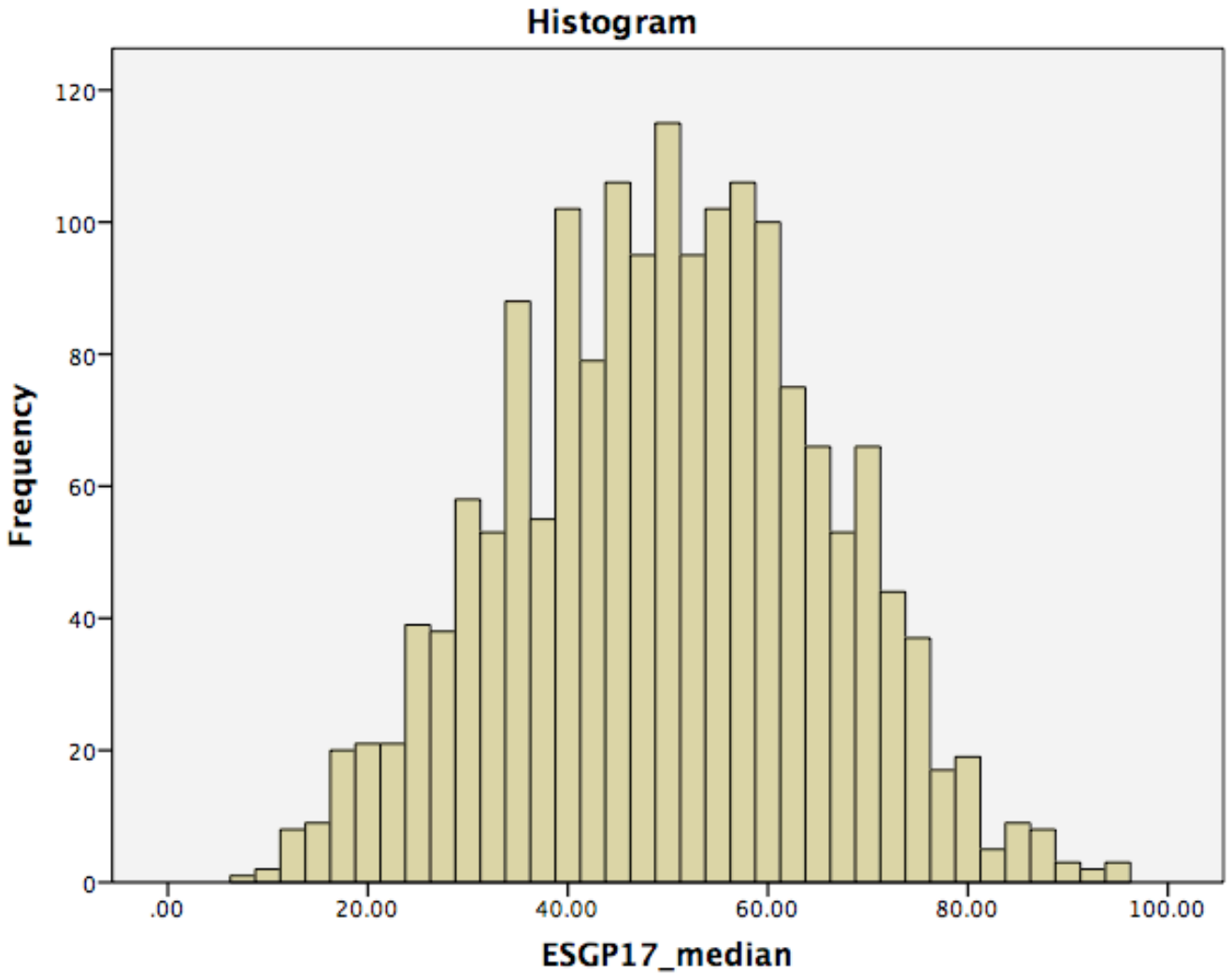


Distribution by N-size quartiles



School Level Results
Grade 5 ELA 2017

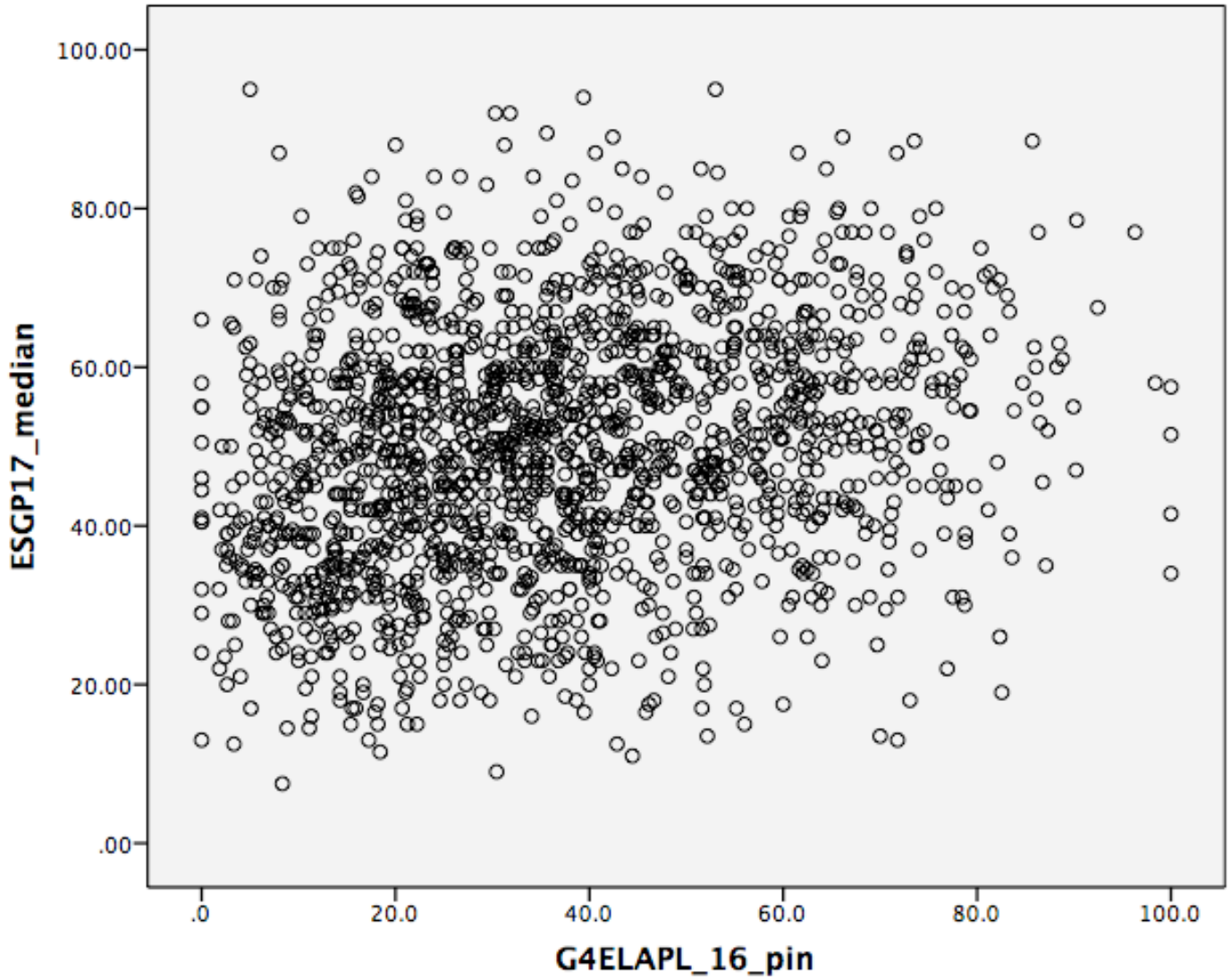
School Level Scores – Grade 5 ELA



Number of Schools: 1720

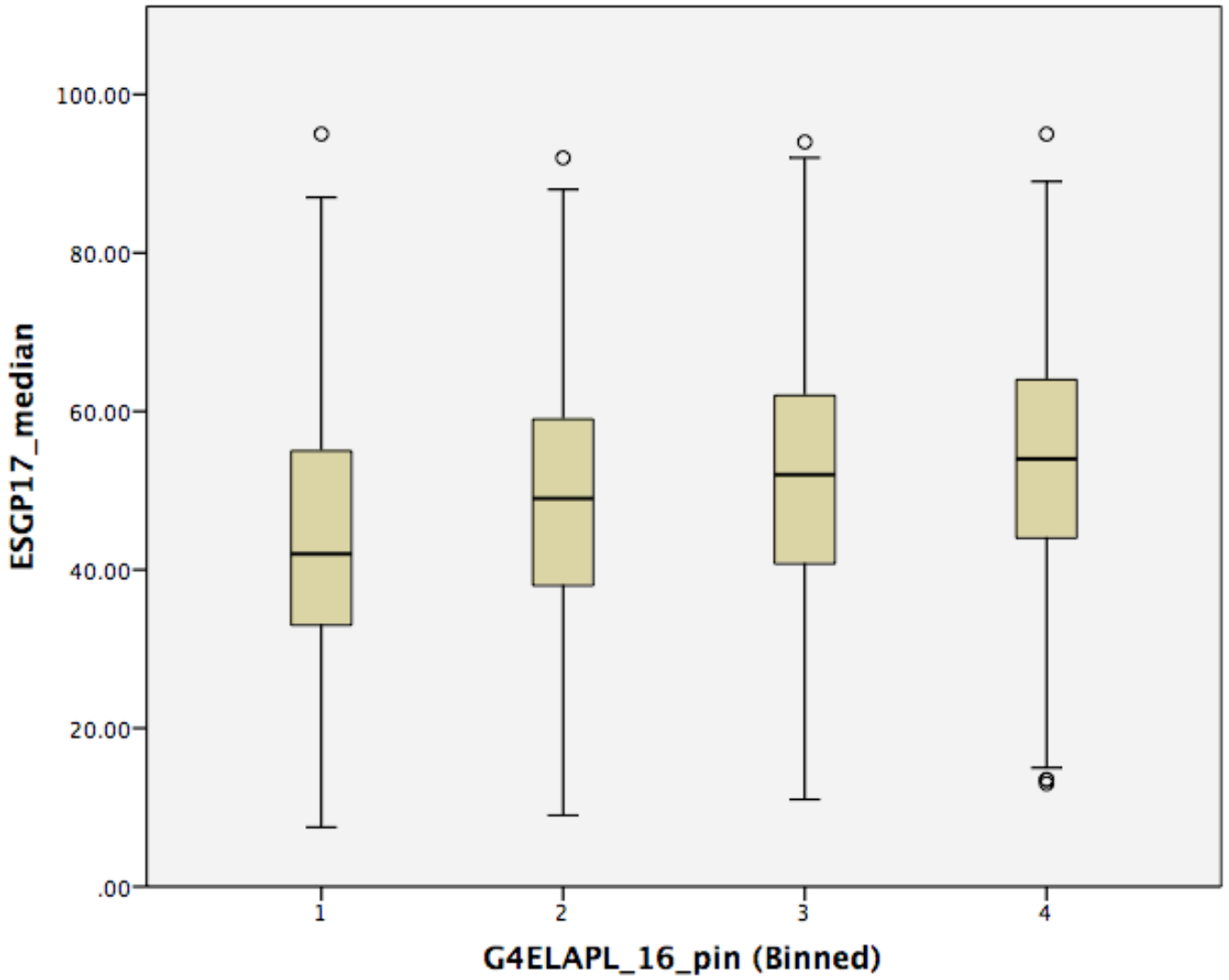
Min: 7.5
Max: 95
Mean: 49.87
Median: 50
SD: 15.56

Correlation with prior-year percent proficient

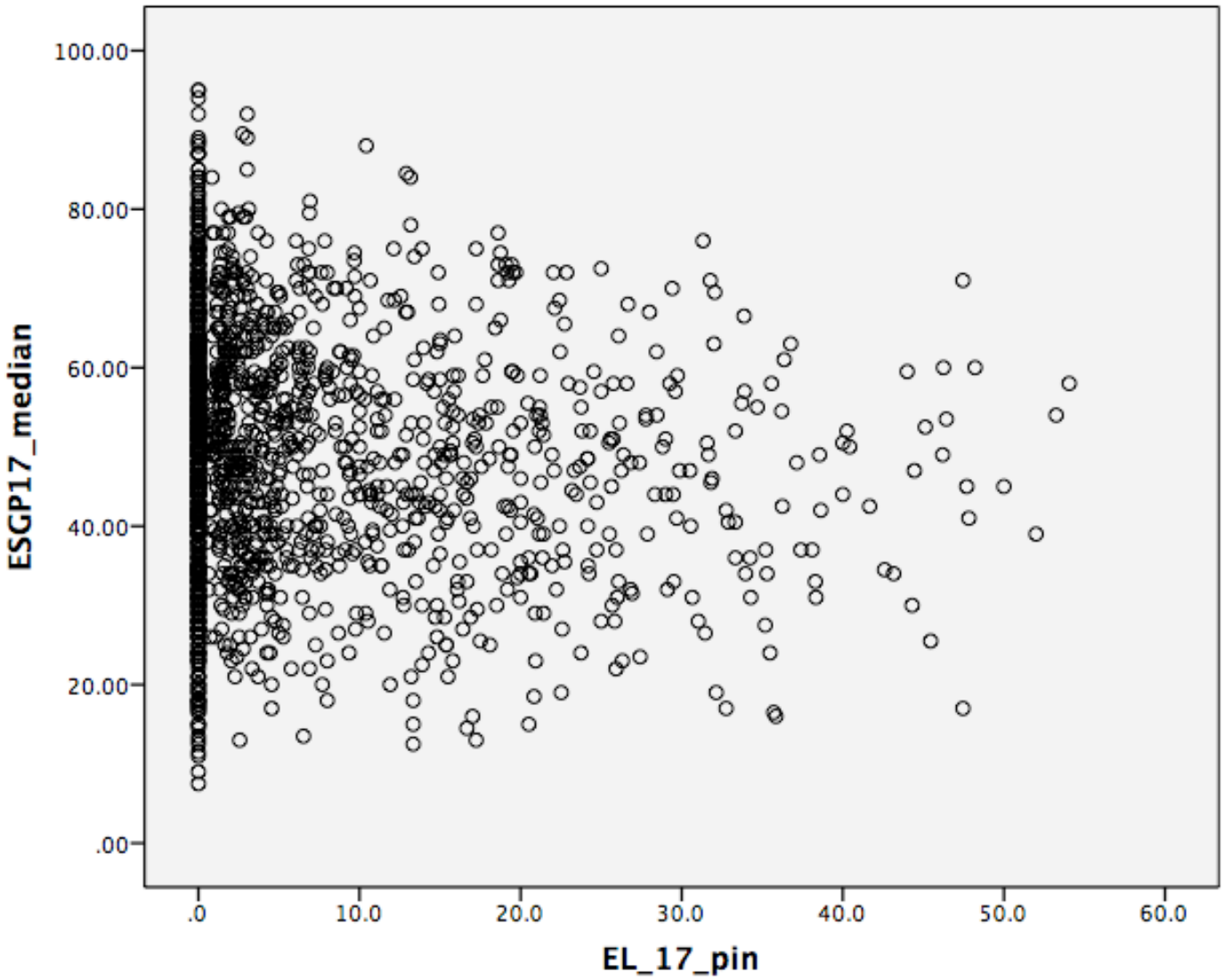


r= .226

Distribution by Prior Proficient Quartile

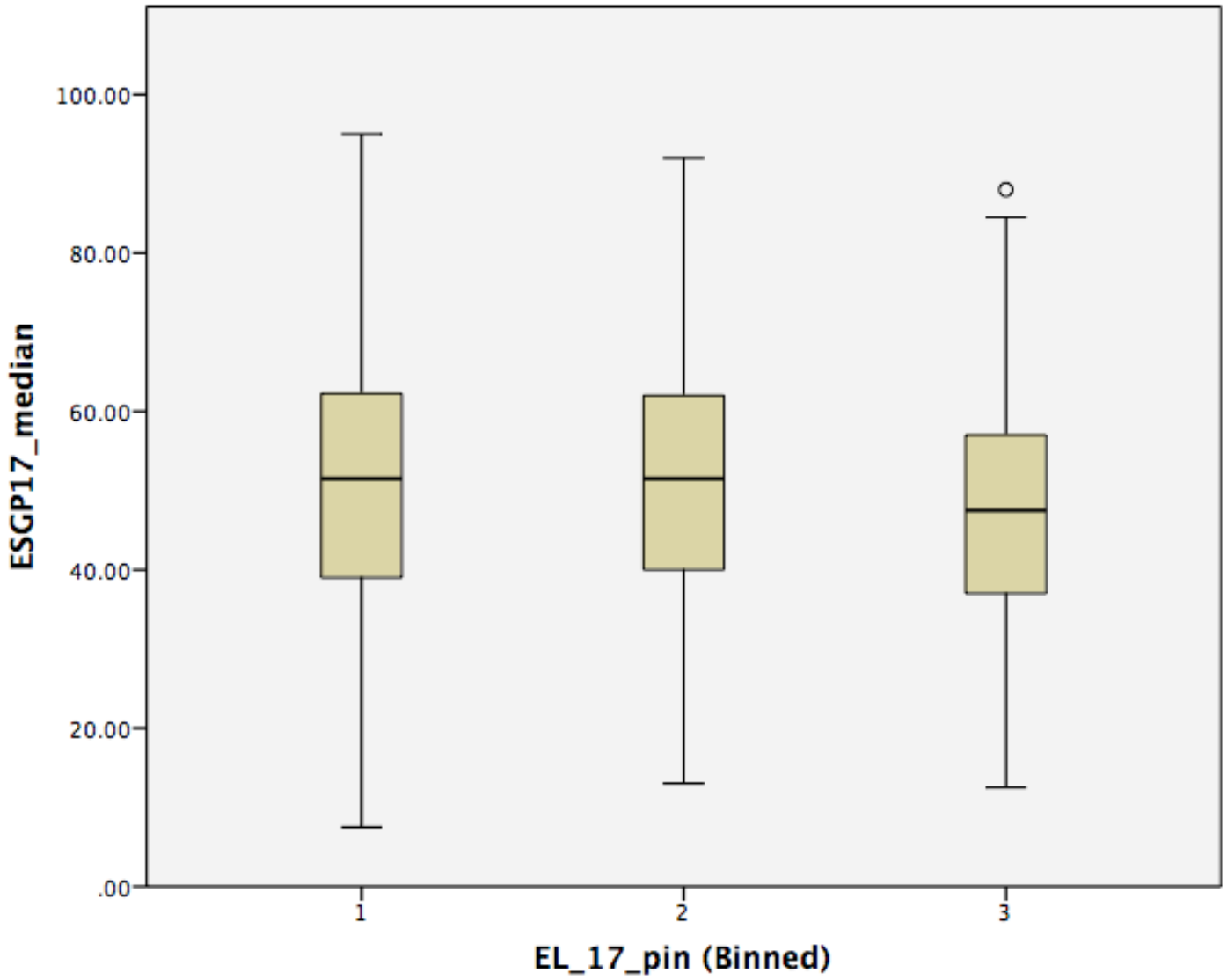


Relationship with percent EL



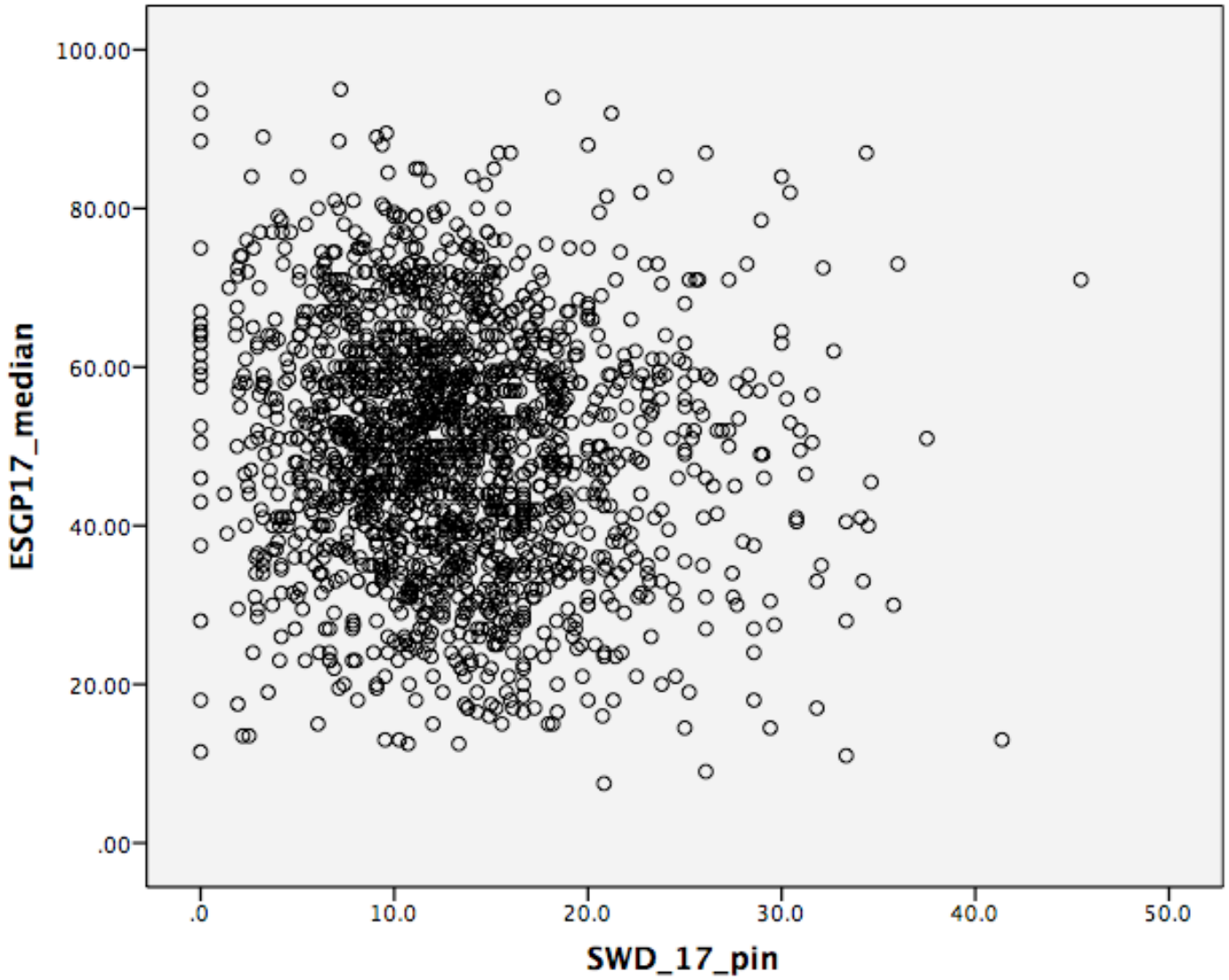
r= -.116

Distribution by EL Groups



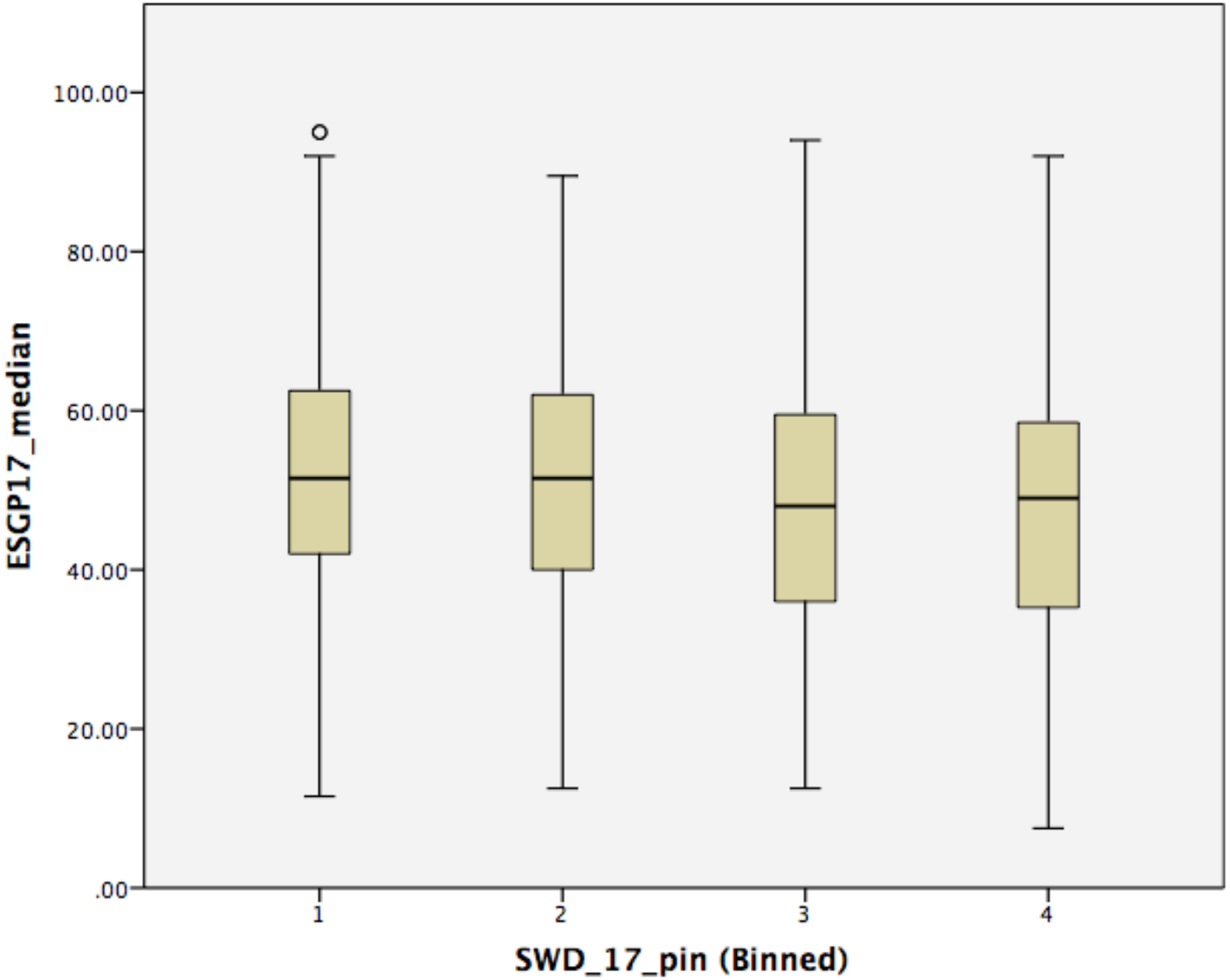
Distribution of percent EL was not sufficiently granular to support 4 groups

