The logo for Children's Institute is located in the top left corner, featuring the text "children's institute" in a white serif font on a dark blue background. Below the logo is a decorative graphic consisting of a vertical yellow bar on the left and a series of small, light green dots that form a curved path across the top and bottom of the page. The dots start at the top left, curve across the top, and then curve back down to the bottom right.

children's
institute

STRENGTHENING SOCIAL AND
EMOTIONAL HEALTH

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

GUILLERMO MONTES, PH.D.
BOHDAN S. LOTYCZEWSKI
A.DIRK HIGHTOWER, PH.D.

NOVEMBER, 2012

CI -ELKPSI | November 2012 | Number T12-018

©2012 CHILDREN'S INSTITUTE INC., 274 N. GOODMAN STREET, SUITE D103, ROCHESTER, NY 14607 | ALL RIGHTS RESERVED

Children's Institute Early Literacy Kindergarten Parent-Reported Screening Instrument (CI-ELKPSI)

GUILLERMO MONTES, PH.D.
BOHDAN S. LOTYCZEWSKI
A.DIRK HIGHTOWER, PH.D.

NOVEMBER, 2012

children's
institute



www.childrens institute.net

CI - ELKPSI | November 2012 | Number T12-018

©2012 CHILDREN'S INSTITUTE INC., 274 N. GOODMAN STREET, SUITE D103, ROCHESTER, NY 14607 | ALL RIGHTS RESERVED

Purpose and objectives: The purpose of this brief technical report is to describe the technical psychometric properties of the Children's Institute Early Literacy Kindergarten Parent-Reported Screening Instrument (CI – ELKPSI). The ELKPSI is a very brief, parent report, a set of four questions that can be used by school districts to identify students entering kindergarten that are likely to need academic intervention in early literacy.

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 literacy 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 literacy. 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 4 item measure was .82.
- The items were in orders of difficulty: child can read simple words, child can write his or her first or last name by self, child can identify written alphabet letters by him or herself, and child reads his or her own written name.
- All items have good infit and outfit mean square estimates (in the [.5, 1.5] range) and are close to expected values indicating good fit with the Rasch Andrich model.
- All items have categories that are progressively ordered.
- A table of norms is provided to convert raw scores from 4-16 to scale scores from 331 to 721.

- The 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 correlated with having repeated a grade by 4th grade.
- As expected the measure has ceiling effects.
- A cutoff was selected. Students below the cutoff were significantly at higher risk of academic failure five years later:
 - They were 2.7 times more likely to fail the ELA exam five years later.
 - They were 2.3 times more likely to fail mathematics state assessment.
 - They were almost 4 times (3.9) more likely to score in level 1 in the ELA exam.
 - They were 3.6 times more likely to score in level 1 in the mathematics exam.
 - They were also 2.9 times more likely to repeat a grade in the study period.

Conclusion:

The CI-ELKSI is a short (4 item) parent-reported questionnaire that is highly 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 below its high-risk cutoff score were two to four times more likely to fail the mathematics and ELA assessments five year later, as well as three times more 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 aggressive 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, students will be likely to 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 below cutoff score.

	n	OR	95% Confidence Interval	
Failing ELA	835	2.72	1.83	4.02
Failing Mathematics	833	2.29	1.54	3.40
ELA level 1	835	3.90	1.99	7.64
Mathematics Level 1	833	3.60	2.06	6.29
Repeating a grade	1141	2.88	2.12	3.92

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 below cutoff were 2.7 times more likely to fail the ELA exam five years later, 2.3 times more likely to fail mathematics state assessment, almost 4 times (3.9) more likely to score in level 1 in the ELA exam, and 3.6 times more likely to score in level 1 in the mathematics exam. They were also 2.9 times more likely to repeat a grade in the study period. Therefore, **these students can be considered to be at substantially higher risk of academic failure.**

Predictive validity:

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

	n	Predictive Validity	Significance
4 th ELA scale score	757	0.33	$p < .01$
4 th Mathematics scale score	758	0.26	$p < .01$
Repeat grade in 5 year period	1031	-0.25	$p < .01$

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 = .82

Factor structure: 1 factor.

