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STRENGTHENING SOCIAL AND
EMOTIONAL HEALTH

Children's Institute Early Self-Regulation Kindergarten Parent-Reported Screening Instrument (CI-ESRKPSI): A five item parent-reported indicator that predicts academic performance 5 years later.

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NOVEMBER, 2012

CI -ESRKPSI | November 2012 | Number T12-019

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Purpose and objectives: The purpose of this brief technical report is to describe the technical psychometric properties of the Children's Institute Early Self-Regulation Kindergarten Parent-Reported Screening Instrument (CI – ESRKPSI). The ESRKPSI is a very brief, parent report, set of five questions that can be used by school districts to identify students entering kindergarten that are likely to need further in-depth assessment in Early Self-Regulation.

The objectives of the project were:

- (a) To make the measure as short as possible, so as to reduce district's and parent's costs in obtaining the information.
- (b) To ensure that the measure had an alpha reliability above .70, which is typically acceptable for screening measures.
- (c) To ensure that the measure could assess the low end of the Early Self-Regulation continuum, thus ceiling effects are expected for this type of construct.
- (d) To ensure that the measure is positively correlated with 4th grade English Language Arts and Mathematics New York State Assessments for the urban population.

Sample: The sample was obtained from a medium-sized city in upstate New York. At their children's registration prior to entry into kindergarten, parents or caregivers completed the Parent Appraisal of Children's Experiences (K-PACE), a screening instrument that assesses multiple domains. In 2004-05, 1,726 kindergarten PACEs were completed. After removal of forms that could not be matched with school district registration records, e.g., because of malformed identifiers, and duplicated records, 1,649 kindergarten students remained in the sample. In fourth grade, students completed NY State assessments of English Language Arts and Mathematics. Students could take the assessments later (e.g., because of retention) or, in rare cases, earlier, than the rest of the cohort, so test scores were obtained from the 2007-08 (N=7), 2008-09 (N=836), 2009-10 (N=323), and 2010-11 (N=11) school years, yielding 1,177 students who had both PACE and NYS ELA scores and 1,172 who had PACE and NYS Mathematics data. Of these, 30 students took the tests two consecutive years. After the second year's results were dropped, 1,147 students with ELA scores and 1,142 with Mathematics scores remained.

The final sample of students was 48% male, and 66% African-American, 21% Latino/Hispanic, and 15% White/not Hispanic. More than one race/ethnicity category could be selected.

Methods: Classical test analyses were used to identify the smallest collection of uni-dimensional items that targeted Early Self-Regulation. Next, Rasch analyses were performed to ensure that items were well-ordered and fit the model. Predictive validity was estimated against 4th grade NY standardized test scores in reading and mathematics, as well as grade retention based on district data.

Results:

- The overall alpha reliability of this 5 item measure was .77.
- The items were (in order of difficulty): this child hurts others; child is irritable, touchy or prickly; child fights with other children; child has short attention span; and child bothers other children. Because the items are all negative, a higher score indicates worse self-regulation.
- All items have good infit and outfit mean square estimates (in [.5, 1.5] range) and are close to expected values indicating good fit with the Rasch Andrich model.
- We collapse two categories in two items based on Rasch analyses. All items have categories that are progressively ordered.

- A table of norms is provided to convert raw scores from 5-18 to scale scores from 338 to 820.
- This brief self-regulation measure is correlated with 4th grade NY state English Language Arts scale scores, and with 4th grade NY state Mathematics scale scores.
- The measure is also correlated with having repeated a grade by 4th grade.
- As expected the measure has floor effects.
- A cutoff was selected. Students above the cutoff (worse self-regulation, about 15% of sample) were significantly at higher risk of academic failure five years later:
 - They were 2.3 times more likely to fail the ELA exam five years later.
 - They were 3.2 times more likely to fail mathematics state assessment.
 - They were 2.5 times more likely to score in level 1 in the ELA exam.
 - They were 4.0 times more likely to score in level 1 in the mathematics exam.
 - They were also 2.0 times more likely to repeat a grade in the study period.

Conclusion:

The CI-ESRKSI is a short (5 item) parent-reported questionnaire that is reliable, well ordered and correlated with third party administered official test score data five years after the assessment took place and with grade retention in the five year period of time.