Relationship with Percent SWD

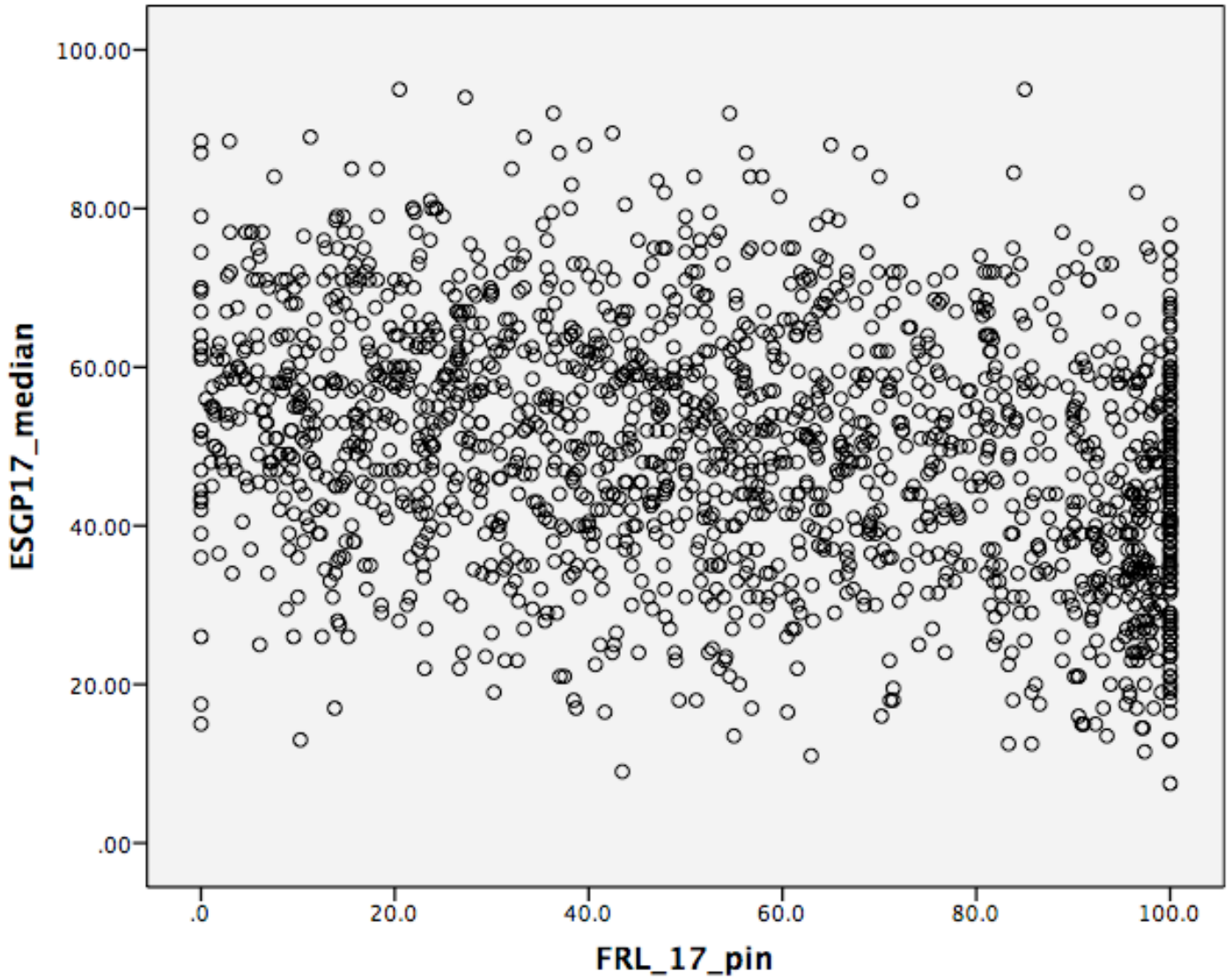


r= -.104

Distribution by SWD Quartile

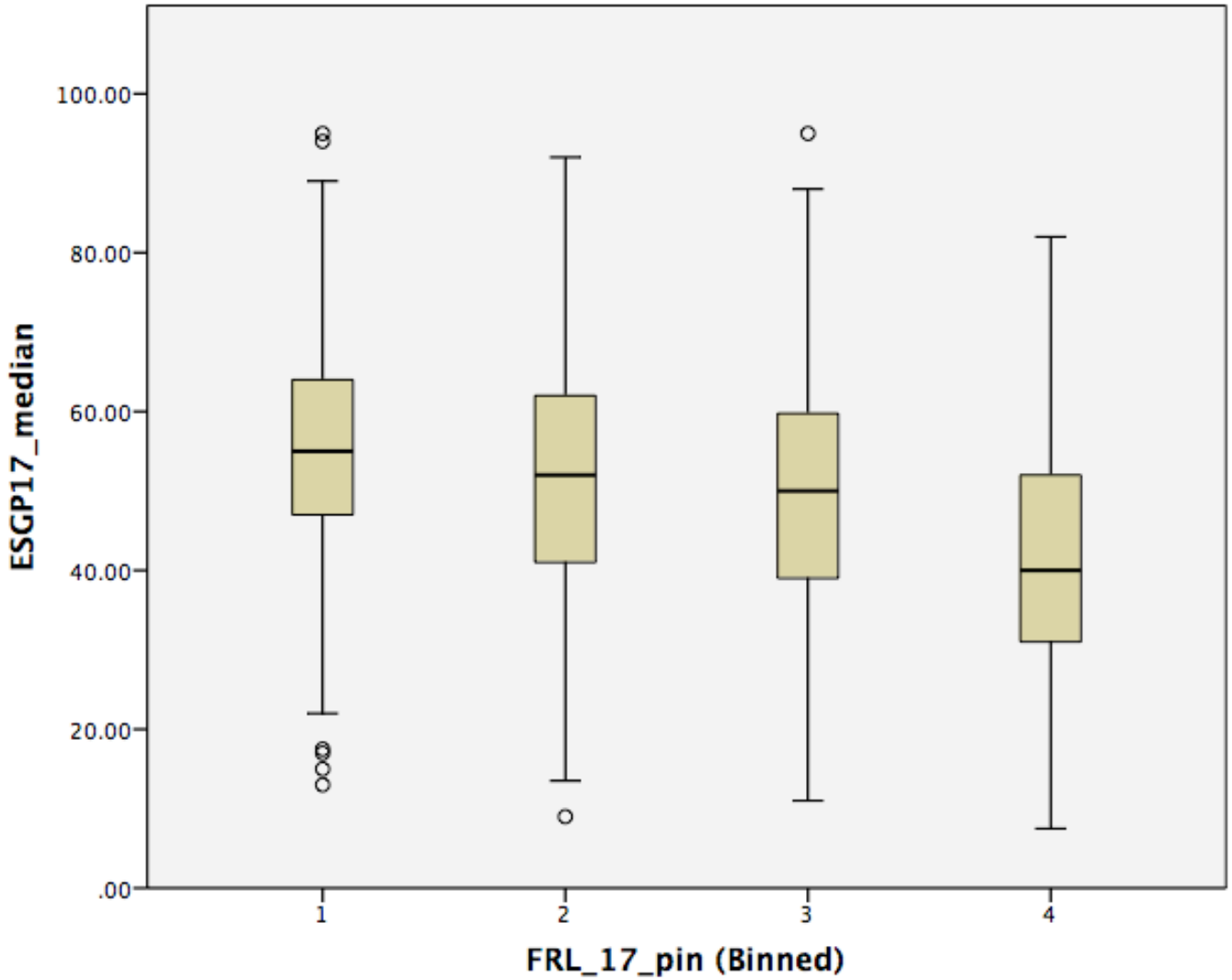


Relationship with percent FRL eligible

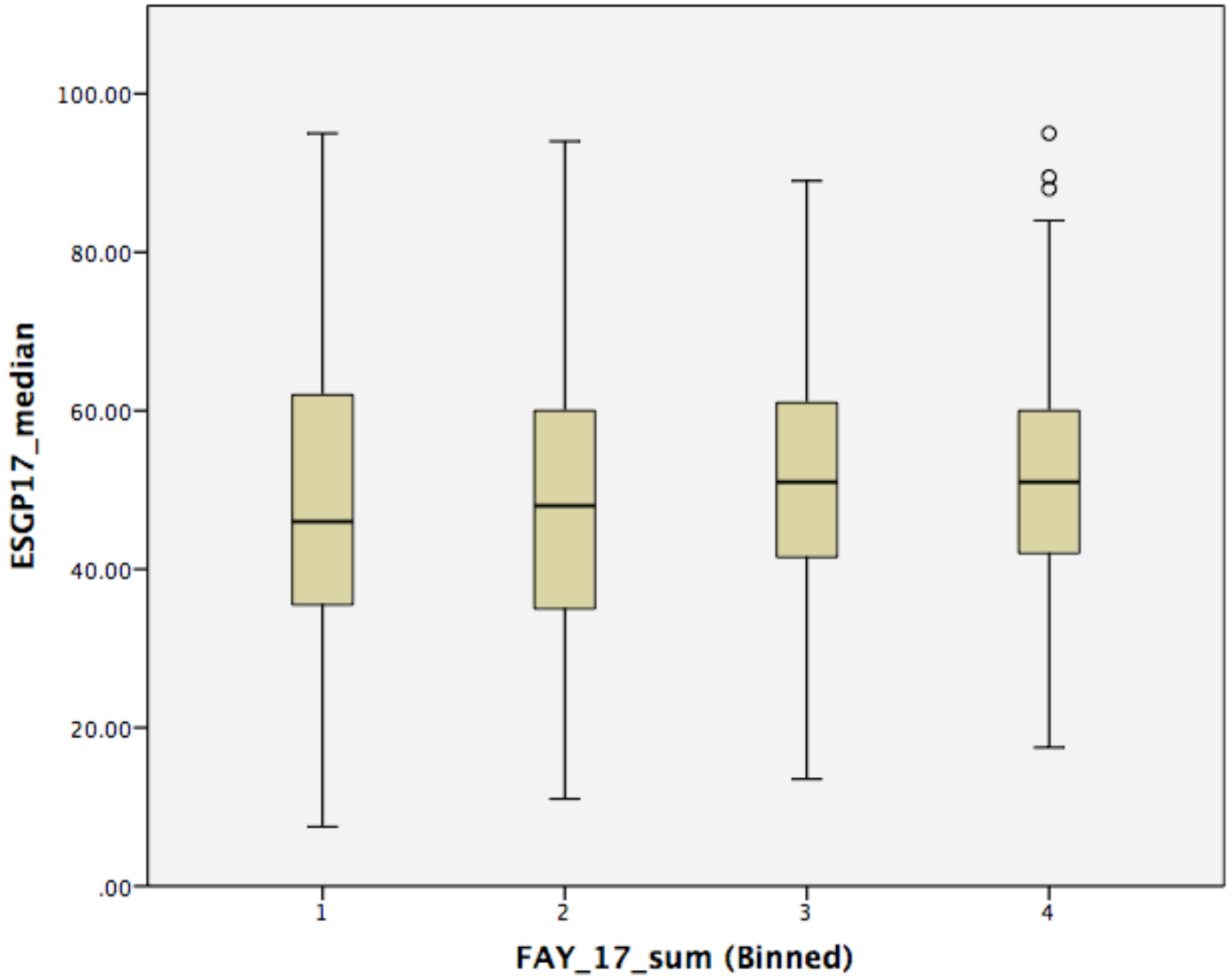


r= -.298

Distribution by FRL Quartile

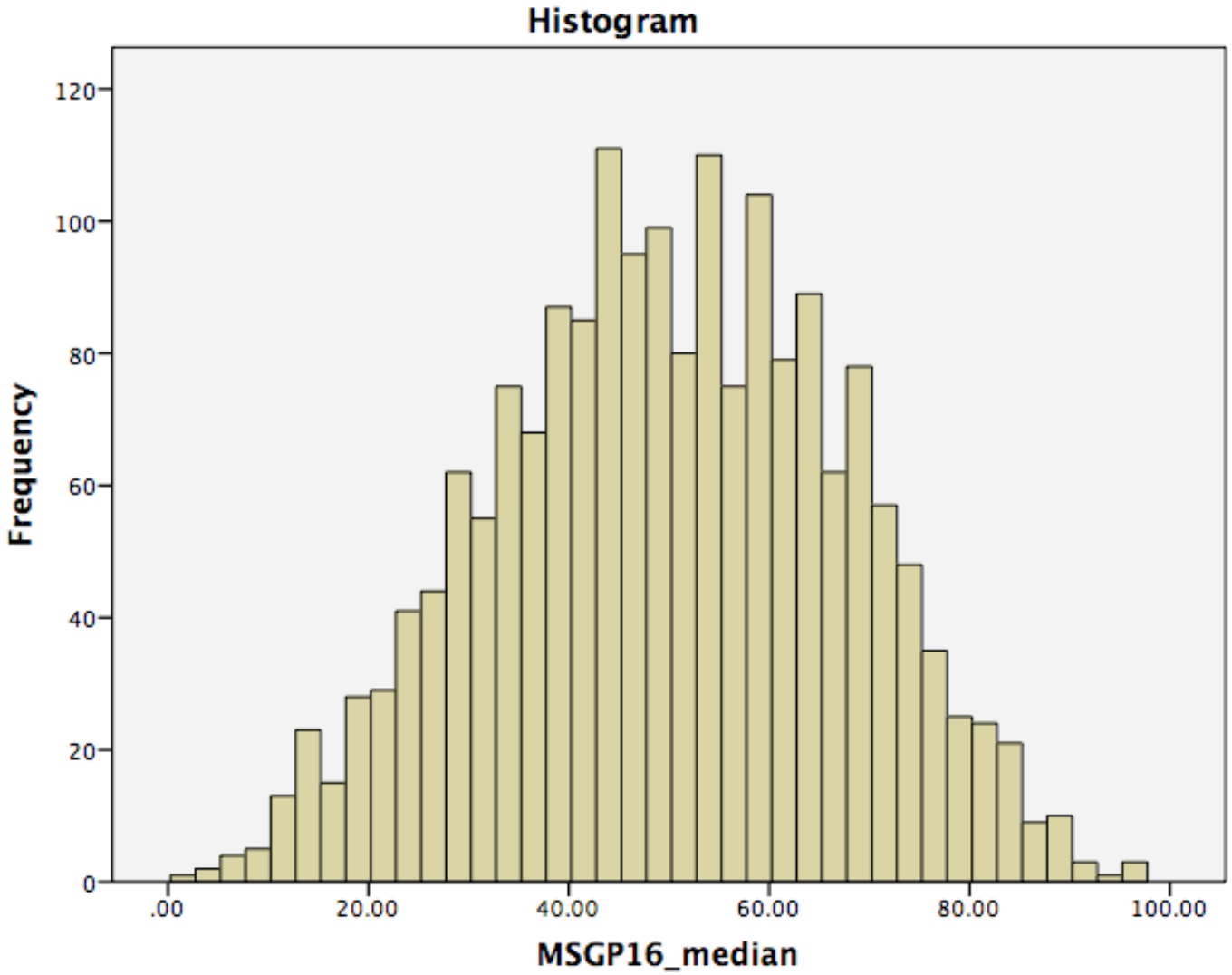


Distribution by N-size quartiles



School Level Results
Grade 4 Math 2016

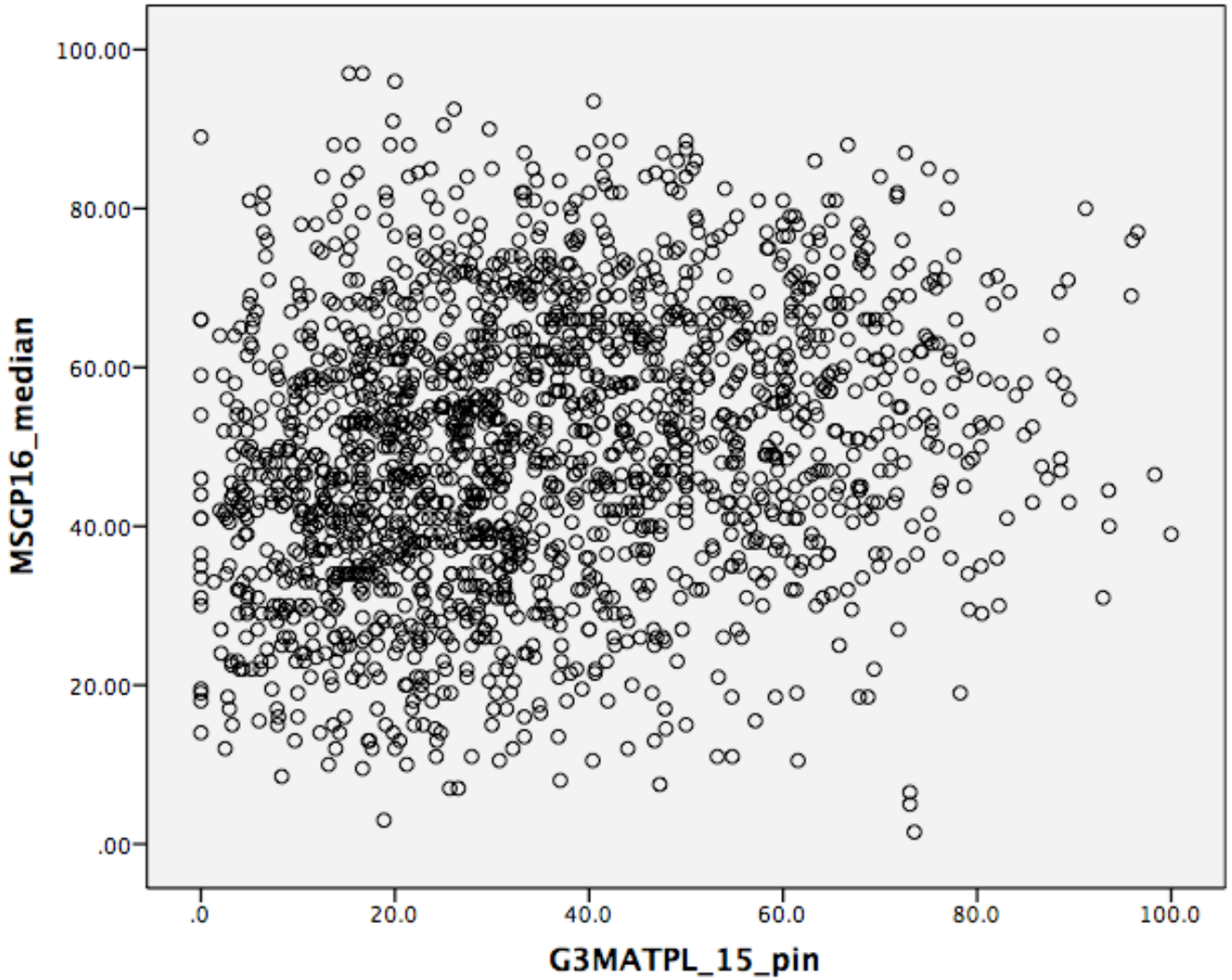
School Level Scores – Grade 4 Math



Number of Schools: 1855

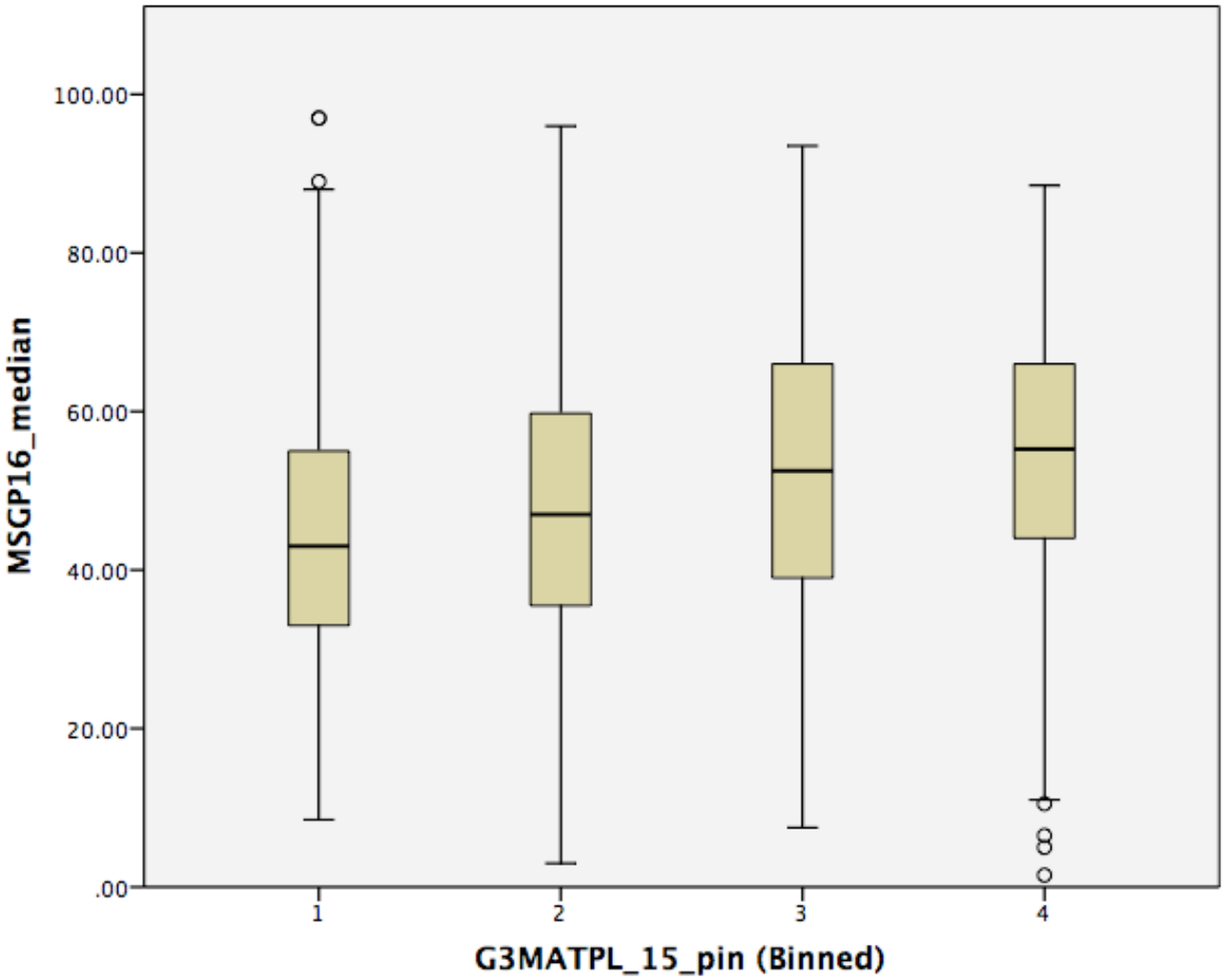
Min: 1.5
Max: 97
Mean: 48.88
Median: 50
SD: 17.44