OBSERVED AVERAGE MEASURES FOR STUDENT (unscored) (BY OBSERVED CATEGORY)

200	300	400	500	600	700	800	NUM	QUESTION
	1	m	2	3	4	5	I5 words	
	1	m	2	3	4	8	I8 write name	
	1	2	m	3	4	4	I4 letters	
	1	m2	3	4	2	I2 reads name		
							NUM QUESTION	

Code for unidentified missing data: m

1	1											
3	9	8	0	9	7	8	7	8	5	5	3	5
9	6	1	2	2	3	7	1	2	1	2	7	6
S			M					S				
0	20		30	40	50	60	70	80	90		99	PERCENTILE

SUMMARY OF 1115 MEASURED (EXTREME AND NON-EXTREME) STUDENT

	TOTAL		MODEL		INFIT		OUTFIT		
	SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	MNSQ	ZSTD	
	MEAN	8.8	3.9	439	97				
	S.D.	3.6	.3	212	44				
	MAX.	16.0	4.0	906	197				
	MIN.	1.0	1.0	82	64	.00	-2.3	.00	-2.3
	REAL RMSE	112	TRUE SD	180	SEPARATION	1.61	STUDEN RELIABILITY	.72	
	MODEL RMSE	106	TRUE SD	183	SEPARATION	1.72	STUDEN RELIABILITY	.75	
	S.E. OF STUDENT MEAN = 6								

STUDENT RAW SCORE-TO-MEASURE CORRELATION = .96

CRONBACH ALPHA (KR-20) STUDENT RAW SCORE "TEST" RELIABILITY = .82

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
5	1811	1081	647	6	1.09	1.6	1.04	.6	A .73	.74	60.8	63.8	I5 words
8	2318	1088	524	5	1.04	1.0	1.01	.2	B .79	.79	53.4	52.5	I8 write name
2	3033	1099	375	5	.98	-.4	1.00	.0	b .81	.81	51.8	54.1	I2 reads name
4	2643	1092	455	5	.90	-2.2	.88	-2.4	a .82	.81	55.1	51.6	I4 letters
MEAN	2451.3	1090.0	500	5	1.00	.0	.98	-.4			55.3	55.5	
S.D.	448.0	6.5	100	0	.07	1.5	.06	1.2			3.4	4.9	

ENTRY NUMBER	DATA CODE	SCORE VALUE	DATA COUNT	%	AVERAGE ABILITY	S.E. MEAN	OUTF MNSQ	PTMEA CORR.	QUESTION
5 A	1	1	651	60	324.88	6.38	1.0	-.66	I5 words
	2	2	220	20	518.66	7.02	.9	.19	
	3	3	120	11	625.15	9.16	1.0	.31	
	4	4	90	8	812.97	13.88	1.9	.53	
	MISSING	***	60	5#	475.02	31.73		.03	
8 B	1	1	451	41	266.46	6.83	1.0	-.69	I8 write name
	2	2	257	24	447.76	6.37	1.0	.02	
	3	3	167	15	568.14	6.96	.7	.26	
	4	4	213	20	700.90	10.06	1.2	.61	
	MISSING	***	53	5#	389.69	40.46		-.04	
2 b	1	1	232	21	160.95	6.81	.9	-.68	I2 reads name
	2	2	220	20	361.23	6.65	1.0	-.19	
	3	3	227	21	475.22	6.91	1.1	.08	
	4	4	420	38	617.97	7.38	1.0	.66	
	MISSING	***	42	4#	356.45	36.89		-.05	
4 a	1	1	303	28	213.27	7.72	1.0	-.66	I4 letters
	2	2	304	28	392.73	5.81	.9	-.14	
	3	3	208	19	519.24	6.39	.8	.18	
	4	4	277	25	679.71	8.54	.9	.66	
	MISSING	***	49	4#	419.33	37.79		-.01	