Students above its high-risk cutoff score were two to three times more likely to fail the mathematics and ELA assessments five year later, as well as twice as likely to repeat a grade in the study period.

School districts can use this brief instrument to provide parents with an opportunity to share their views of their child's literacy at entrance into kindergarten, and can use the information to screen children who need an intervention plan to improve academic outcomes in elementary school.

Because the information is obtained from parents, it is anticipated that parents would be happy to have a responsive school contact them about the needs they have expressed. The information in this report indicates that absent successful identification and intervention, more than half of the students identified with the measure will fail academically by 4th grade.

Odds Ratios predicting academic failure for students below cutoff:

Table 1 shows the odds ratios and associated 95% confidence intervals.

Table 1. Odds of failing for students above cutoff score (worse self-regulation).

	N	OR	95% Confidence Interval	
Failing ELA	739	2.27	1.44	3.58
Failing Mathematics	736	3.15	2.00	4.97
ELA level 1	739	2.52	1.15	5.51
Mathematics Level 1	736	4.02	2.18	7.40
Repeating a grade	1005	2.09	1.44	3.01

Note: OR odds ratio. All ORs were stat. significant at $p < .01$ Computation on ELA and mathematics only for students who did not repeat a grade.

Students who scored above the cutoff were 2.3 times more likely to fail the ELA exam, 3.2 times more likely to fail mathematics state assessment, 2.5 times more likely to score in level 1 in the ELA exam, and 4 times more likely to score in level 1 in the mathematics exam. They were also 2.1 times more likely to repeat a grade in the study period. Importantly, all these assessments happened five years after the parent completed the scale. Therefore, **these students can be considered to be at substantially higher risk of academic failure.**

Predictive validity:

Raw ELSI score (higher is worse) correlations with district academic data (5 years from assessment):

	n	Predictive Validity	Significance
4 th ELA scale score	739	-0.15	$p < .01$
4 th Mathematics scale score	736	-0.15	$p < .01$
Repeat grade in 5 year period	1005	0.13	$p < .01$

Note: Computation on ELA and mathematics only for students who did not repeat a grade.

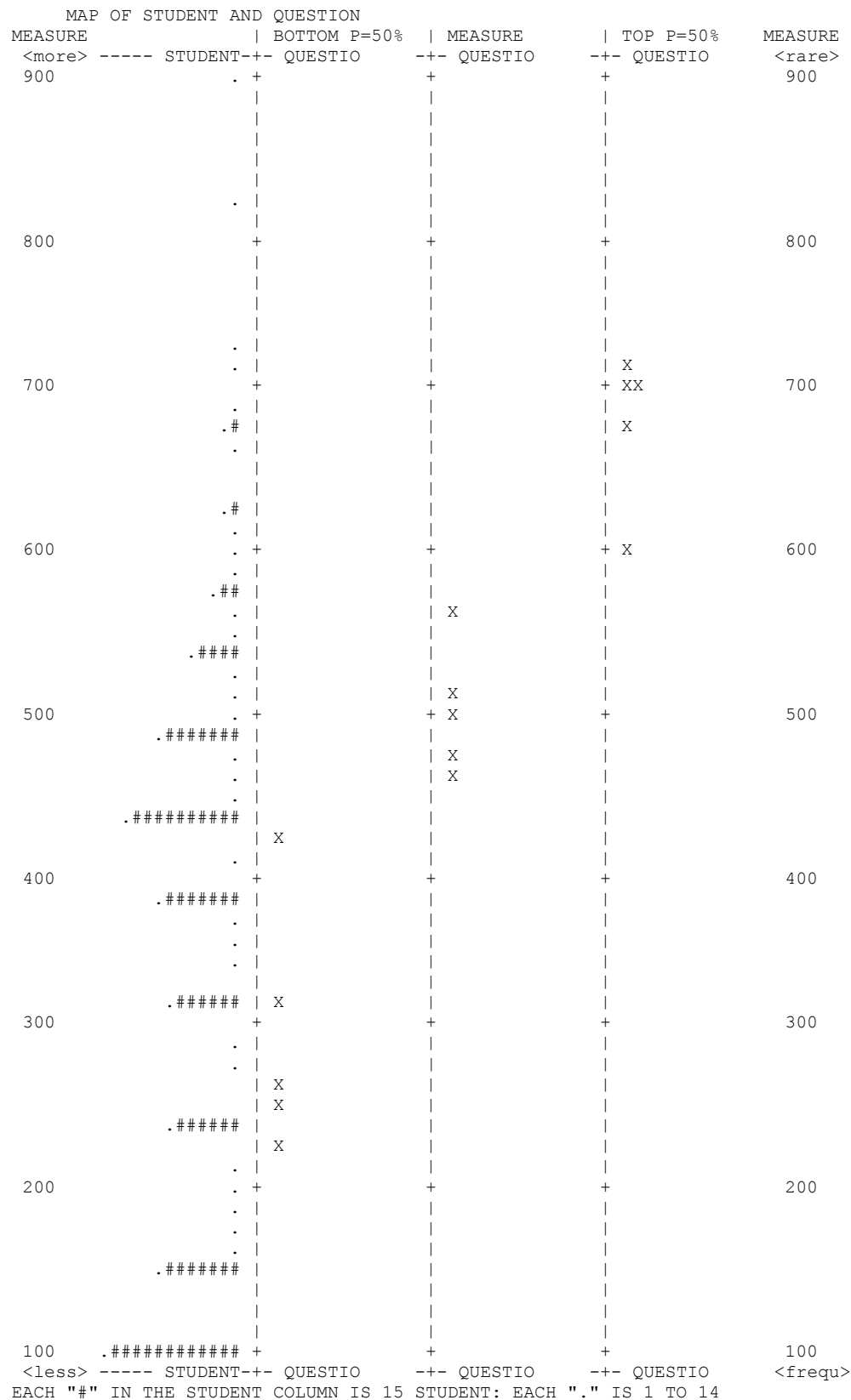
The measure was correlated in the expected direction.