Correlation with prior-year percent proficient

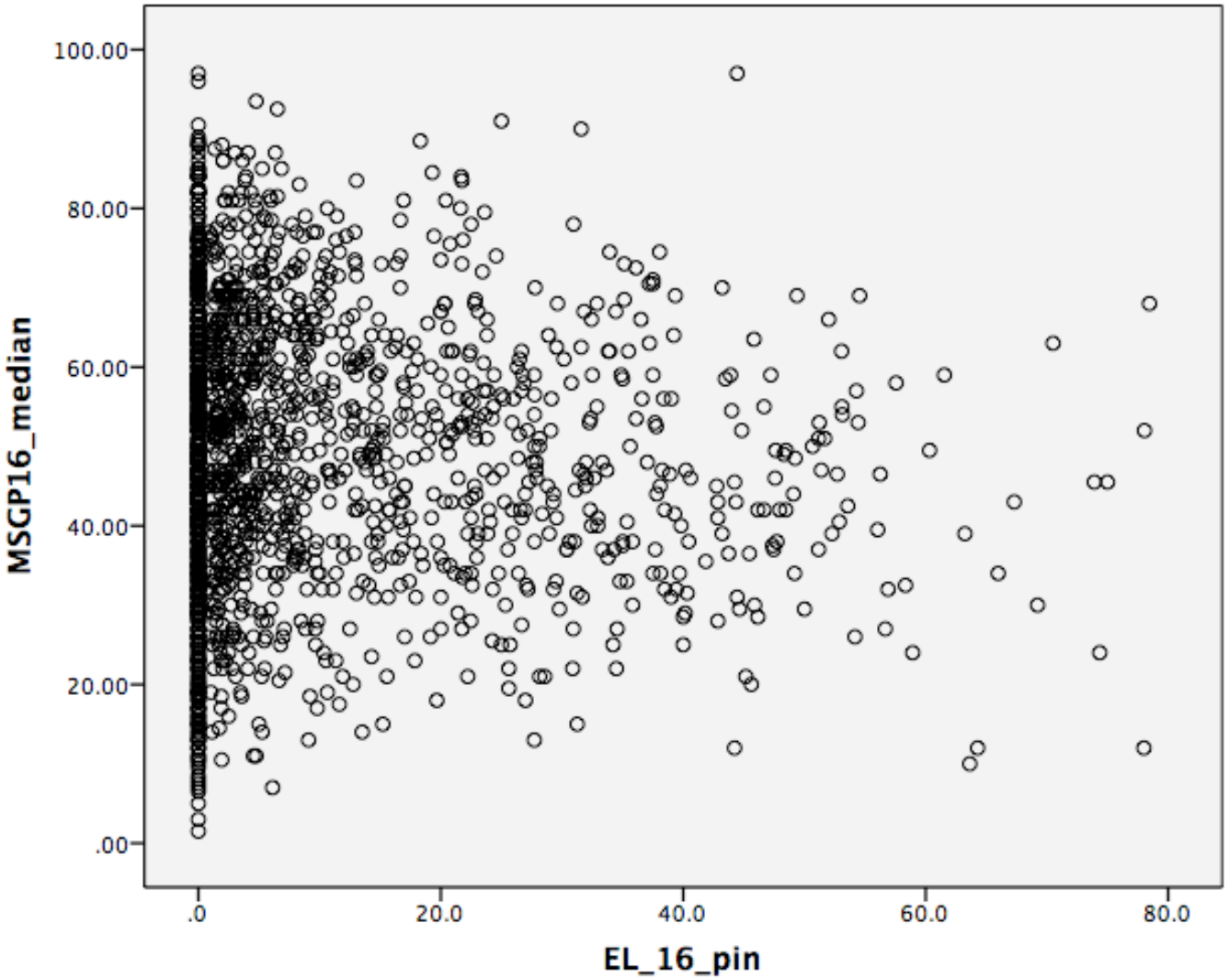


r= .215

Distribution by Percent Proficient Quartile

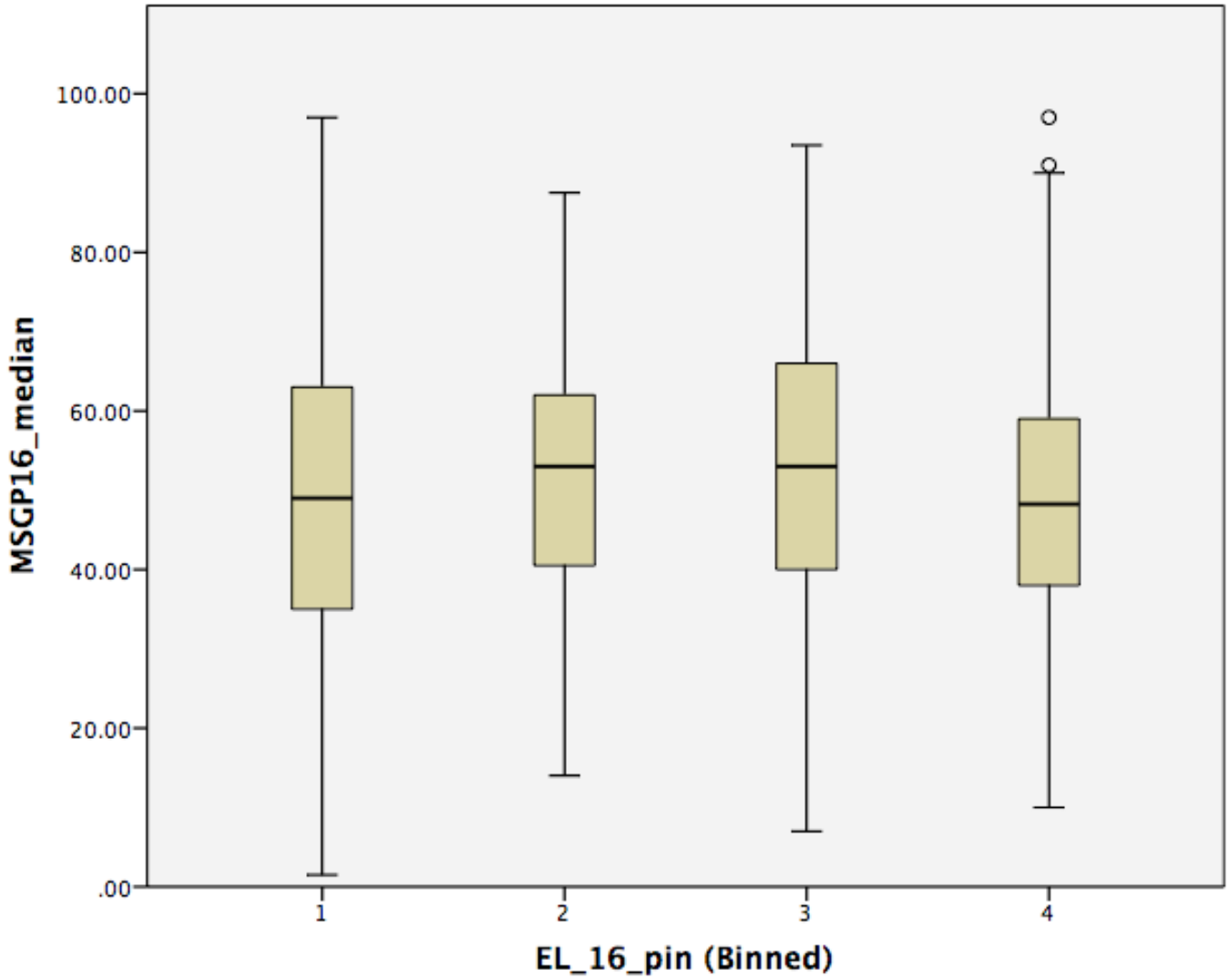


Relationship with percent EL

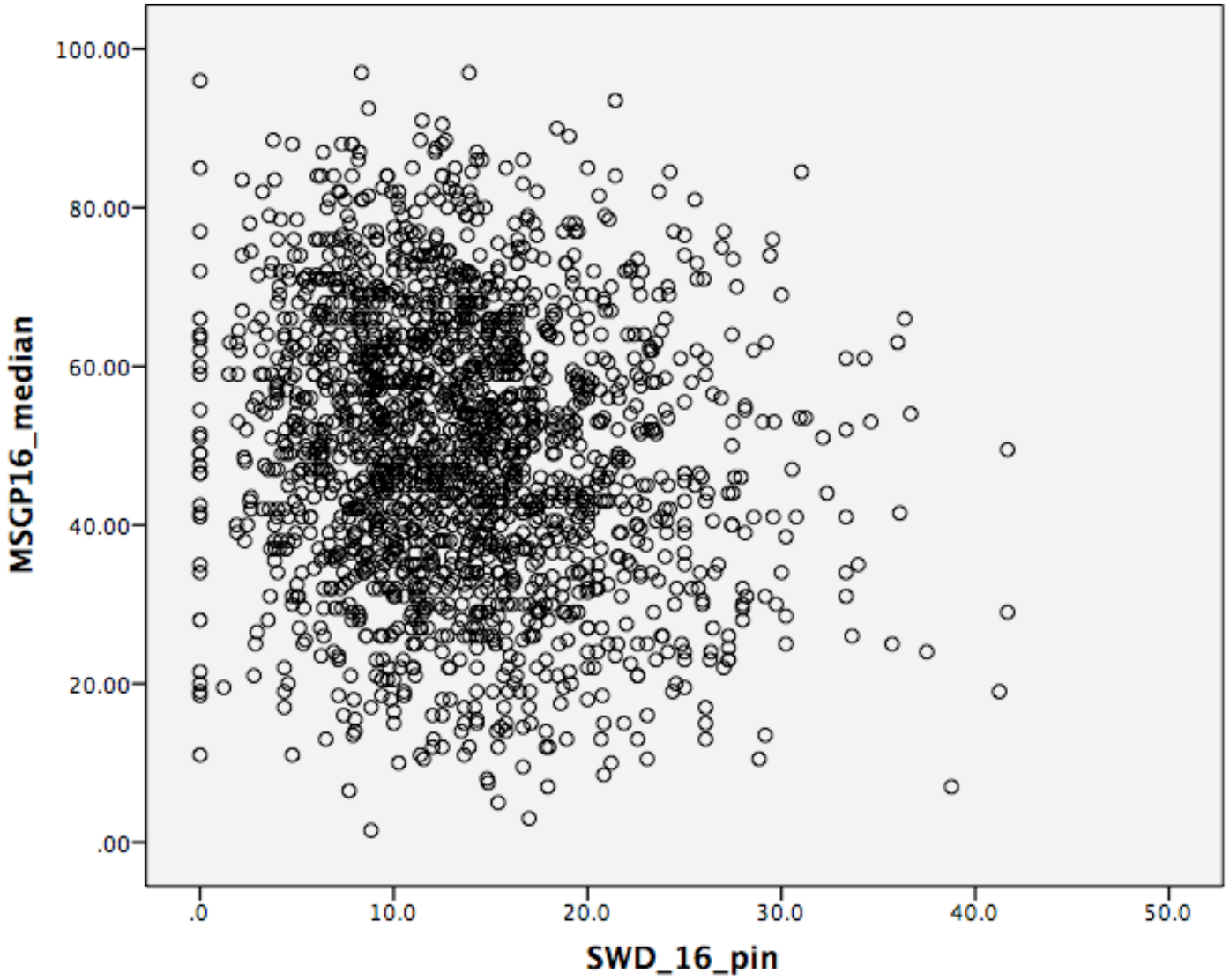


r= -.067

Distribution by EL Quartiles

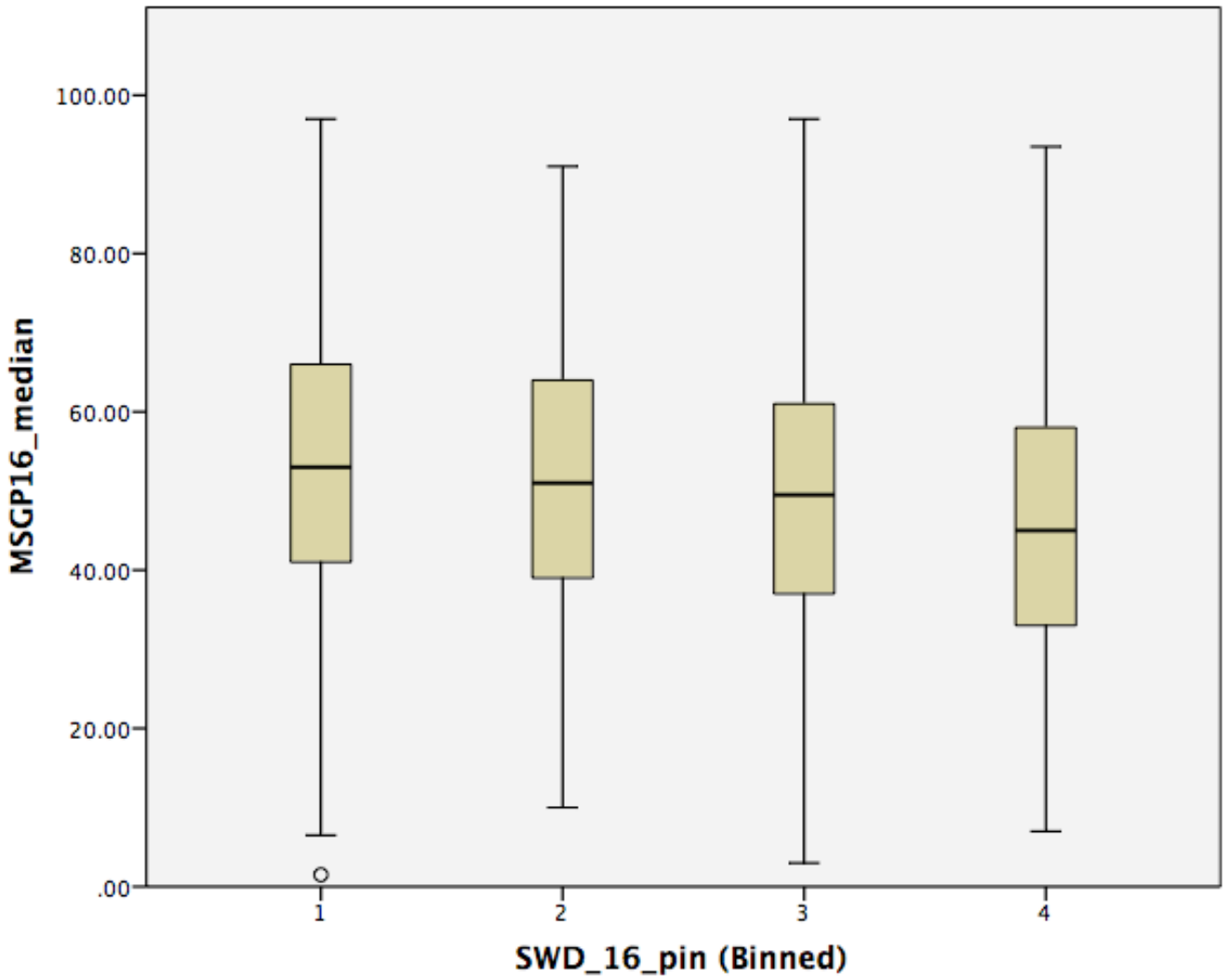


Relationship with Percent SWD

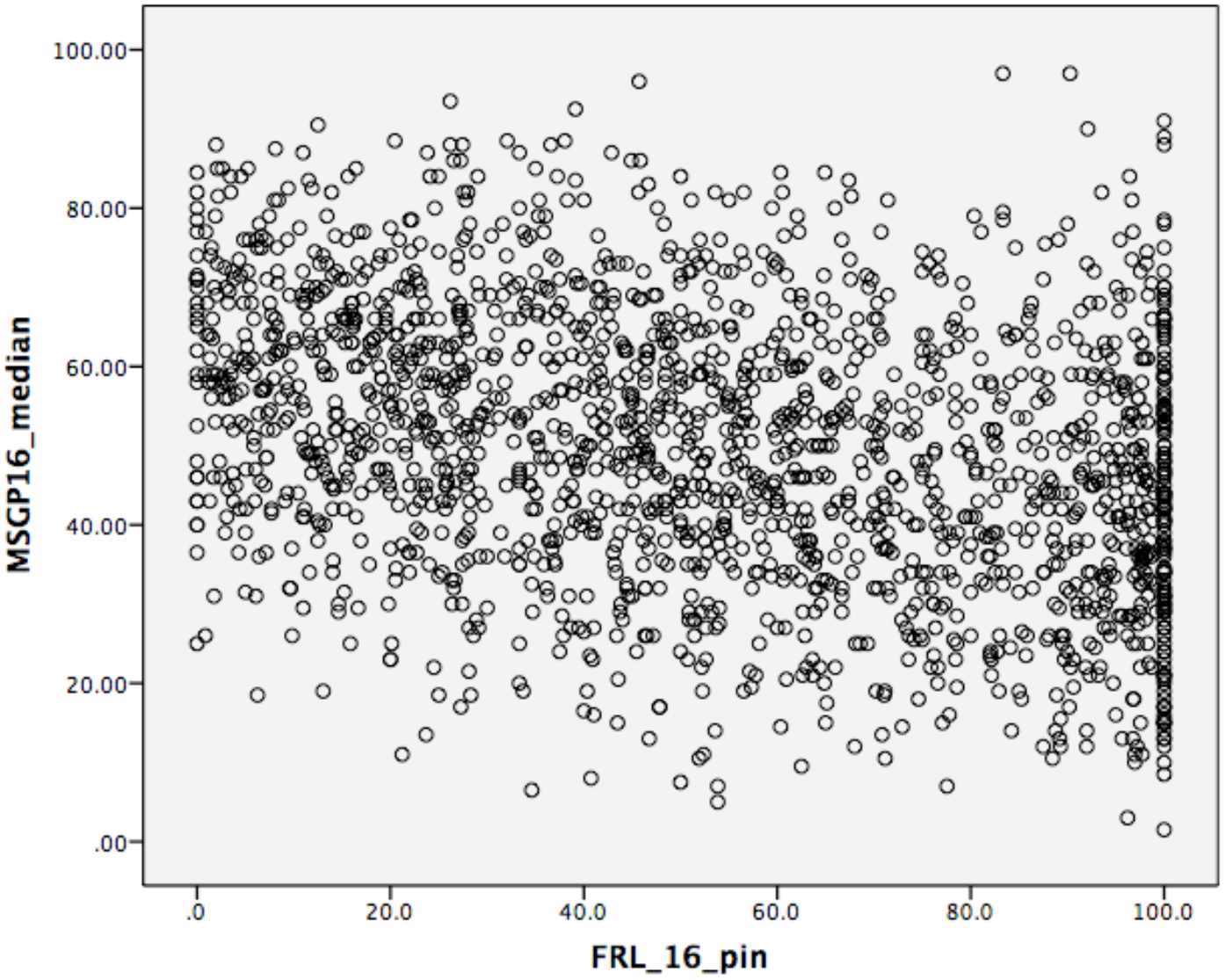


r= -.142

Distribution by SWD Quartile

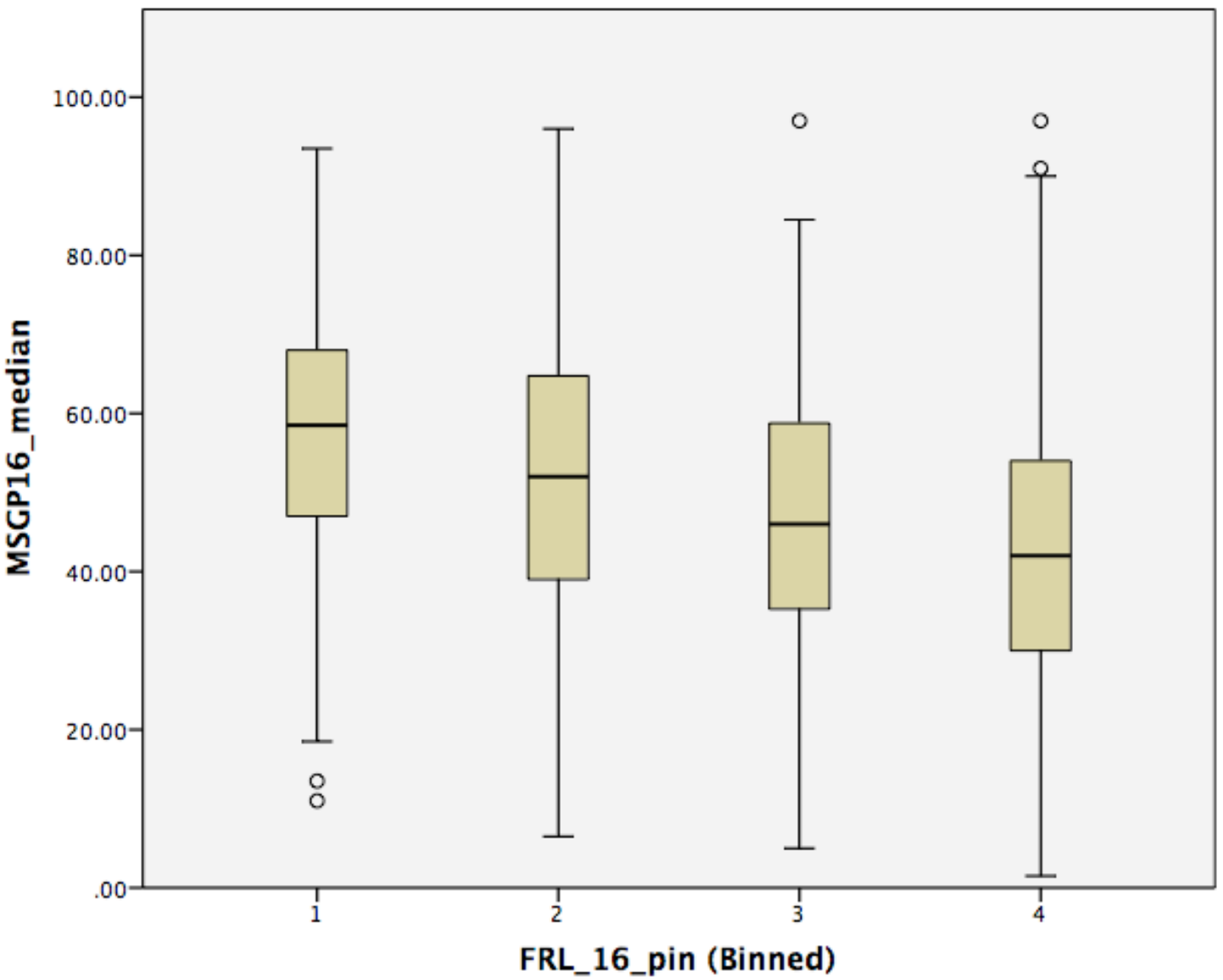


Relationship with percent FRL eligible

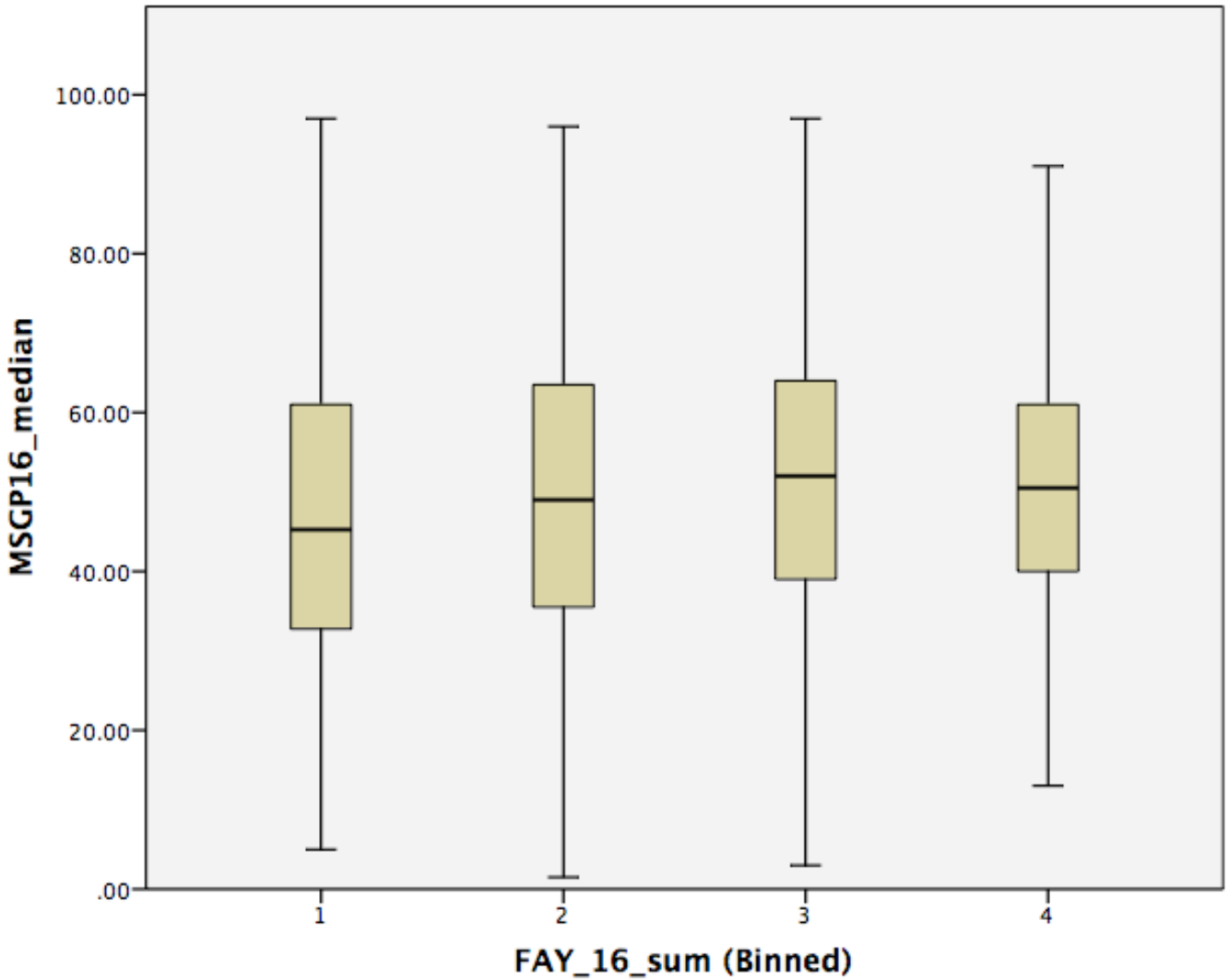


r= -.33

Distribution by FRL Quartile

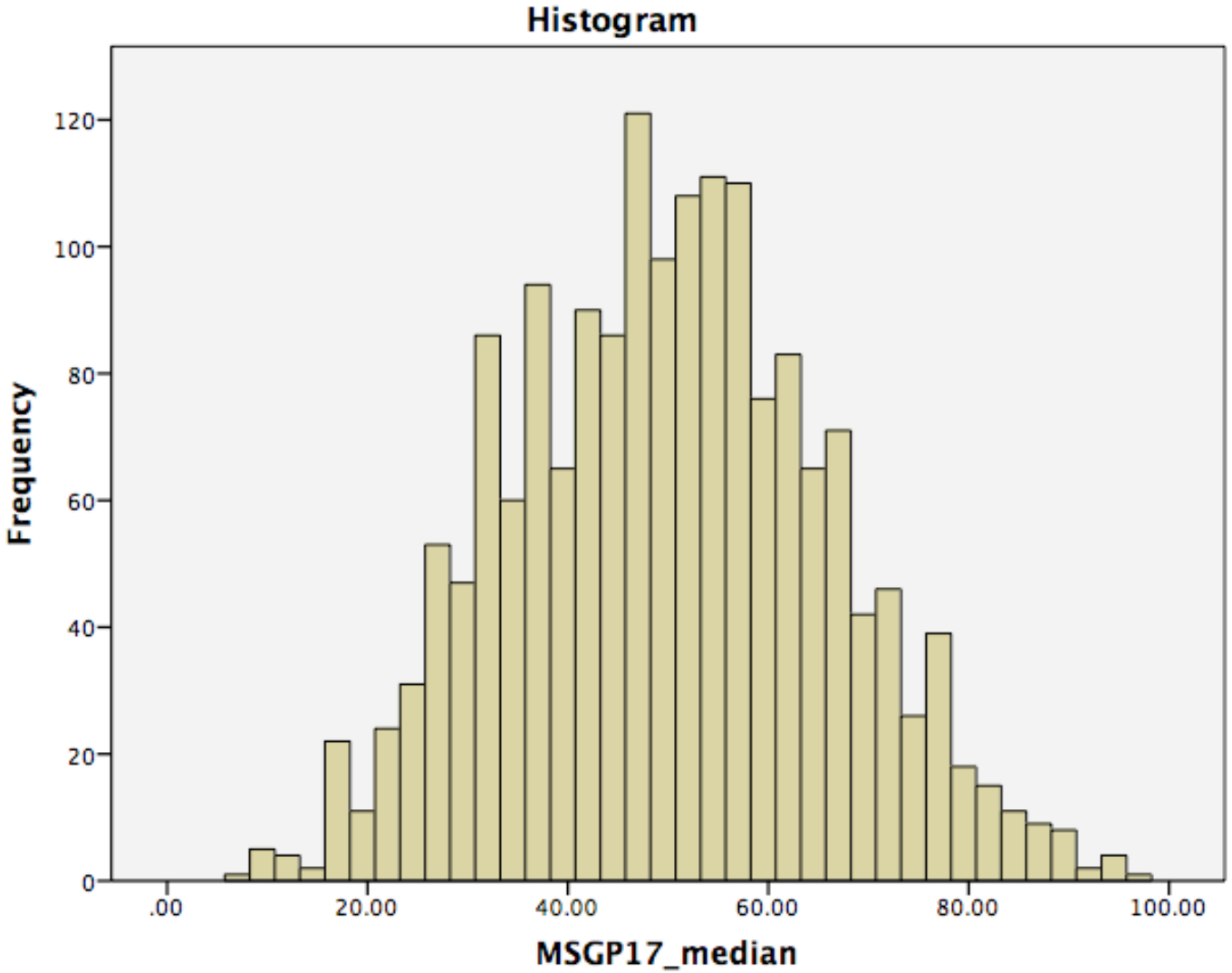