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

TABLE OF MEASURES ON TEST OF 4 QUESTION

SCORE	MEASURE	S.E.	SCORE	MEASURE	S.E.	SCORE	MEASURE	S.E.
4	81E	189	9	460	65	14	695	82
5	217	110	10	501	64	15	779	106
6	307	84	11	543	65	16	907E	185
7	367	73	12	587	68			
8	416	67	13	636	73			

CURRENT VALUES, UMEAN=500.0000 USCALE=100.0000

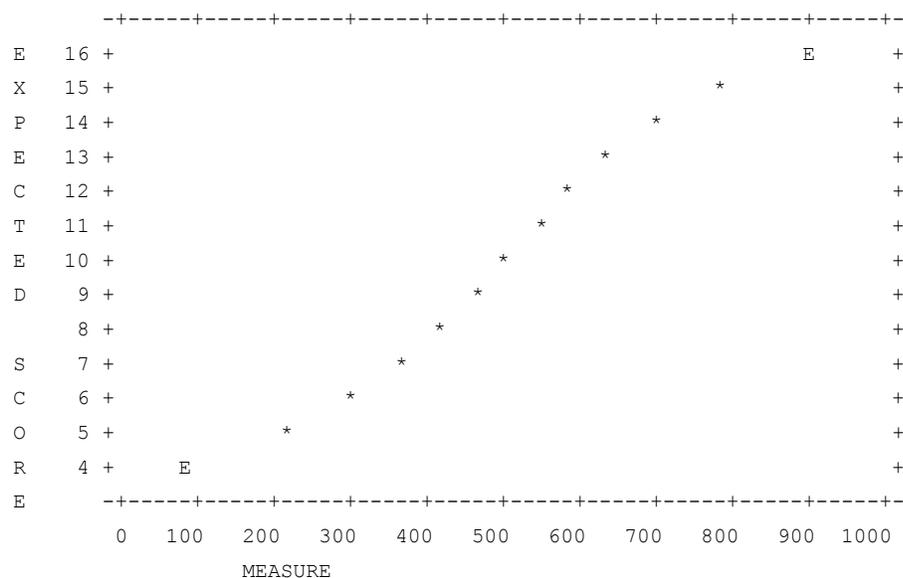
TO SET MEASURE RANGE AS 0-100, UMEAN=50.7248 USCALE=12.1086

TO SET MEASURE RANGE TO MATCH RAW SCORE RANGE, UMEAN=10.0870 USCALE=1.4530

Predicting Score from Measure: Score = Measure * .0168 + -2.3849

Predicting Measure from Score: Measure = Score * 57.9554 + 151.8831

RAW SCORE-MEASURE OGIVE FOR COMPLETE TEST



STUDEN	1	9	8	0	9	7	8	7	9	5	5	3	5
%TILE	0	10	20	30	40	50	60	70	80	90	99		
QUESTI				1	1	1		1					
%TILE				0	20	50	70	99					

TABLE 20.2 "Early Literacy Scale" OUT_____EL.txt Aug 18 12:32 2012
INPUT: 1141 STUDENT 27 QUESTION REPORTED: 1115 STUDENT 4 QUESTION 4 CATS WINSTEPS 3.73

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

SCORE	MEASURE	S.E.	NORMED	S.E.	FREQUENCY	%	CUM.FREQ.	%	PERCENTILE
4	81E	189	331	89	136	12.2	136	12.2	6
5	217	110	395	52	107	9.6	243	21.8	17
6	307	84	437	40	88	7.9	331	29.7	26
7	367	73	466	34	114	10.2	445	39.9	35
8	416	67	489	32	109	9.8	554	49.7	45
9	460	65	510	31	80	7.2	634	56.9	53
10	501	64	529	30	91	8.2	725	65.0	61
11	543	65	549	31	85	7.6	810	72.6	69
12	587	68	569	32	94	8.4	904	81.1	77
13	636	73	593	34	61	5.5	965	86.5	84
14	695	82	620	39	60	5.4	1025	91.9	89
15	779	106	660	50	37	3.3	1062	95.2	94
16	907E	185	721	87	53	4.8	1115	100.0	98

THE NORMED SCALE IS EQUIVALENT TO UIMEAN= 292.7208 USCALE= .4717