CTT analysis:

Alpha reliability = .77

Factor structure: 1 factor.

Rasch analysis:



STUDENT - MAP - QUESTION
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EXPECTED SCORE: MEAN (Rasch-score-point threshold, ":" indicates Rasch-half-point threshold)

(ILLUSTRATED BY AN OBSERVED CATEGORY)

100	200	300	400	500	600	700	800	900	NUM	QUESTION
-----+-----+-----+-----+-----+-----+-----+-----+-----										
1		1	:	2	:	3		3	16	I16 hurts
1	1	:	2	:	3	:	4	4	19	I19 irritable
1	1	:	2	:	3	:	4	4	15	I15 fights
1	1	:	2	:	3	:	4	4	17	I17 inattention
1	1	:	2	:	3			3	18	I18 bothers
-----+-----+-----+-----+-----+-----+-----+-----+-----									NUM	QUESTION
100	200	300	400	500	600	700	800	900		

1	1	1	1	1	1																					
8	1	0	1	9	1	6	1	6	3	2	1															
3	9	13	22	3	50	31	11	11	0	34	27	15	4	35	17	52	22	2	24	1	7	11	6	4	4	STUDENT
	S			M				S					T													
0	20	30	40	50	70	80	90						99													PERCENTILE

OBSERVED AVERAGE MEASURES FOR STUDENT (scored) (ILLUSTRATED BY AN OBSERVED CATEGORY)

100	200	300	400	500	600	700	800	900	NUM	QUESTION
-----+-----+-----+-----+-----+-----+-----+-----+-----										
		1		2		3			16	I16 hurts
	1		2	3	4				19	I19 irritable
	1		2	3	4				15	I15 fights
	1		2	3	4				17	I17 inattention
	1		2	3					18	I18 bothers
-----+-----+-----+-----+-----+-----+-----+-----+-----									NUM	QUESTION
100	200	300	400	500	600	700	800	900		

1	1	1	1	1	1																					
8	1	0	1	9	1	6	1	6	3	2	1															
3	9	13	22	3	50	31	11	11	0	34	27	15	4	35	17	52	22	2	24	1	7	11	6	4	4	STUDENT
	S			M				S					T													
0	20	30	40	50	70	80	90						99													PERCENTILE