Distribution by N-size quartiles



School Level Results
Grade 5 Math 2017

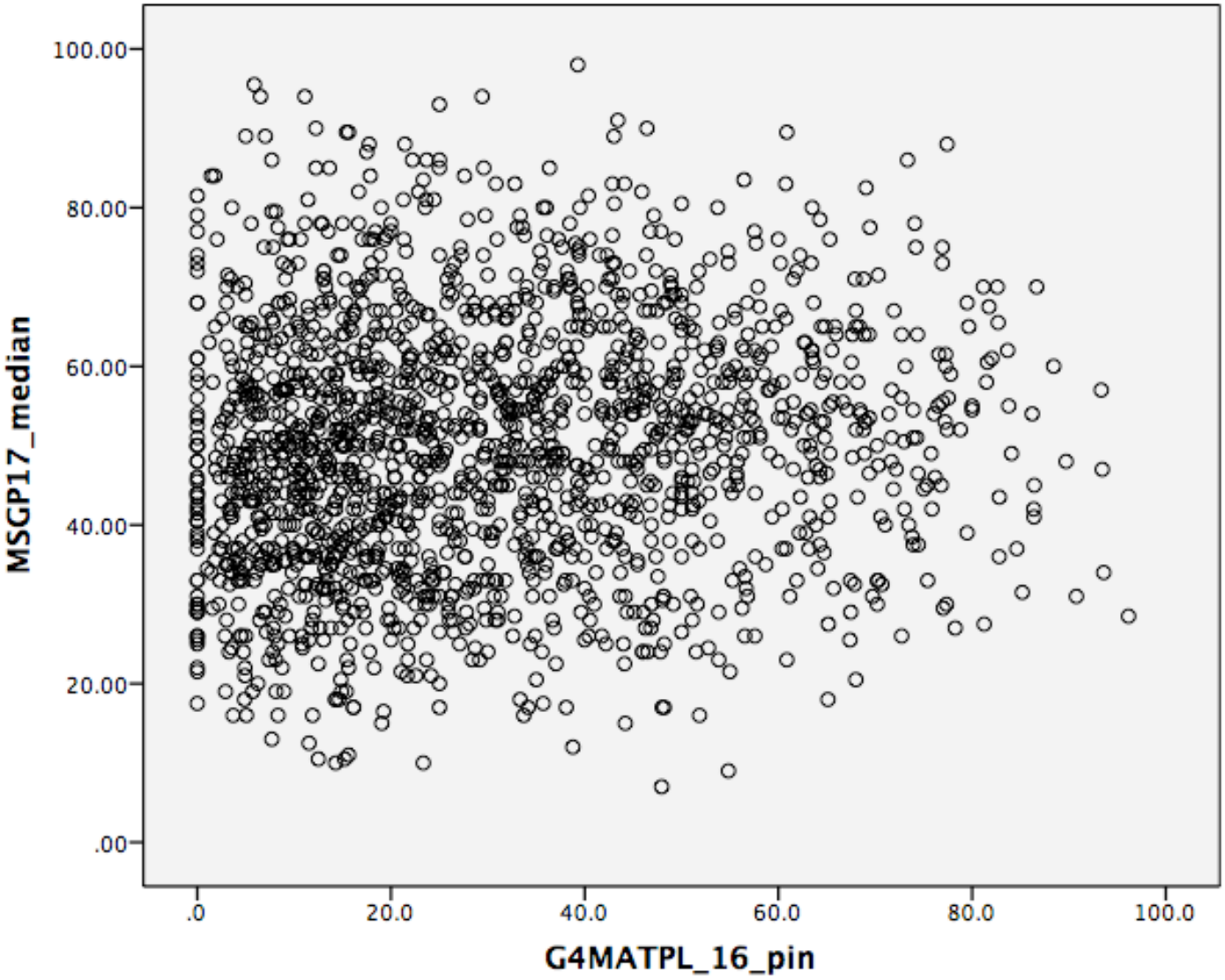
School Level Scores – Grade 5 Math



Number of Schools: 1745

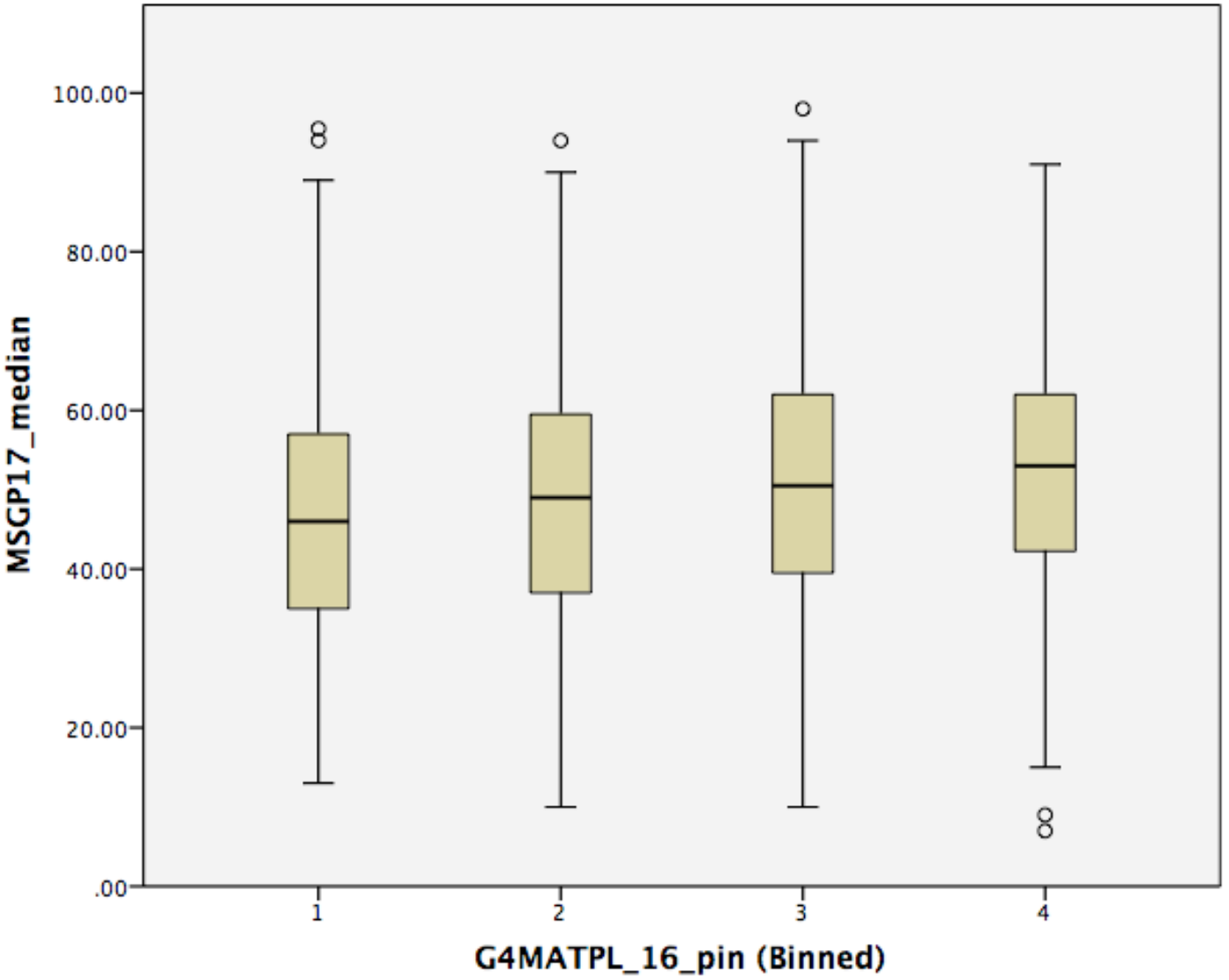
Min: 7
Max: 98
Mean: 50
Median: 50
SD: 15.86

Correlation with prior-year percent proficient

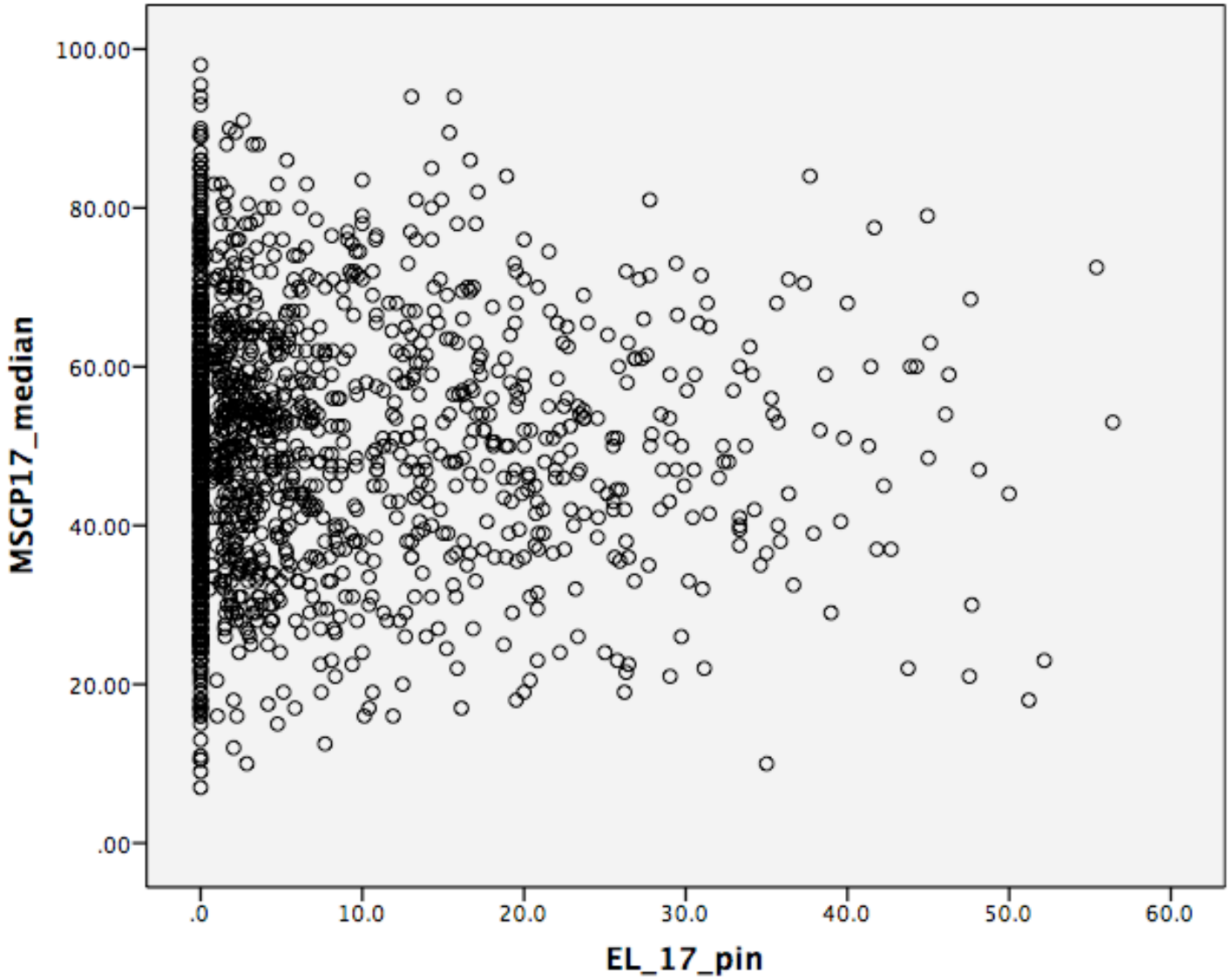


r= .106

Distribution by Prior Percent Proficient

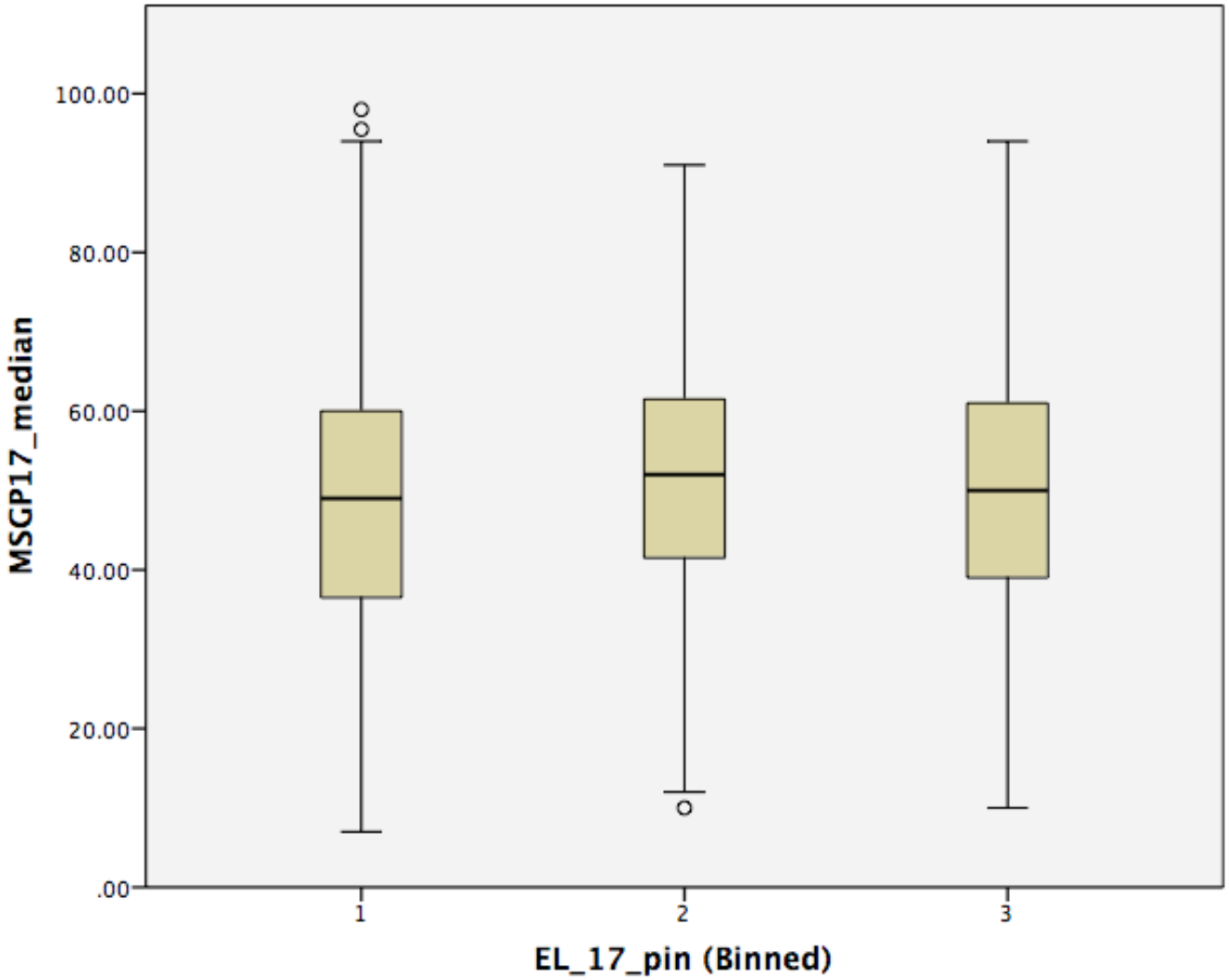


Relationship with percent EL



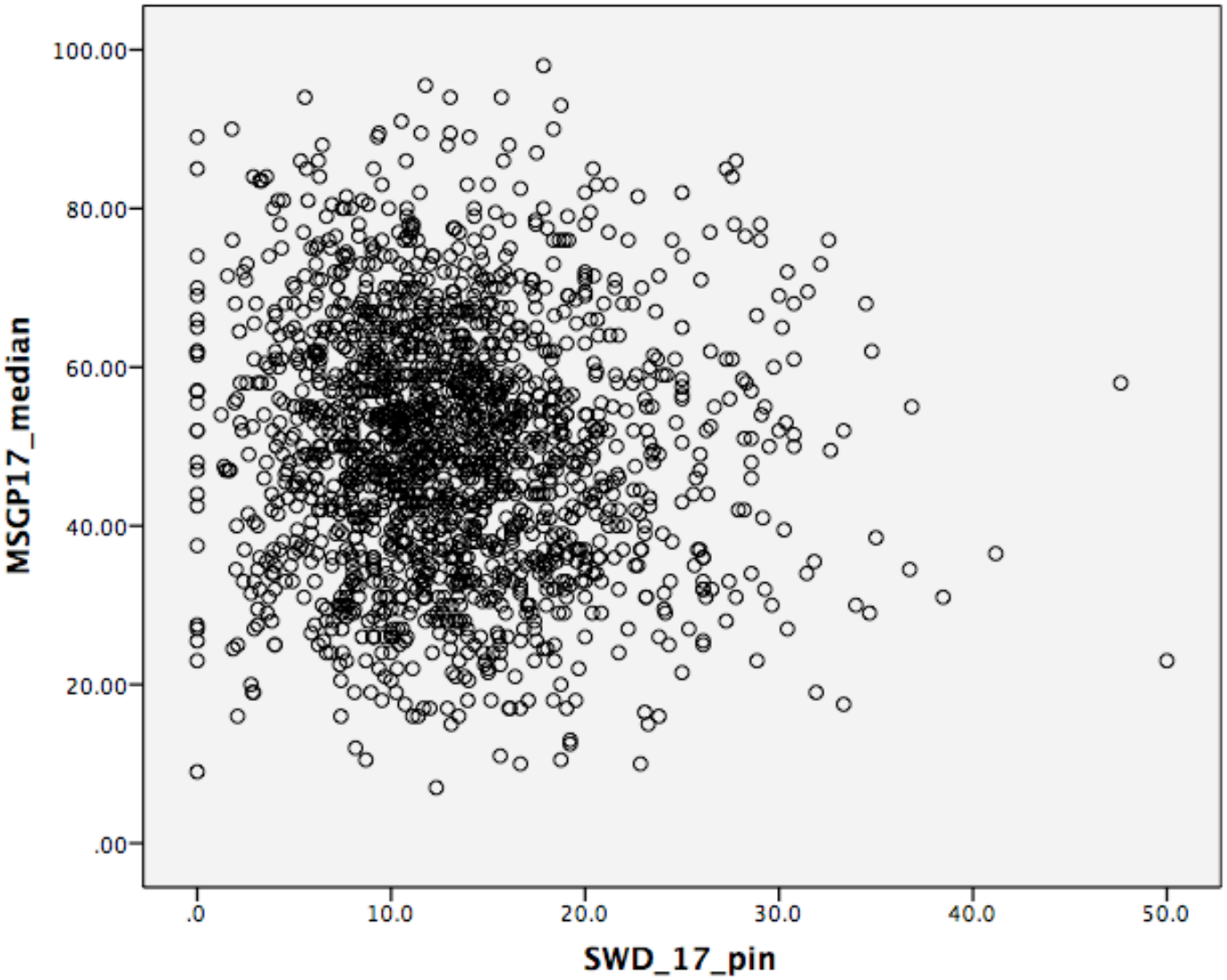
r= -.002

Distribution by EL Groups



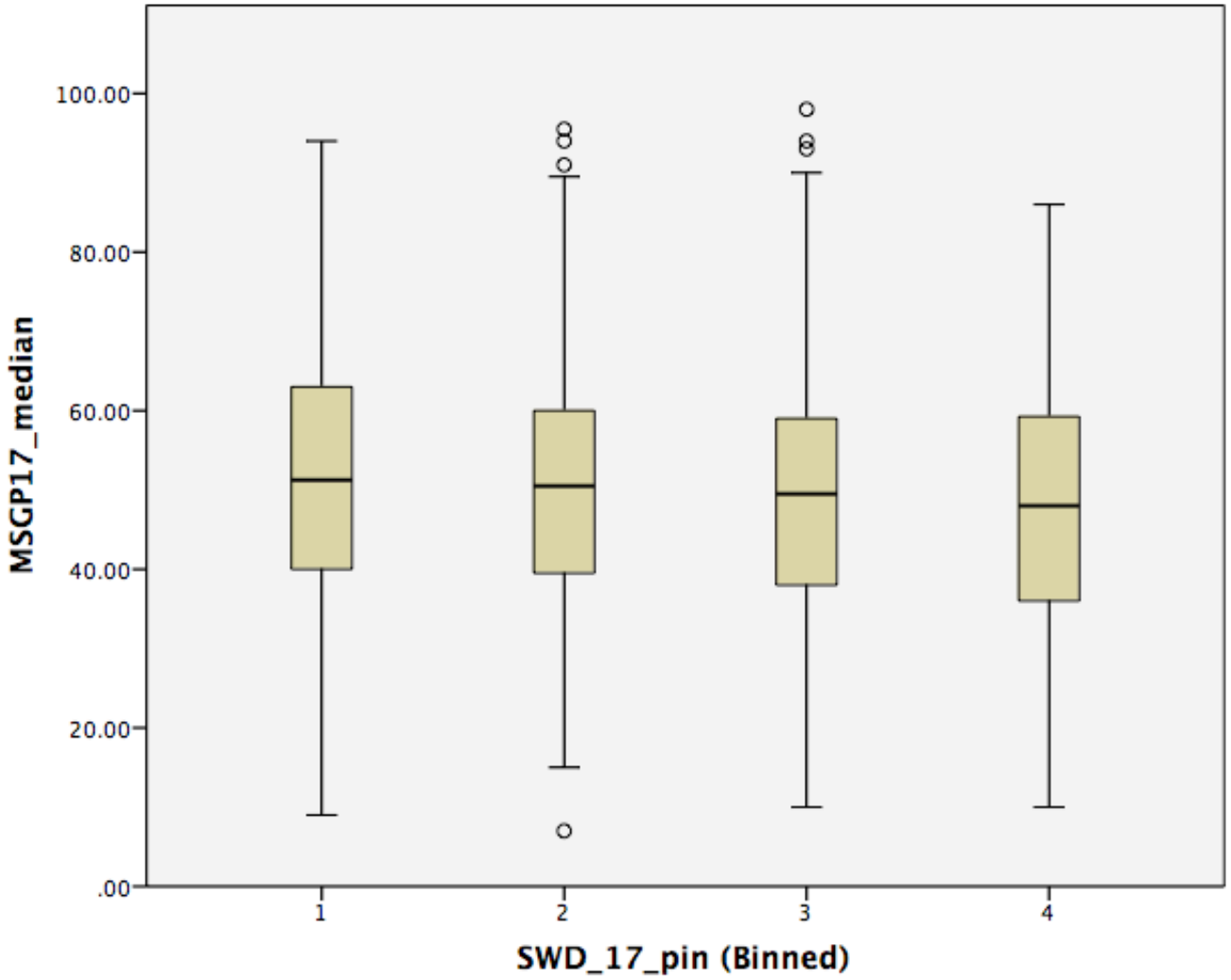
Only 3 groups produced due to lack of granularity in distribution

Relationship with Percent SWD

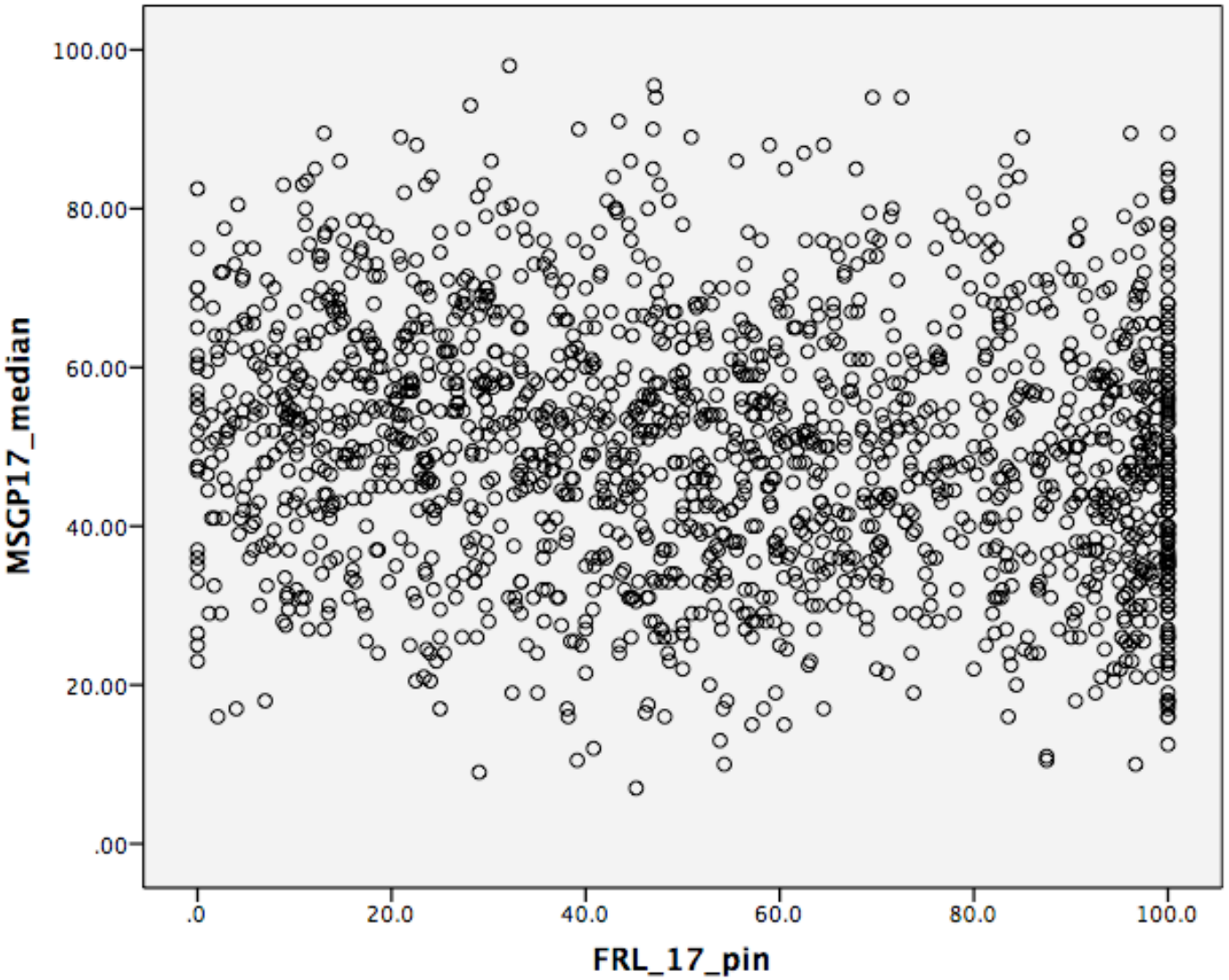


r= -.062

Distribution by SWD Quartile

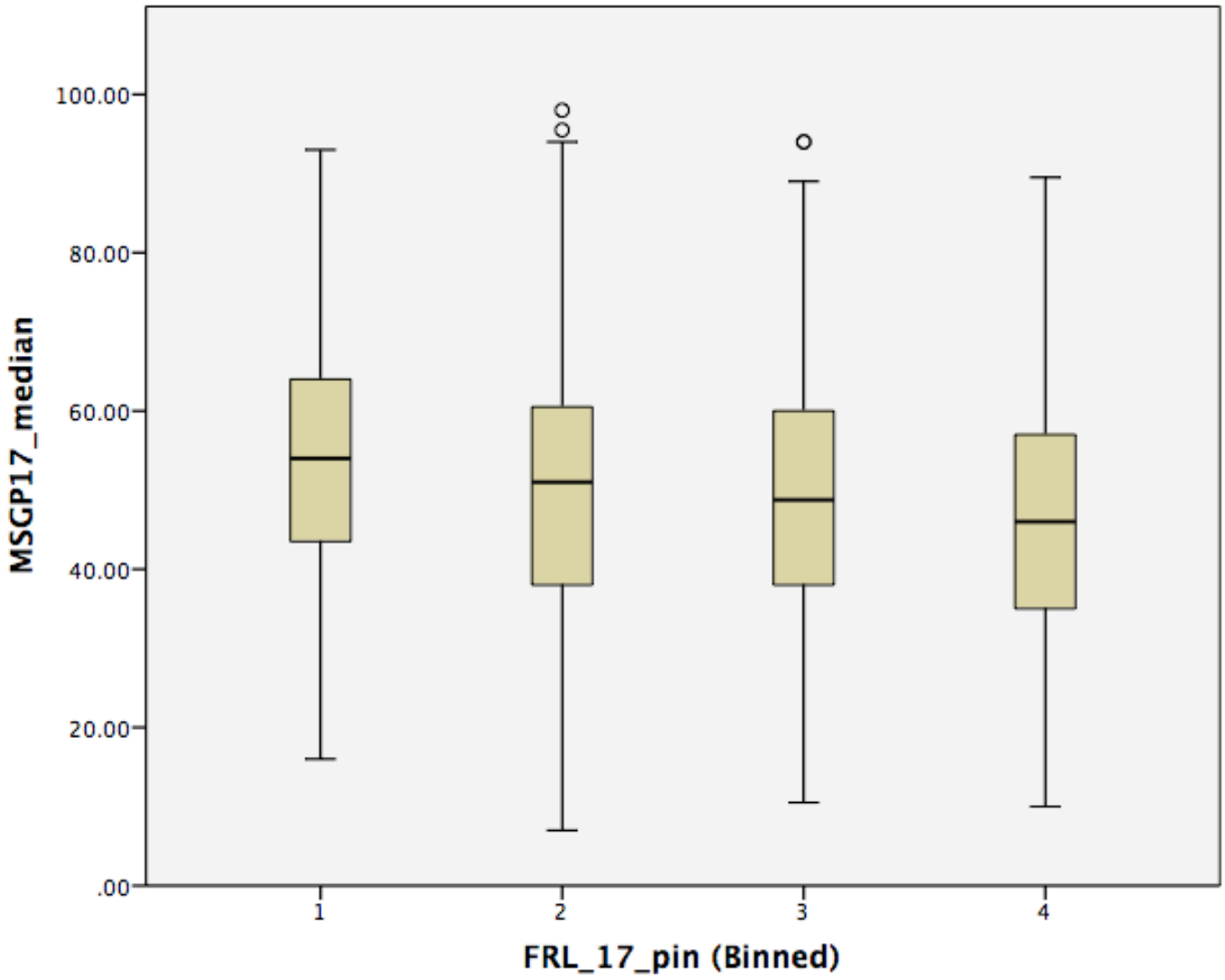


Relationship with percent FRL eligible

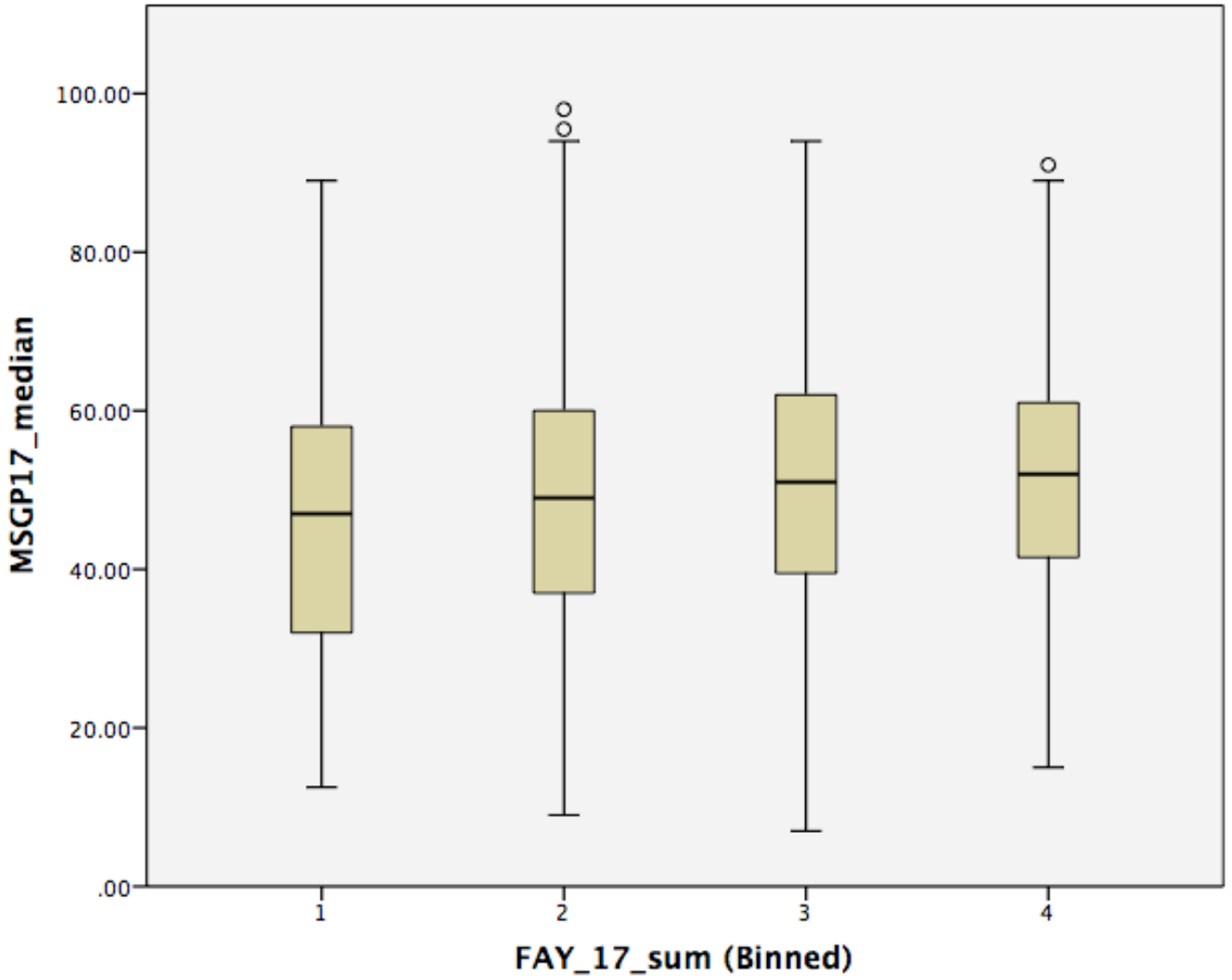


r= -.152

Distribution by FRL Quartile



Distribution by N-Size Quartiles



Comparison of Models

Comparison of Correlation with Prior Status

	Regression	Value Table	SGP
Grade 4 ELA	0.22	0.21	.21
Grade 5 ELA	0.29	0.32	.23
Grade 4 Math	0.25	0.37	.22
Grade 5 Math	0.13	0.23	.11

Comparison of Correlation with EL %

	Regression	Value Table	SGP
Grade 4 ELA	−0.07	−0.06	-.06
Grade 5 ELA	−0.19	−0.19	-.12
Grade 4 Math	−0.07	−0.11	-.07
Grade 5 Math	−0.07	−0.1	-.002

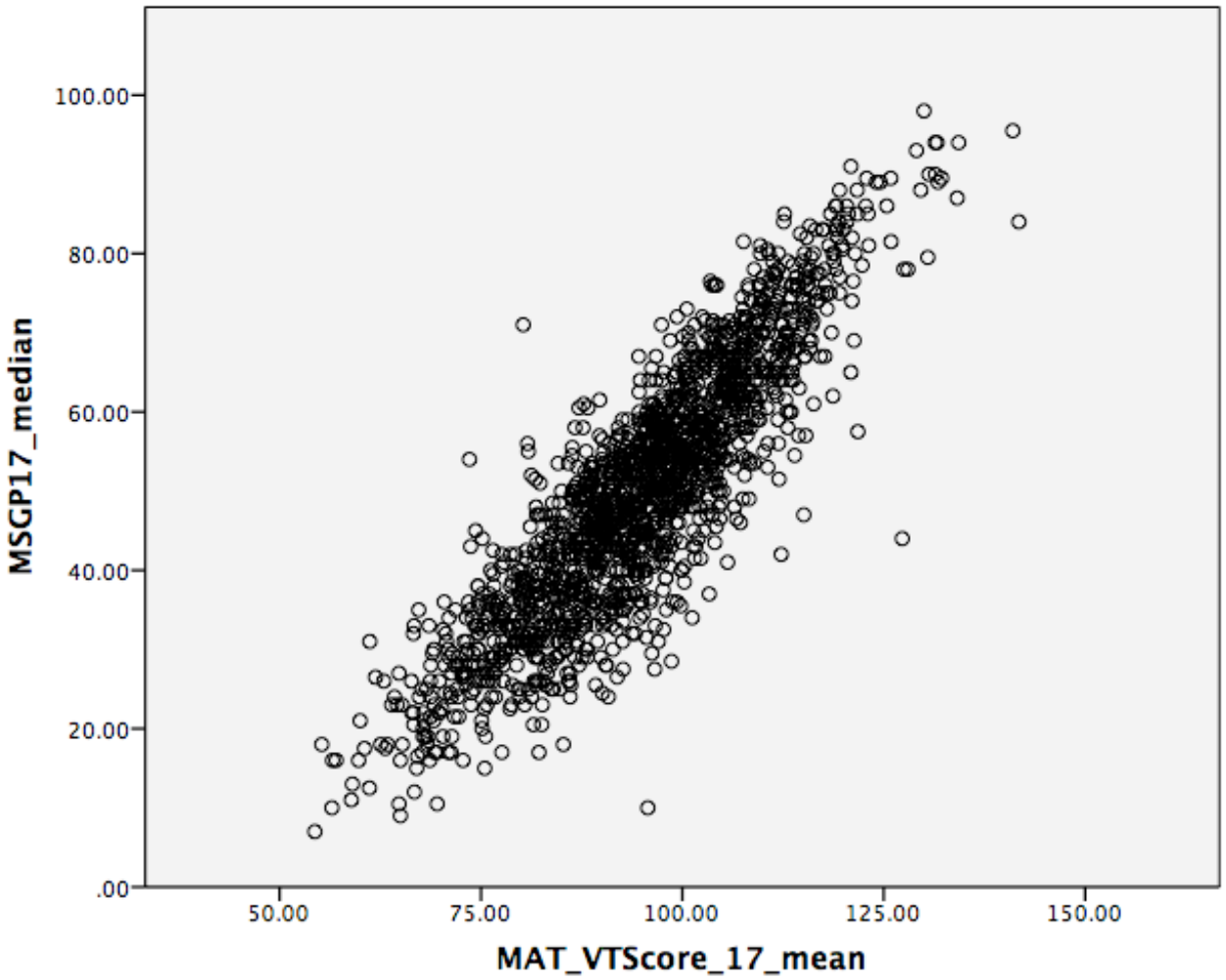
Comparison of Correlation with SWD %

	Regression	Value Table	SGP
Grade 4 ELA	−0.13	−0.14	-.13
Grade 5 ELA	−0.15	−0.15	-.10
Grade 4 Math	−0.14	−0.17	-.14
Grade 5 Math	−0.09	−0.13	-.06

Comparison of Correlation with FRL %

	Regression	Value Table	SGP
Grade 4 ELA	−0.41	−0.39	-.39
Grade 5 ELA	−0.39	−0.41	-.30
Grade 4 Math	−0.36	−0.44	-.33
Grade 5 Math	−0.22	−0.29	-.15

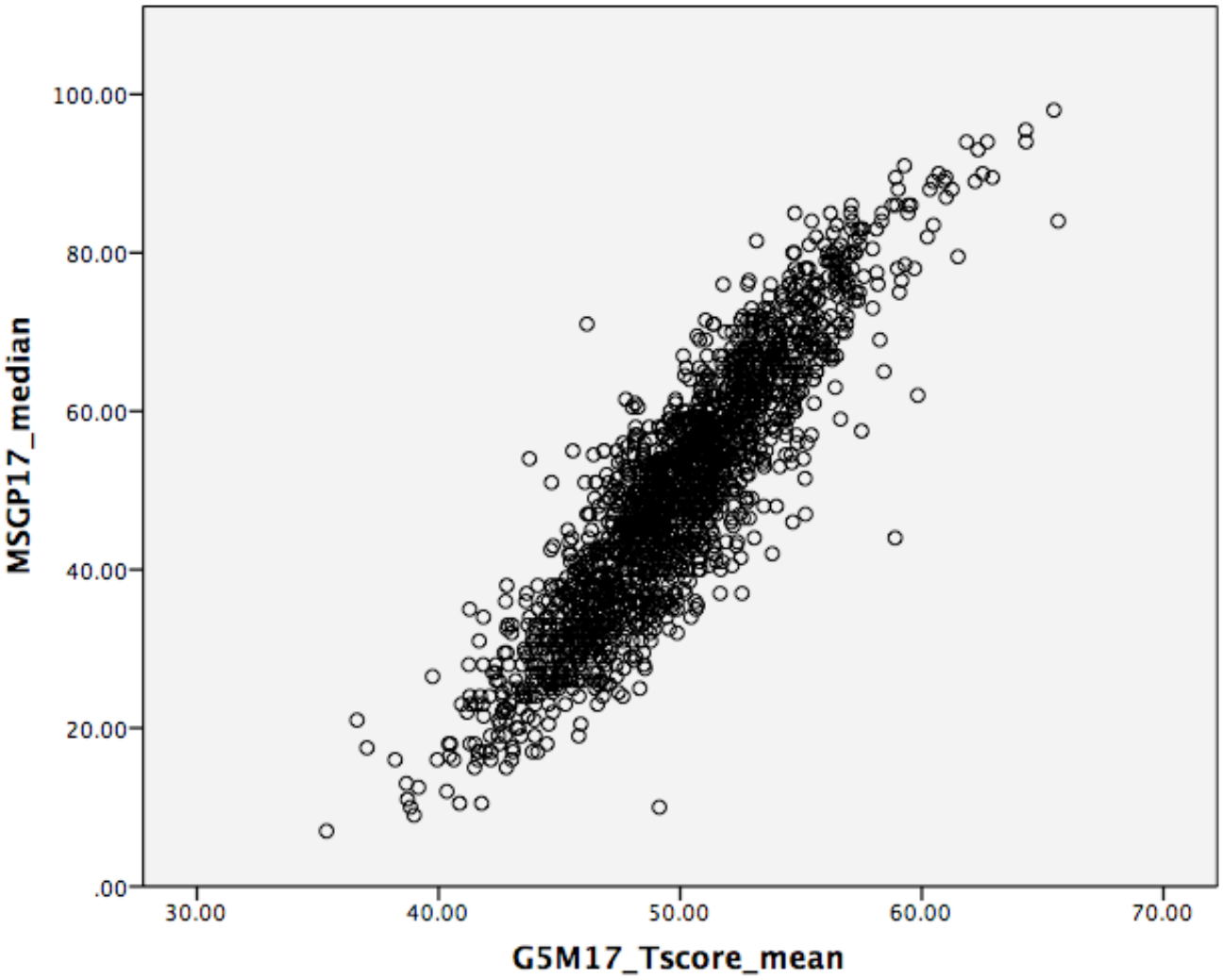
Correlation SGP to Value Tables – G5 Math