SUMMARY OF 1110 MEASURED (EXTREME AND NON-EXTREME) STUDENT

	TOTAL		MEASURE	MODEL ERROR	INFIT		OUTFIT	
	SCORE	COUNT			MNSQ	ZSTD	MNSQ	ZSTD
MEAN	8.5	4.9	328	101				
S.D.	2.8	.5	196	42				
MAX.	18.0	5.0	955	211				
MIN.	1.0	1.0	10	68	.00	-2.7	.00	-2.6
REAL RMSE	117	TRUE SD	157	SEPARATION	1.34	STUDEN	RELIABILITY	.64
MODEL RMSE	109	TRUE SD	163	SEPARATION	1.49	STUDEN	RELIABILITY	.69
S.E. OF STUDENT MEAN = 6								

STUDENT RAW SCORE-TO-MEASURE CORRELATION = .91

CRONBACH ALPHA (KR-20) STUDENT RAW SCORE "TEST" RELIABILITY = .79

ENTRY	TOTAL	TOTAL	MODEL	INFIT	OUTFIT	PT-MEASURE	EXACT MATCH							
NUMBER	SCORE	COUNT	MEASURE	S.E.	MNSQ	ZSTD	MNSQ	ZSTD	CORR.	EXP.	OBS%	EXP%	QUESTION	G
17	2075	1078	475	5	1.14	2.8	1.15	3.1	A .74	.75	55.8	58.8	I17 inattention	Y
19	1948	1068	511	6	1.11	2.1	1.11	2.3	B .71	.74	61.8	60.8	I19 irritable	Y
15	2029	1087	496	6	1.04	.9	1.10	2.1	C .71	.75	60.6	59.3	I15 fights	Y
18	1790	1075	457	6	.89	-2.6	.86	-3.1	b .74	.70	72.9	64.5	I18 bothers	Z
16	1563	1092	561	7	.80	-4.7	.76	-4.0	a .69	.62	79.4	68.5	I16 hurts	Z
MEAN	1881.0	1080.0	500	6	.99	-.3	1.00	.1			66.1	62.4		
S.D.	186.2	8.6	36	0	.13	2.9	.16	3.0			8.7	3.7		

ENTRY	DATA	SCORE	DATA	AVERAGE	S.E.	OUTF	PTMEA		
NUMBER	CODE	VALUE	COUNT	%	ABILITY	MEAN	MNSQ	CORR.	QUESTION
17	A	1	416	39	147.94	6.83	1.0	-.72	I17 inattention
		2	395	37	382.90	5.58	.9	.23	
		3	199	18	495.27	7.76	1.0	.42	
		4	68	6	573.47	17.94	1.4	.33	
		MISSING ***	63	6#	430.60	35.47		.09	
19	B	1	425	40	155.16	7.21	1.0	-.71	I19 irritable
		2	441	41	405.87	5.33	1.0	.34	
		3	167	16	498.79	9.00	1.2	.38	
		4	35	3	595.20	31.16	1.7	.25	
		MISSING ***	73	6#	358.59	30.58		.03	
15	C	1	387	36	146.86	7.52	1.1	-.68	I15 fights
		2	496	46	386.43	5.36	1.1	.28	
		3	166	15	497.19	9.75	1.2	.37	
		4	38	3	615.65	29.02	1.4	.28	
		MISSING ***	54	5#	421.50	41.85		.07	
18	b	1	498	46	172.73	6.88	.9	-.73	I18 bothers
		2	439	41	430.03	4.20	.5	.44	
		4	34	3	489.53	34.99	2.1	.15	
		3	104	10	570.69	11.16	.8	.41	
		MISSING ***	66	6#	380.66	31.12		.05	
16	a	1	687	63	225.08	6.19	.8	-.67	I16 hurts
		2	339	31	474.05	4.23	.5	.50	
		4	16	1	599.48	44.71	1.3	.17	
		3	50	5	633.60	20.49	1.0	.34	
		MISSING ***	49	4#	417.71	42.36		.06	

Missing % includes all categories. Scored % only of scored categories

TABLE OF MEASURES ON TEST OF 5 QUESTION

SCORE	MEASURE	S.E.	SCORE	MEASURE	S.E.	SCORE	MEASURE	S.E.
5	10E	189	10	436	74	15	679	73
6	147	112	11	488	71	16	739	82
7	243	89	12	537	69	17	824	108
8	315	81	13	583	68	18	955E	187
9	378	78	14	630	69			