School level correlation of median SGP with mean VT Score

r = .88

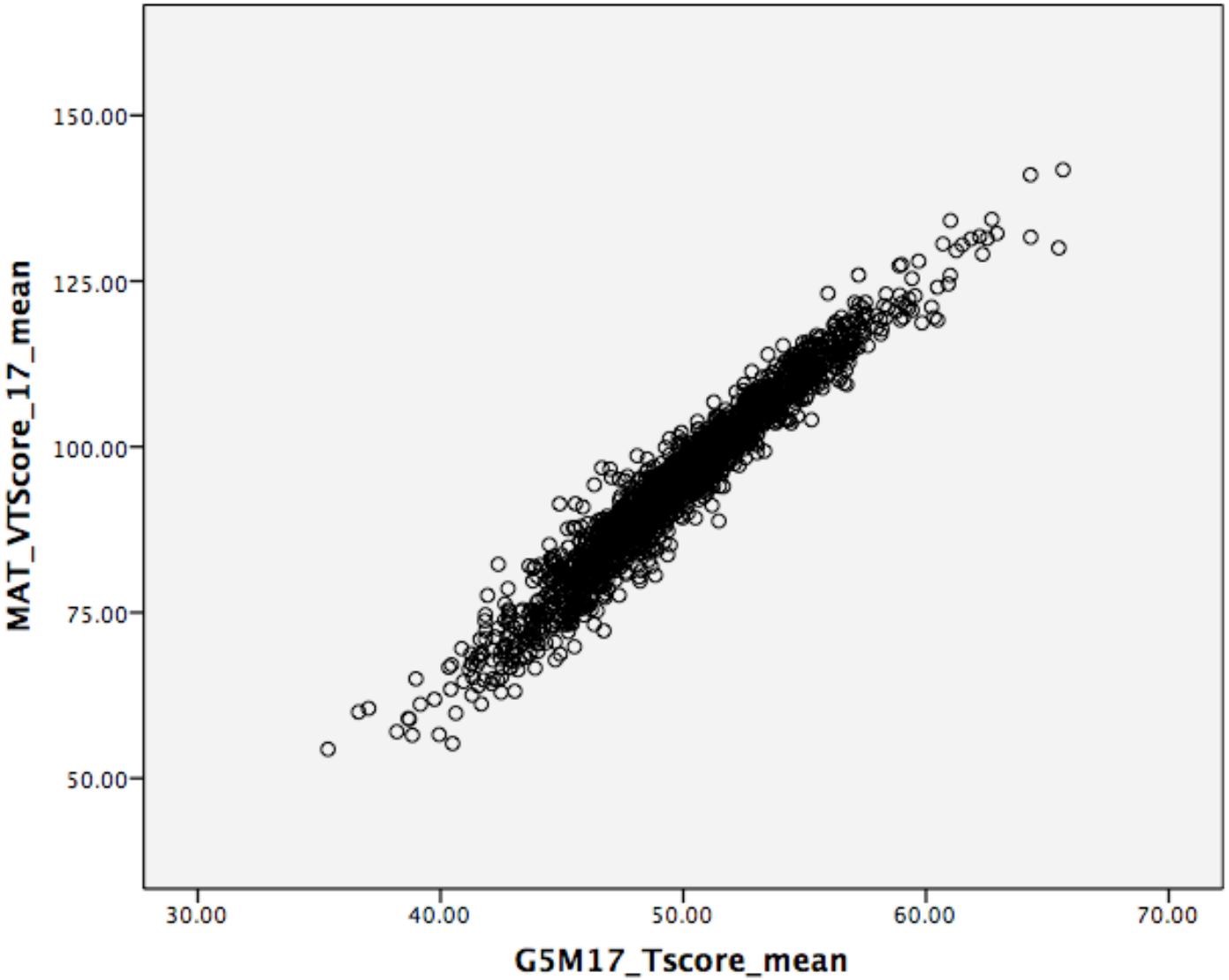
Correlation SGP to Regression – G5 Math



School level correlation of median SGP with mean regression residual T Score

r = .90

School Level Correlation – Grade 5 Math



School level correlation of mean regression residual T-Score and mean VT Score

r = .97

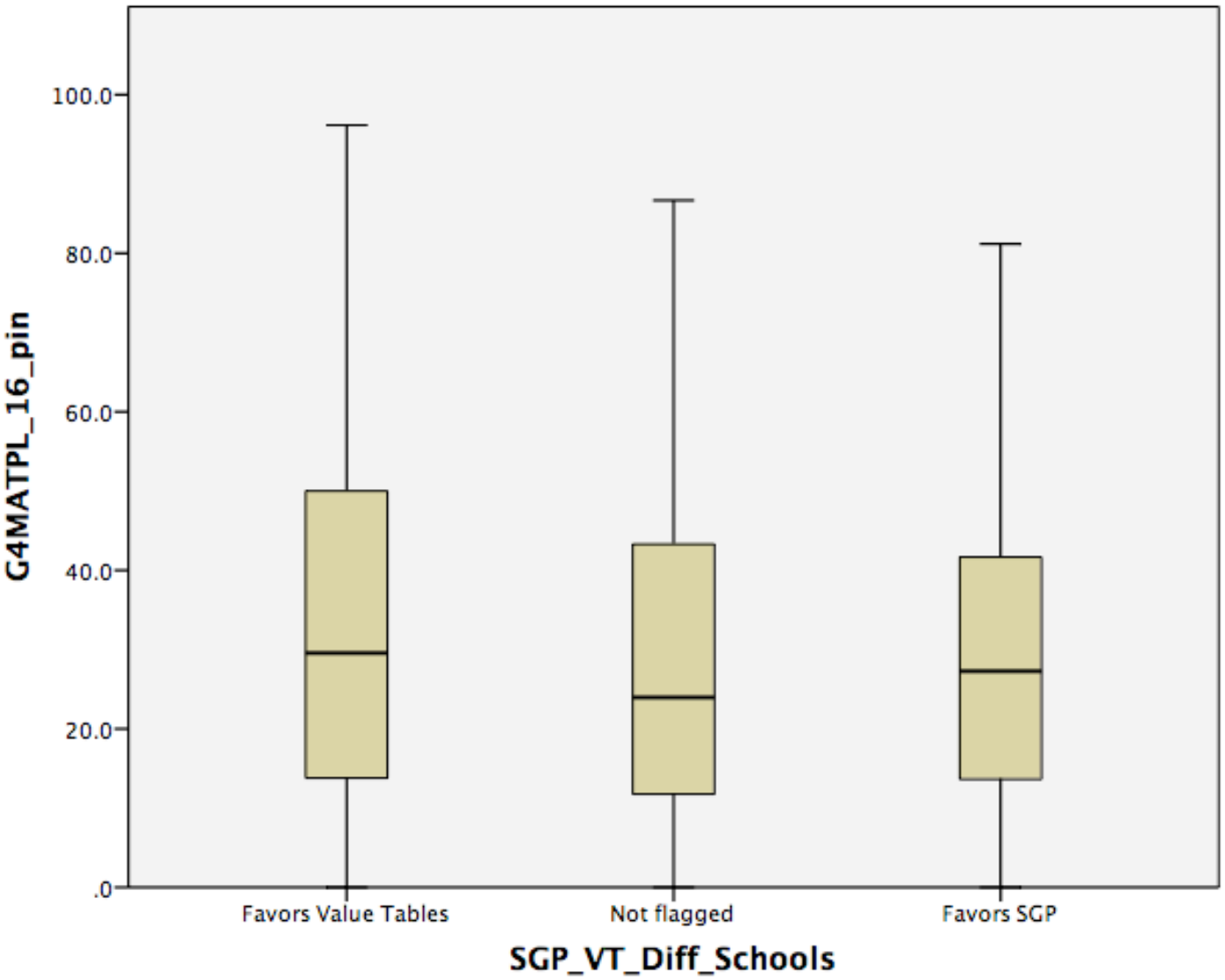
For which schools do models differ?

- We looked at schools for which the models were most different
- Computed z scores for each of value table, regression, and SGP in math 2017 only
- Identified schools that differed by .33 SD or more in one direction or another
- Pairwise comparisons of SGP with value tables and regression outcomes
  - SGP Difference Schools: Z score of MGP was .33 or more greater than Regression/ VT (i.e. model favors SGPs in relative standings)
  - Regression/ VT Difference Schools: Z score of Regression/VT was -.33 or more less than MGP schools (i.e. model favors Regression/VT in relative standings)

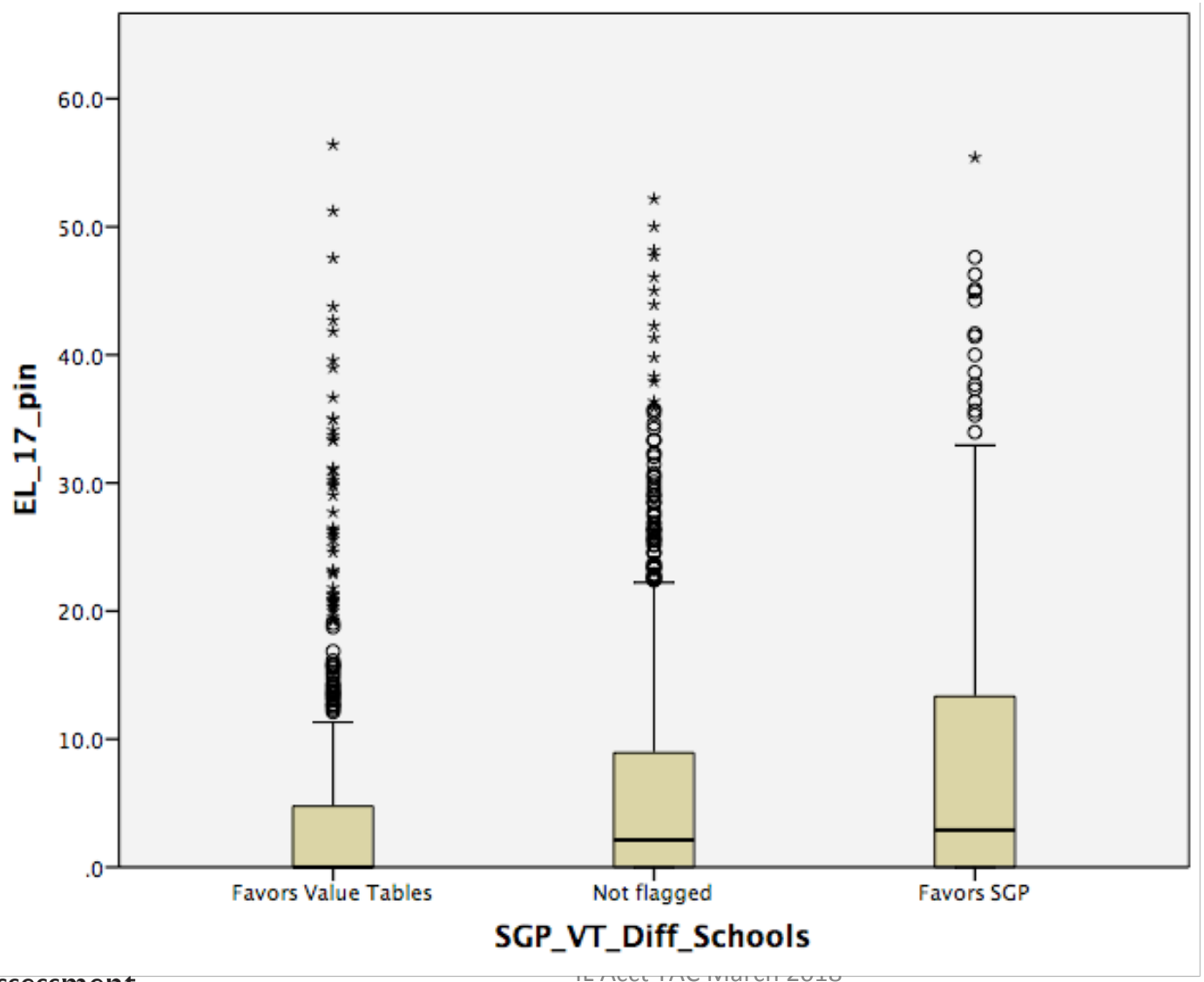
Summary: SGP – Value Table Comparison

	N	Percent
Favors SGP over VT	301	17.2
Not flagged	866	49.6
Favors VT over SGP	578	33.1
Total	1745	100

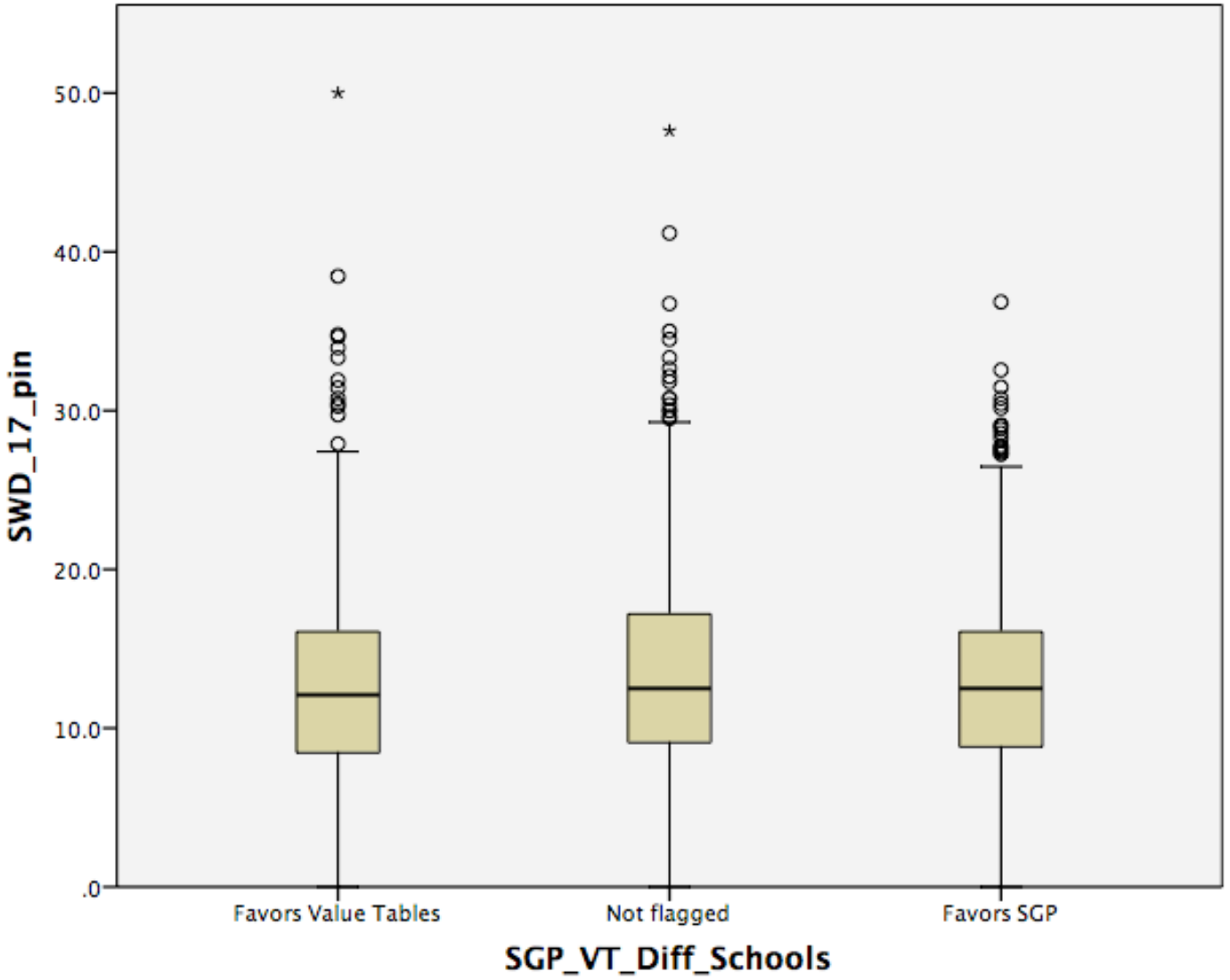
Comparison of "Difference Schools" on Prior Year Percent Proficient



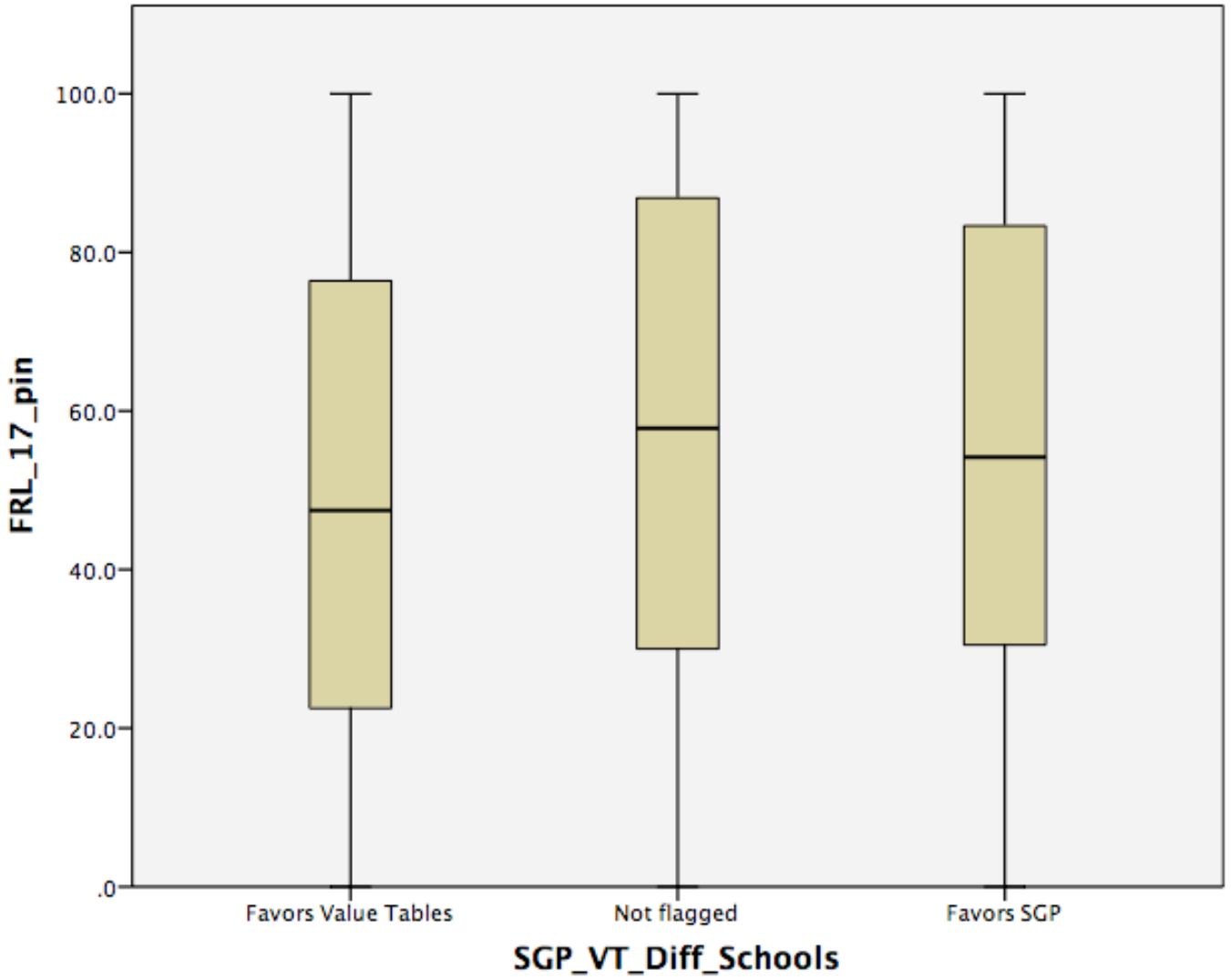
Comparison of Difference Schools on percent EL



Comparison of Difference Schools on percent SWD



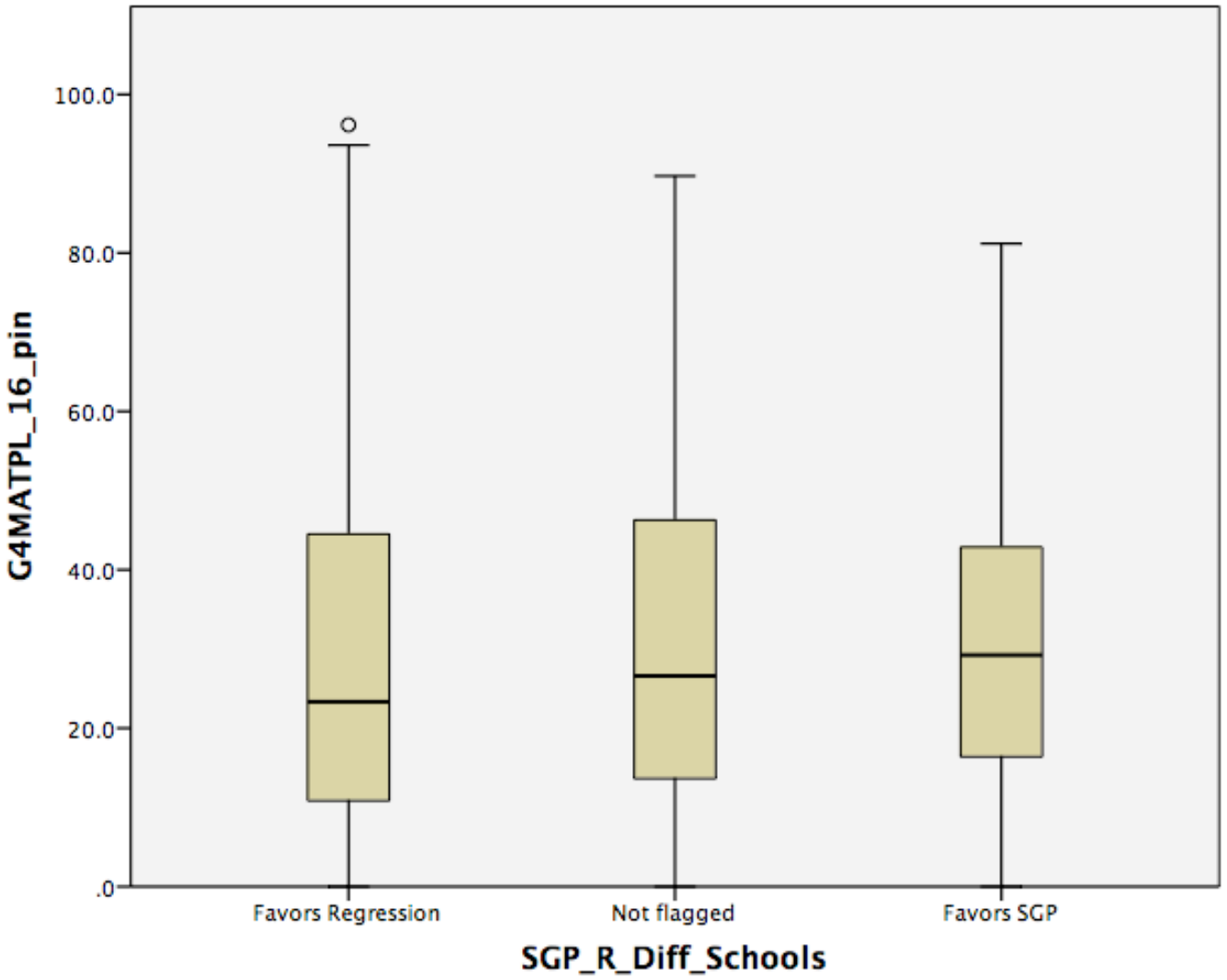
Comparison of Difference Schools on percent FRL



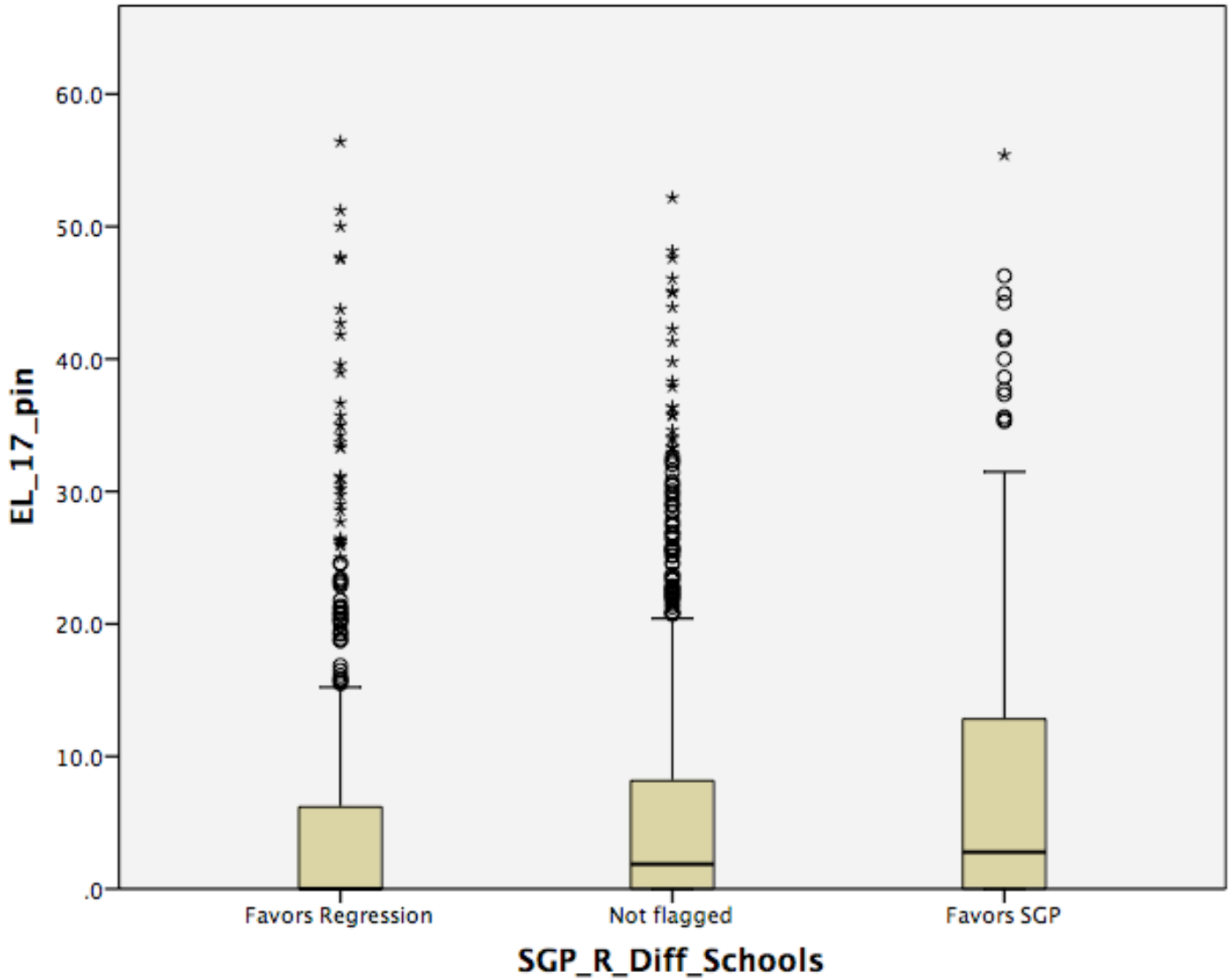
Summary: SGP – Regression Comparison

	N	Percent
Favors SGP over Regression	321	18.4
Not flagged	865	49.6
Favors Regression over SGP	559	32.0
Total	1745	100