CURRENT VALUES, UMEAN=500.0000 USCALE=100.0000

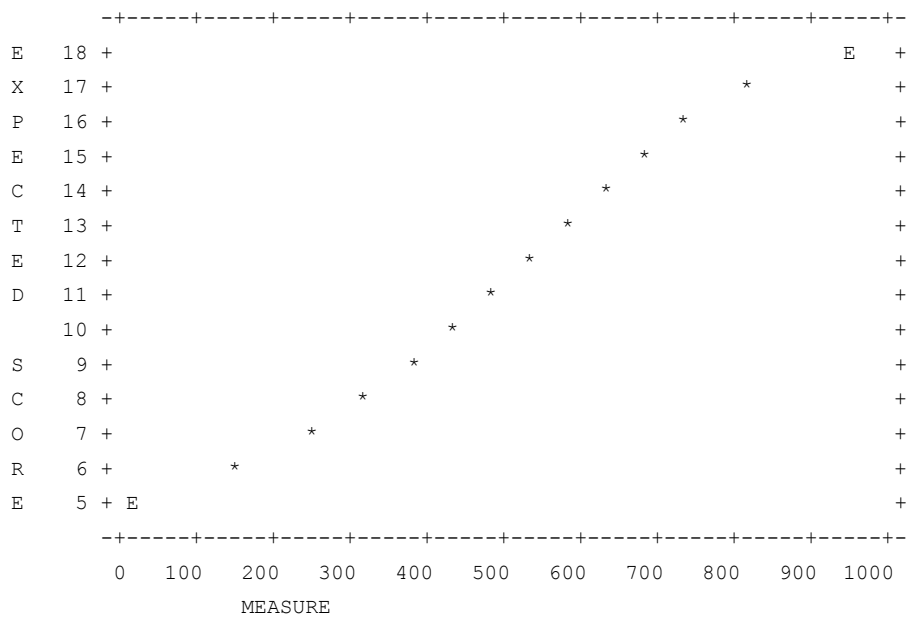
TO SET MEASURE RANGE AS 0-100, UMEAN=51.8480 USCALE=10.5724

TO SET MEASURE RANGE TO MATCH RAW SCORE RANGE, UMEAN=11.7402 USCALE=1.3744

Predicting Score from Measure: Score = Measure * .0156 + -1.2814

Predicting Measure from Score: Measure = Score * 62.6518 + 90.2620

RAW SCORE-MEASURE OGIVE FOR COMPLETE TEST



1	1	1	1	1	1	1	1	1	1	1
6	1	0	9	1	6	1	6	3	2	1
STUDEN	9661	1	193222	3576121304	1954547243224	17116	4	4		
		S		M		S		T		
%TILE	0	10	20	30	40	50	70	80	90	99
QUESTI						1	111	1		
						T	S	M	S	T
%TILE						0	60	80	99	

TABLE OF SAMPLE NORMS (500/100) AND FREQUENCIES CORRESPONDING TO COMPLETE TEST

SCORE	MEASURE	S.E.	NORMED	S.E.	FREQUENCY	%	CUM.FREQ.	%	PERCENTILE
5	10E	189	338	96	182	16.4	182	16.4	8
6	147	112	408	57	127	11.4	309	27.8	22
7	243	89	457	45	111	10.0	420	37.8	33
8	315	81	493	42	106	9.5	526	47.4	43
9	378	78	526	40	114	10.3	640	57.7	53
10	436	74	555	38	174	15.7	814	73.3	65
11	488	71	582	36	125	11.3	939	84.6	79
12	537	69	607	35	72	6.5	1011	91.1	88
13	583	68	630	35	39	3.5	1050	94.6	93
14	630	69	654	35	26	2.3	1076	96.9	96
15	679	73	679	37	19	1.7	1095	98.6	98
16	739	82	709	42	7	.6	1102	99.3	99
17	824	108	753	55	4	.4	1106	99.6	99
18	955E	187	820	95	4	.4	1110	100.0	99

THE NORMED SCALE IS EQUIVALENT TO UIMEAN= 332.6817 USCALE= .5101