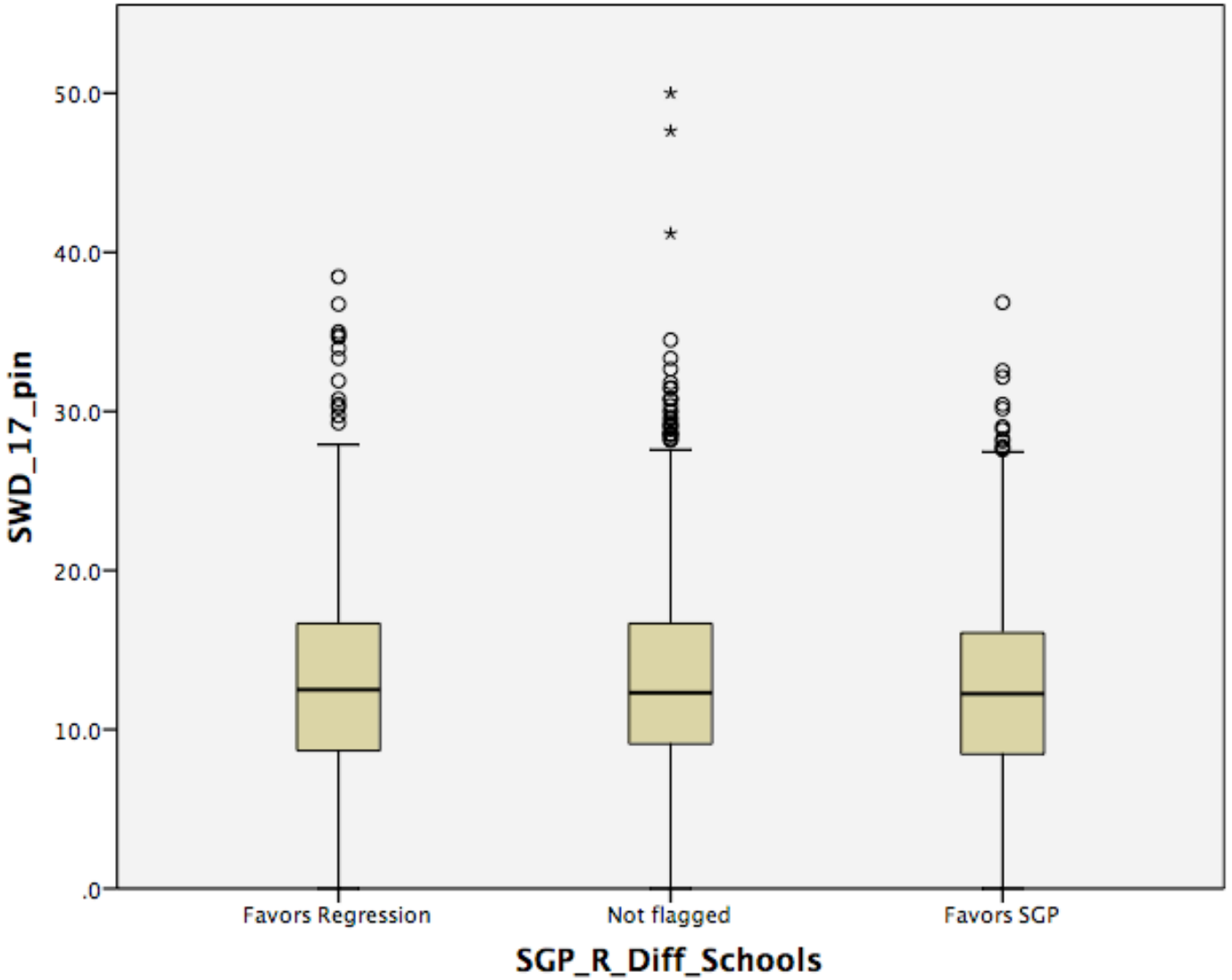
Comparison of "Difference Schools" on Prior Year Percent Proficient



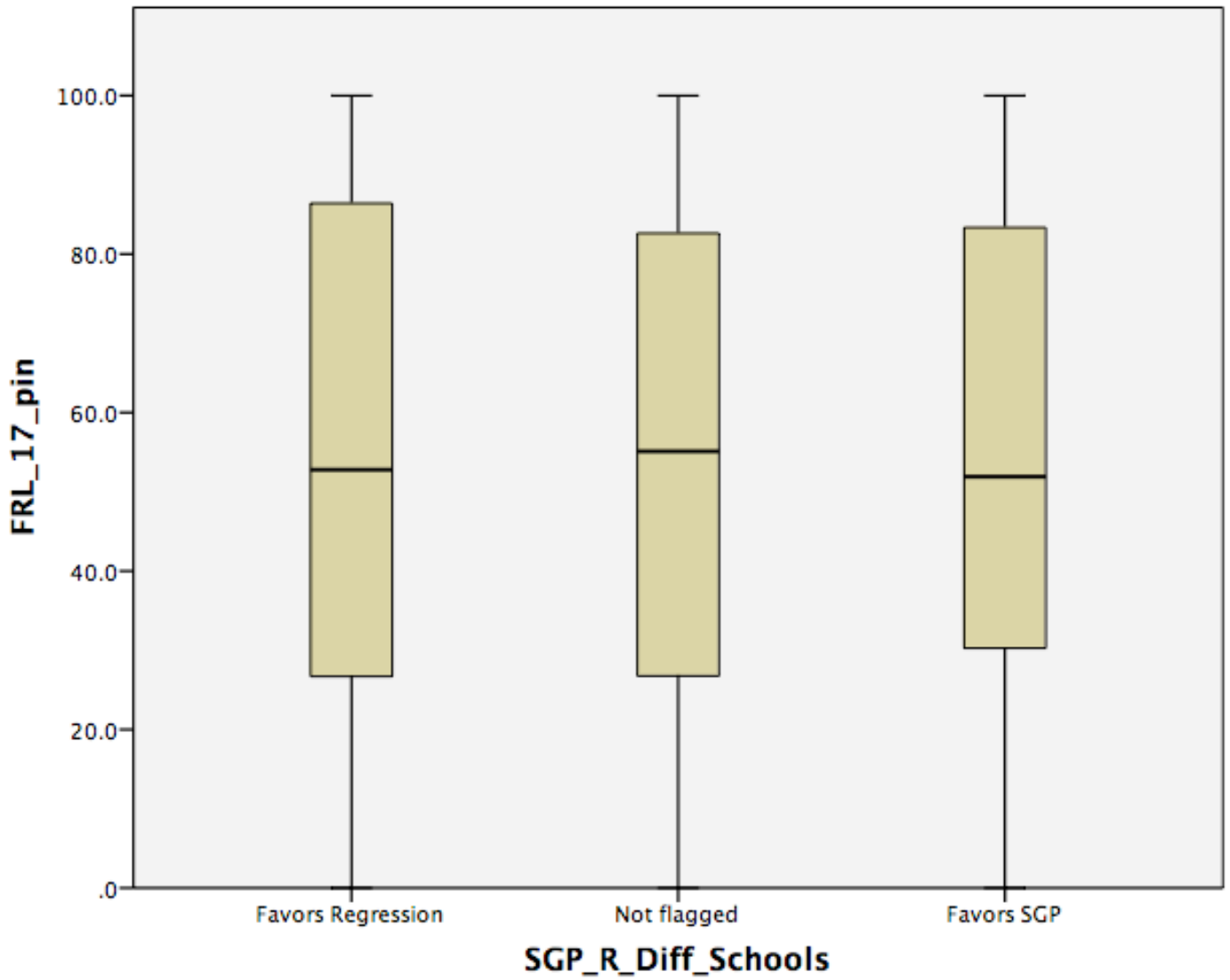
Comparison of Difference Schools on percent EL



Comparison of Difference Schools on percent SWD



Comparison of Difference Schools on percent FRL



Overall Findings

- SGP results are well correlated with both regression and value tables, but the relationship is weaker than regression to value tables; in other words, SGPs appear to be more dissimilar than the other two models
- Compared to regression and value tables, SGPs had a slightly lower correlation with prior year status, percent EL, percent SWD, and percent FRL eligible
- A limited look at the schools for which the models were most different, reveals that SGPs tend to classify schools that are lower achieving and serve more EL and SWD students more favorably with respect to relative scores

Value Table Sensitivity Analysis

Overview

- Value Table growth scores were produced as follows:
  - Determined score earned by each student using value table look-up
    - Table assigns points based on change in PARCC Performance Level from Year 1 to Year 2. (e.g., Grade 3 to Grade 4 in ELA)
- Data file included:
  - Grade 3, 2015 – ELA
  - Grade 4, 2016 – ELA
  - Grade 5, 2017 – ELA
- Valid cases:
  - Valid PARCC score in both years
  - Full academic year in year 2 (outcome year)
  - School analyses include schools with 20 or more cases

3 Options – Grade 4 ELA

- Option 1: (presented at January TAC Meeting)
  - **Status Heavy**: Students at higher performance levels receive more points for maintaining performance across years.
  - **Inconsistent scoring**: the points earned/lost for movement up/down vary by level.
  - **Design priority: reward achieving and maintaining proficiency; reward growth for all students, (slightly bigger boost for students at the lowest levels.)**
- Option 2:
  - **Status Neutral**: All students receive the same score for maintaining the same performance level across years (i.e., 100 points)
  - **Consistent scoring**: students earn (or lose) the same number of points for movement up or down an equivalent number of levels.
  - **Design priority: reward growth equally across the scale**
- Option 3:
  - **Status Light:** Students at higher performance levels receive slightly more points for maintaining performance across years.
  - **Semi-Consistent Scoring**: Students at the low end of the scale receive more points than students at the high end of the scale for movement to an adjacent level.
  - **Design priority: reward growth for lower achieving students**

Option 1 – Status Heavy/Inconsistent

			Performance in Year 2									
			Did Not Yet Meet		Partially Met		Approached		Met		Exceeded	
			1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
Performance Level in Year 1	Did not yet meet	1a	50	110	140	160	170	180	190	195	200	200
		1b	25	60	115	145	160	170	180	190	195	200
	Partially Met	2a	20	35	70	115	150	160	170	180	190	195
		2b	10	35	50	80	120	145	155	165	180	195
	Approached	3a	10	30	40	60	90	120	145	160	175	190
		3b	10	25	35	40	70	95	125	145	165	180
	Met	4a	10	20	30	35	50	75	100	130	150	175
		4b	0	10	20	30	45	55	85	110	135	160
	Exceeded	5a	0	0	10	20	35	45	65	95	120	145
		5b	0	0	0	10	25	35	55	75	100	130

Option 2: Status-Neutral/Consistent

			Performance in Year 2									
			Did Not Yet Meet		Partially Met		Approached		Met		Exceeded	
			1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
Performance Level in Year 1	Did not yet meet	1a	100	110	130	140	150	160	170	180	190	200
		1b	80	100	110	130	140	150	160	170	180	190
	Partially Met	2a	60	80	100	110	130	140	150	160	170	180
		2b	40	60	80	100	110	130	140	150	160	170
	Approached	3a	20	40	60	80	100	110	130	140	150	160
		3b	0	20	40	60	80	100	110	130	140	150
	Met	4a	0	0	20	40	60	80	100	110	130	140
		4b	0	0	0	20	40	60	80	100	110	130
	Exceeded	5a	0	0	0	0	20	40	60	80	100	110
		5b	0	0	0	0	0	20	40	60	80	100

Option 3: Status Light/Semi-Consistent

			Performance in Year 2									
			Did Not Yet Meet		Partially Met		Approached		Met		Exceeded	
			1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
Performance Level in Year 1	Did not yet meet	1a	100	140	150	160	170	180	190	200	200	200
		1b	85	105	140	150	160	170	180	190	200	200
	Partially Met	2a	75	90	110	140	150	160	170	180	190	200
		2b	55	75	95	115	140	150	160	170	180	190
	Approached	3a	35	55	75	100	120	140	150	160	170	180
		3b	0	35	55	75	105	125	140	150	160	170
	Met	4a	0	0	35	55	75	110	130	140	150	160
		4b	0	0	0	35	55	75	115	135	140	150
	Exceeded	5a	0	0	0	0	35	55	75	120	140	150
		5b	0	0	0	0	0	35	55	75	130	150

Value Table Score Ranges

ELA Score Ranges

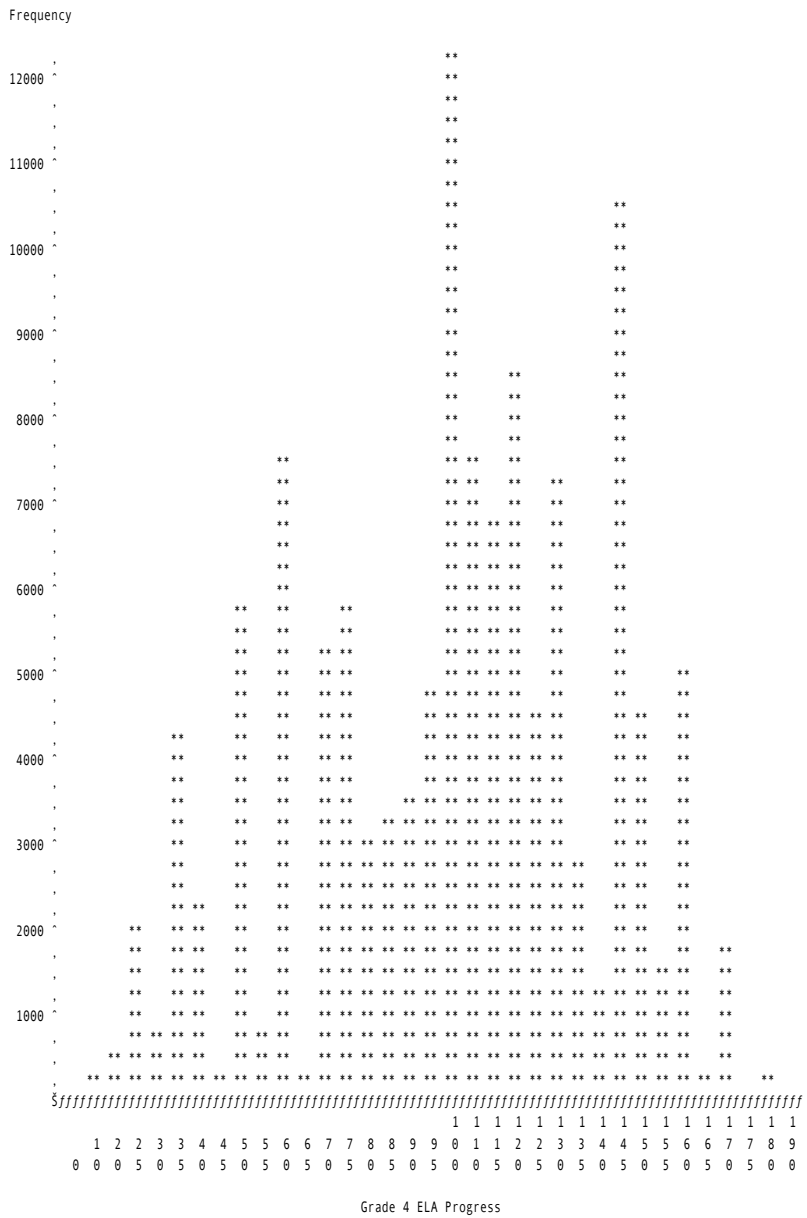
Grade	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
3	650-674	675-699	700-712	713-725	726-737	738-749	750-780	781-809	810-829	830-850
4	650-674	675-699	700-711	712-724	725-736	737-749	750-769	770-789	790-819	820-850
5	650-674	675-699	700-712	713-725	726-737	738-749	750-773	774-798	799-824	825-850

Value Table Growth Scores: Descriptive

Grade 4 ELA 2016 (N=124816): Student Level Summary				
	Minimum	Maximum	Mean	Std. Deviation
Option 1 – Status Heavy	0	190	102.03	37.50
Option 2 – Status Neutral	0	170	102.07	23.16
Option 3 – Status Light	0	190	125.66	25.77

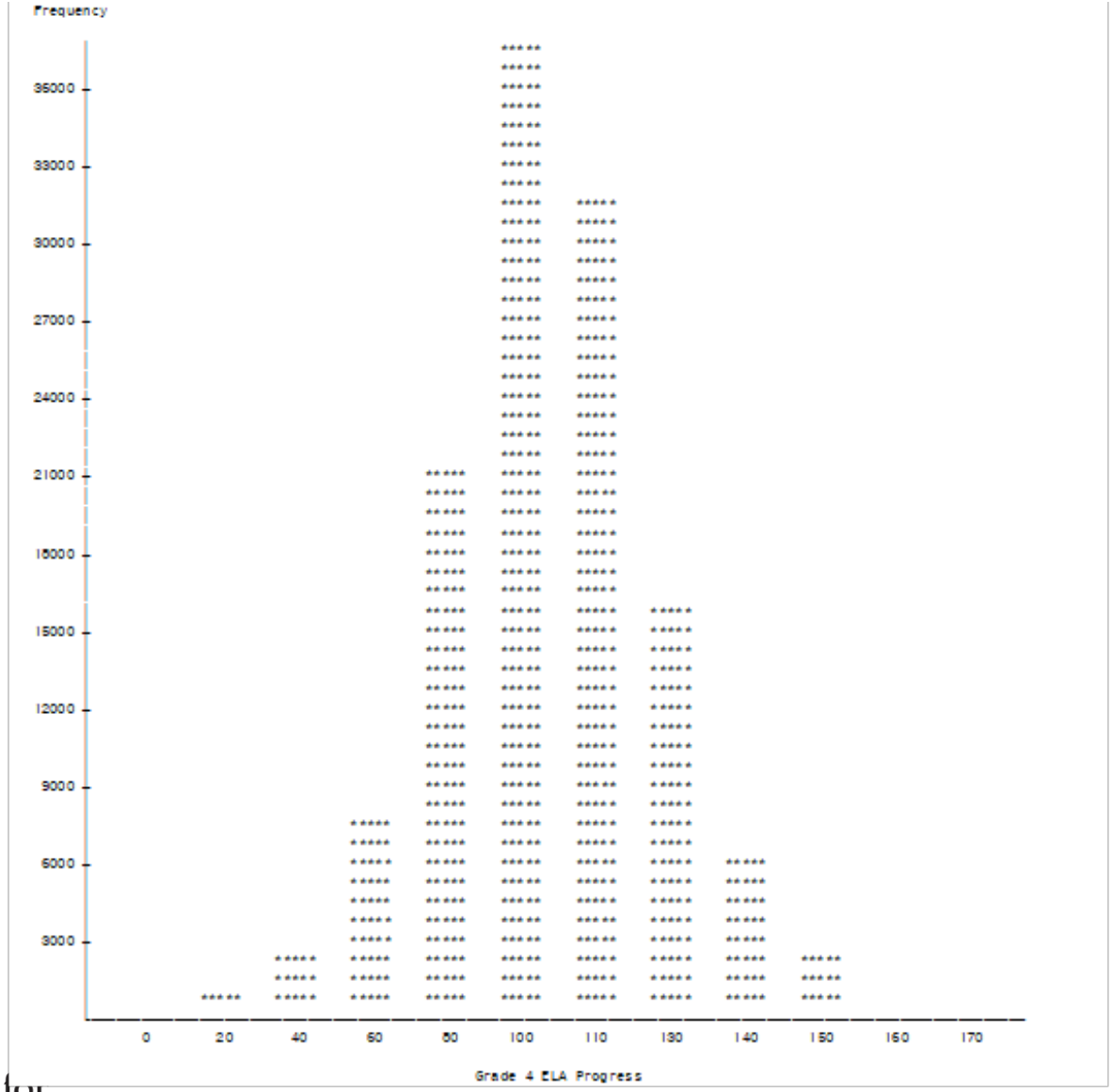
Grade 4 ELA School Level Summary (N=1931)				
	Minimum	Maximum	Mean	Std. Deviation
Option 1 – Status Heavy	45.90	146.70	101.39	14.42
Option 2 – Status Neutral	61.21	131.46	101.78	8.60
Option 3 – Status Light	75.15	153.65	125.23	9.76

Distribution of Student Growth – Option 1

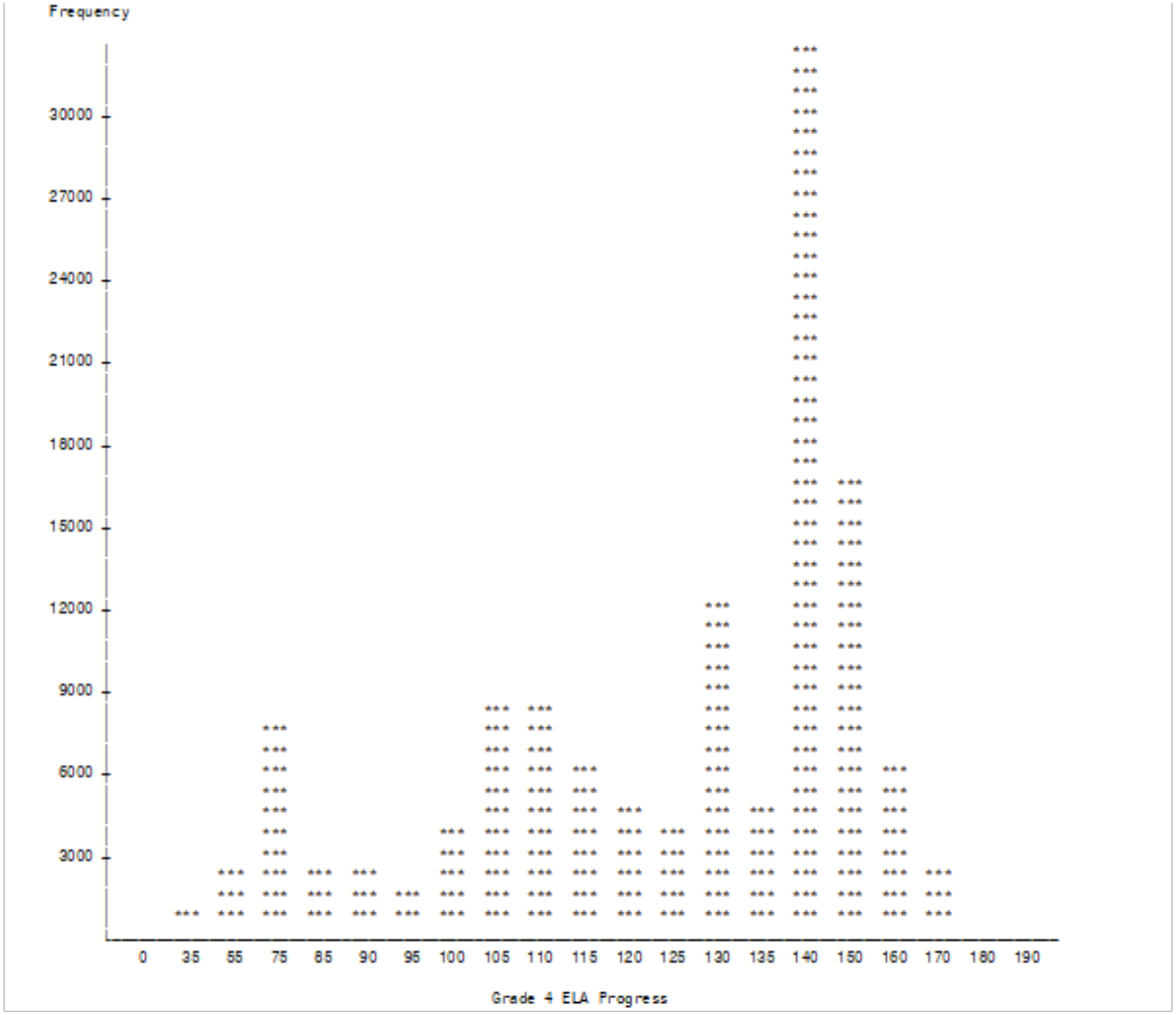


Center for Assessment

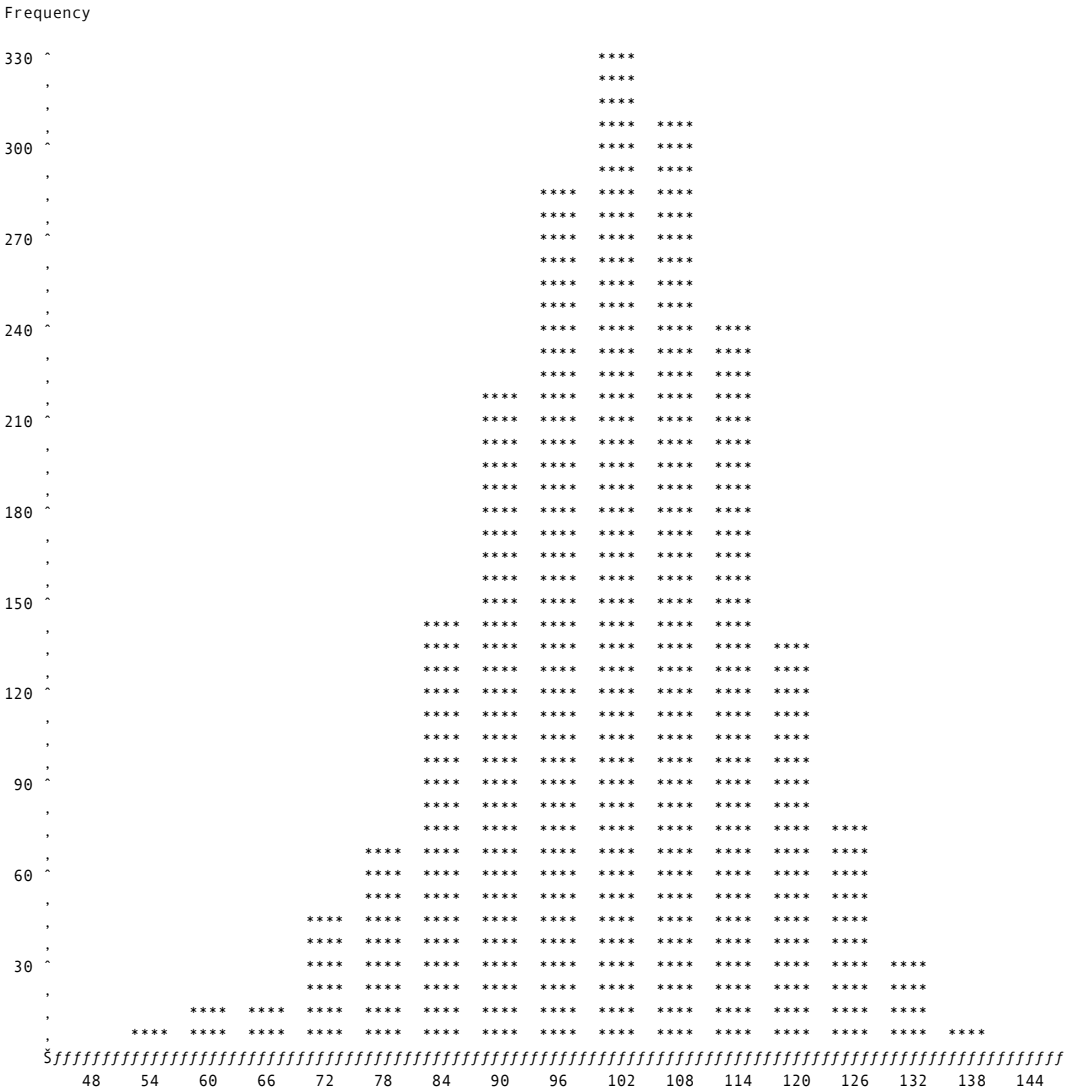
Distribution of Student Growth – Option 2



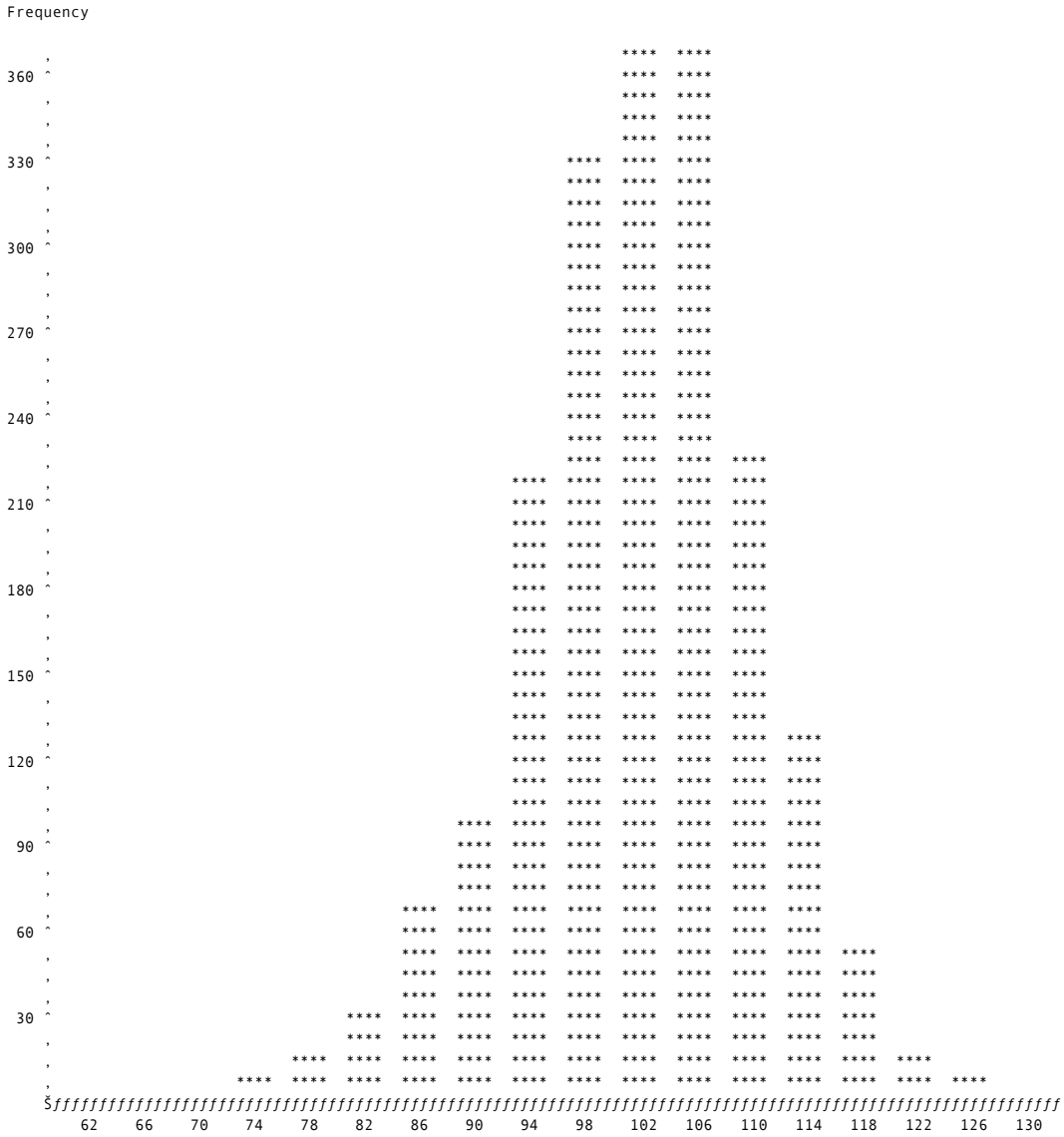
Distribution of Student Growth – Option 3



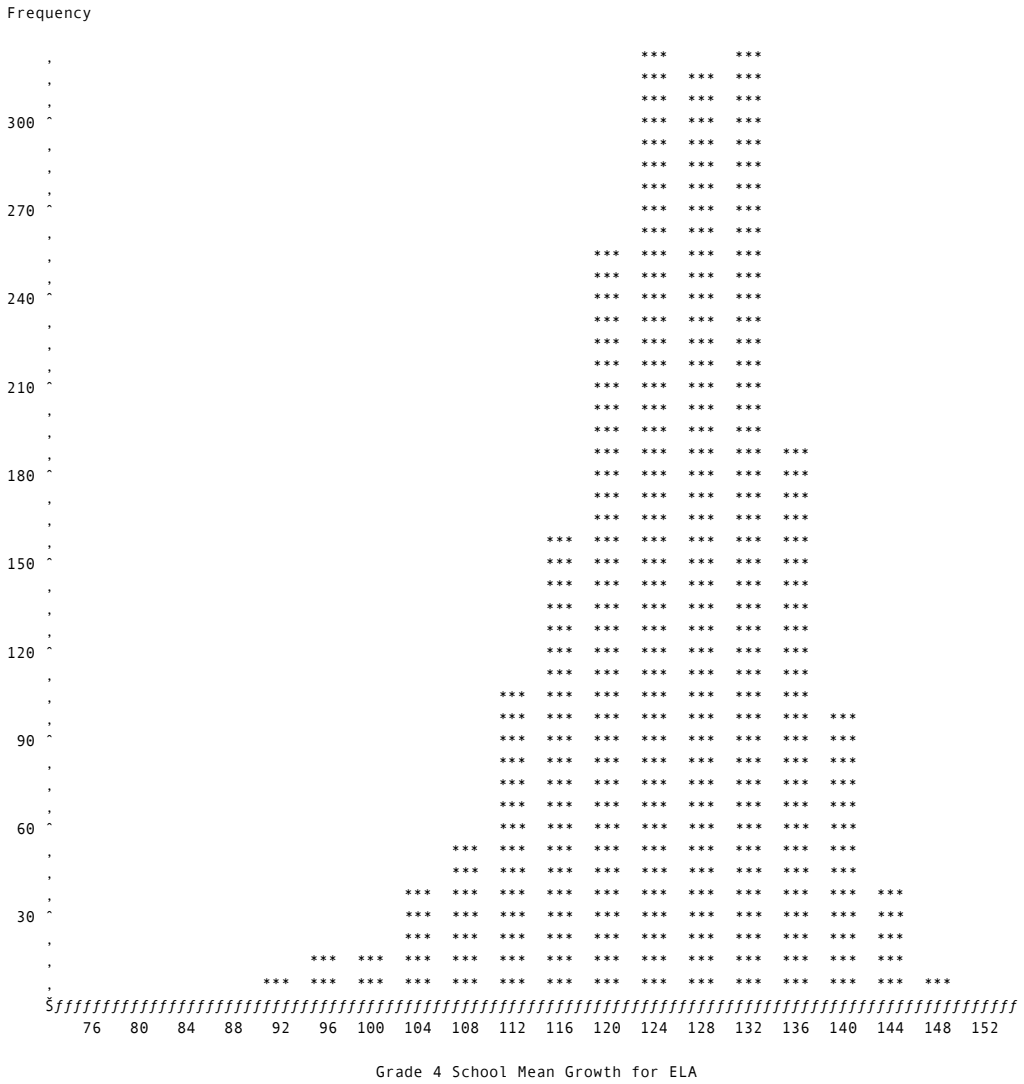
Grade 4 ELA School Growth Distribution – Option 1



Grade 4 ELA School Growth Distribution – Option 2



Grade 4 ELA School Growth Distribution – Option 2



Comparison of Correlations

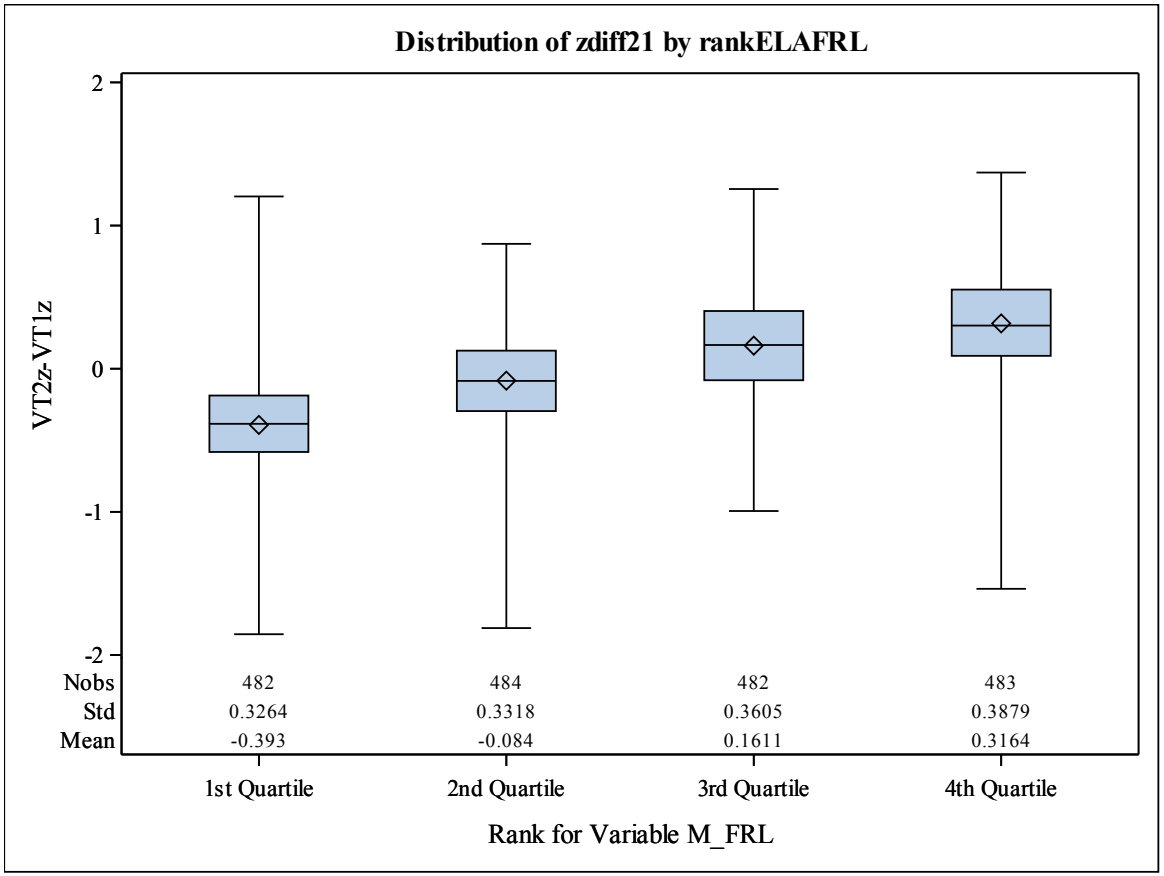
Correlation between school growth and…	Option 1: Status Heavy/ Inconsistent	Option 2: Status Neutral/ Consistent	Option 3: Status Light/Semi-Consistent
Prior Year Status	0.21**	-0.18**	0.11**
EL representation	-0.06*	0.09**	-0.01
SWD representation	-0.14**	-0.03	-0.11**
FRL representation	-0.39**	-0.11**	-0.33**

Grade 4 ELA School Growth: Correlations Across VT Options

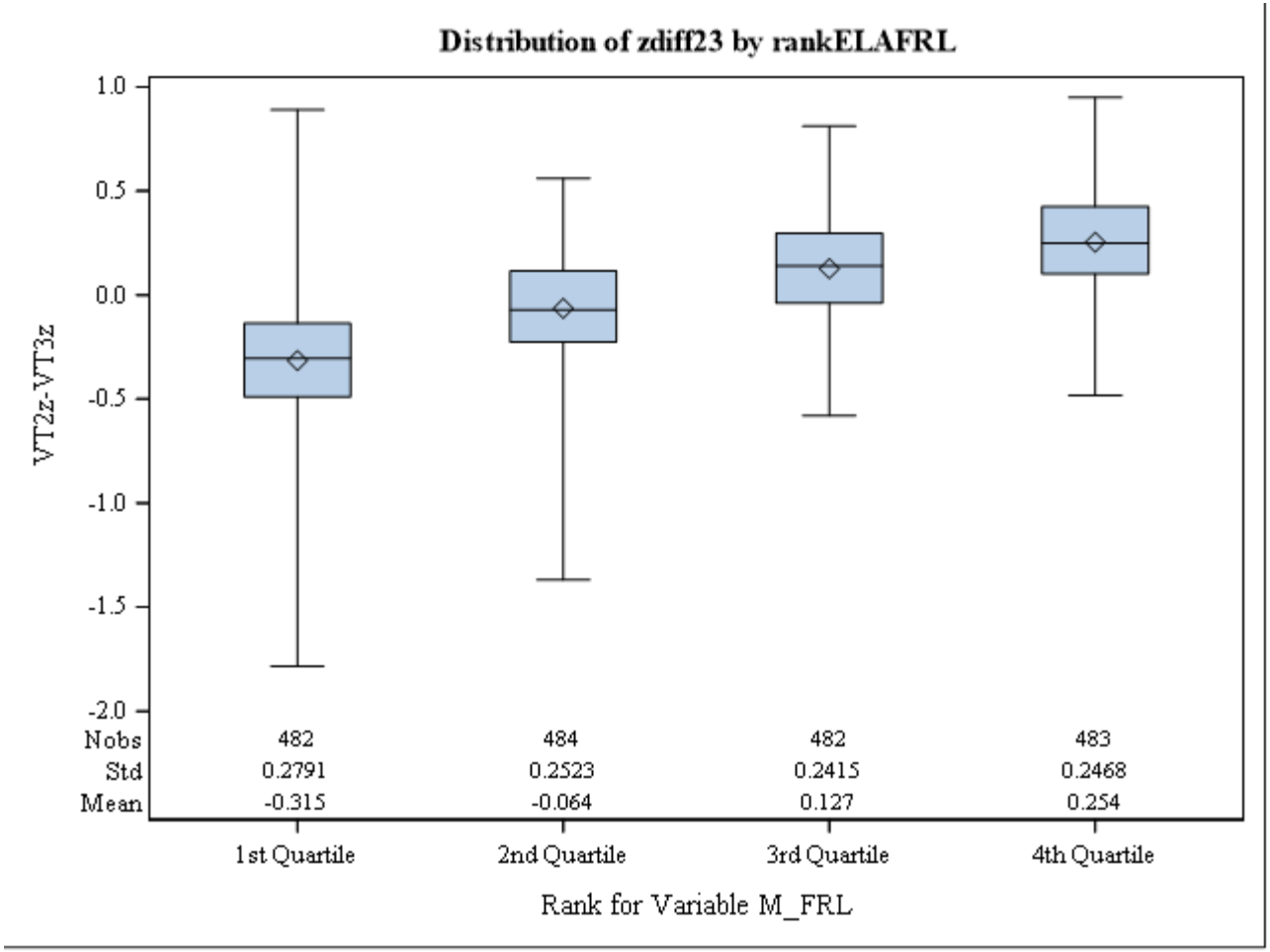
Pearson Correlation Coefficients, N = 1931 Prob > |r| under H0: Rho=0		
	Option 2: Status Neutral/Consistent	**Option 3: Status Light/ Semi-Consistent**
Option 1: Status Heavy/ Inconsistent	0.90 <.0001	0.98 <.0001
Option 2: Status Neutral/Consistent		0.94 <.0001

Comparison of Performance VT2 – VT1 by FRL Quartile

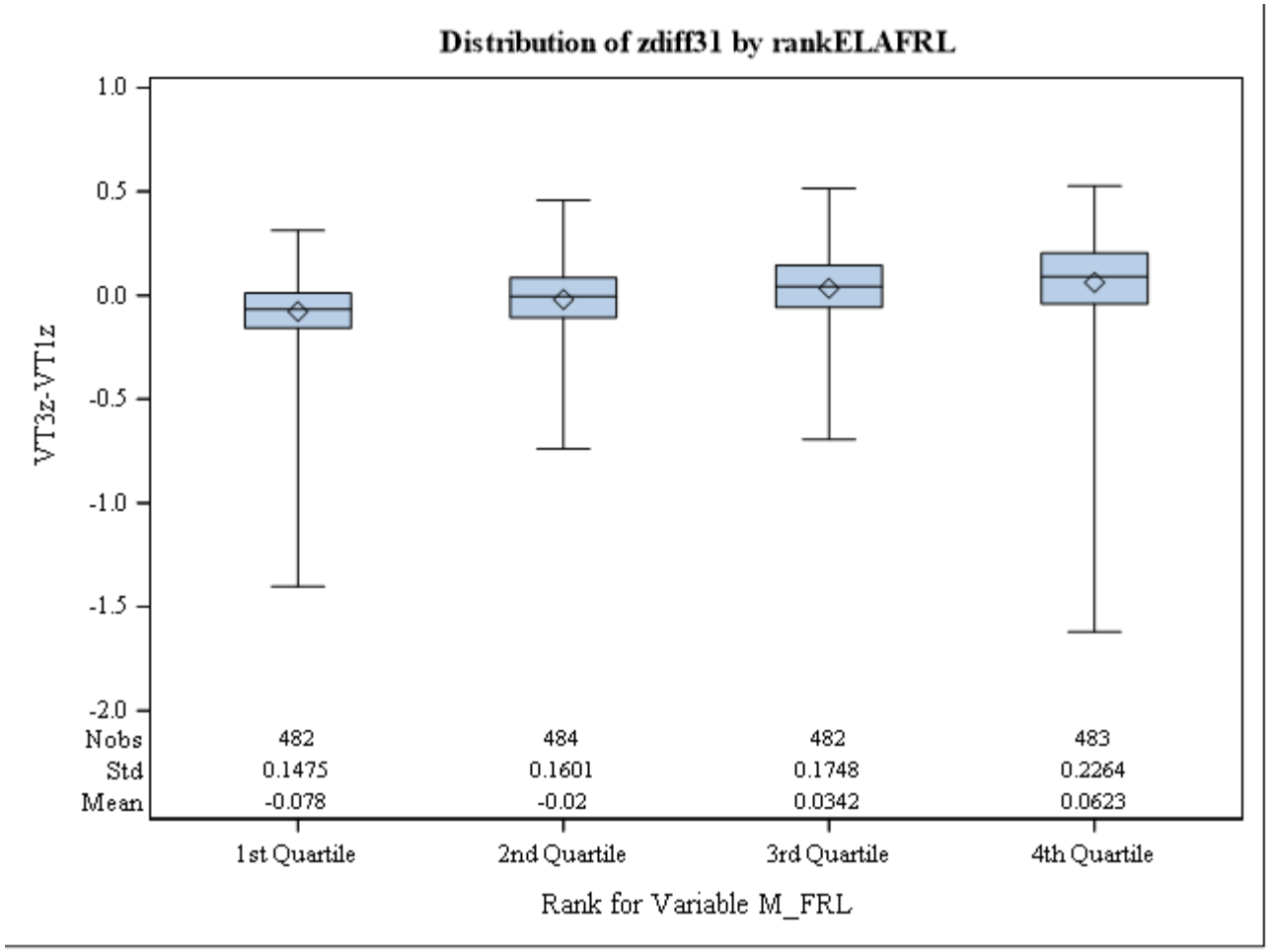
Difference in Z-score from VT2 - VT1 by FRL Quartile



Comparison of Performance VT2 – VT3 by FRL Quartile



Comparison of Performance VT3 – VT1 by FRL Quartile



Comparison of Year-to-Year Correlation (Reliability)

Value Table	Correlation
Option 1: Status Heavy/Inconsistent	0.03
Option 2: Status Neutral/ Consistent	-0.27**
Option 3: Status Light/ Semi-Consistent	-0.07*

Correlation Between Absolute Change in School Growth from Year 1 to Year 2 and N-Size

	Correlation
Option 1: Status Heavy	-0.13
Option 2: Status Neutral	-0.10
Option 3: Status Light	-0.13

TAC Discussion and Recommendations

- Considering the information presented today and in January, what model(s) are or are not promising for inclusion in the accountability system?
  - How do the models stack-up against the criteria TAC developed?
  - What are the advantages and disadvantages of each model?
- What guidance does the TAC have regarding developing model specifications and implementation?
- What guidance does the TAC have regarding establishing growth performance expectations?