Criterion-Prediction Validity of the Test of Silent Contextual Reading Fluency

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The *Test of Silent Contextual Reading Fluency* (TOSCRF) (Hammill, Wiederholt, & Allen, 2006) is a quick measure of reading ability which is composed of an Examiner's Manual and four equivalent forms (A, B, C, D). The test can be administered in 10 minutes and provides raw scores, standard scores, percentiles, and age/grade equivalents. It was normed on a representative sample of 1,898 students ranging from 7 years, 0 months to 18 years, 11 months in age who each were administered all four forms of the TOSCRF. These students resided in 23 states. The TOSCRF can be used by classroom teachers, special education teachers, reading specialists, school psychologists, speech pathologists, or any other persons who have some training in standardized test administration.

The TOSCRF measures the speed with which a student can identify words in a series of printed passages, in which all spaces and punctuation have been removed. Students are given 3 minutes to draw lines between as many words as possible. Each form can be administered to one student or to an entire classroom in approximately 10 minutes.

Scoring the TOSCRF begins with the last row the student attempted and continues backwards until the point at which the student has correctly identified all the words in one passage or until all words have been scored. A word is correctly identified when a line is clearly drawn separating the word from another word. The student receives credit for all the words from Passage 1 to the completely correct passage and is awarded one point for each word correctly identified after that correct passage. When a student does not indentify all the words correctly in any of the attempted passages, the total TOSCRF raw score is the total number of correctly identified words. Using the student's raw score, the examiner can derive a percentile rank, standard score, descriptive rating of the test's standard score, and age and grade equivalents.

Since the publication of the TOSCRF, seven studies have correlated this test to well-known criterion reading measures. The demographic characteristics of the samples used in these studies are described in Table 1.

These studies have examined the relationship of the TOSCRF to the following measures:

- *Gray Oral Reading Test—Fourth Edition* (GORT-4) (Wiederholt & Bryant, 2001)

- *Group Reading Assessment and Diagnostic Evaluation* (GRADE) (Williams, 2001)

- *Stanford Achievement Test Series-Ninth Edition* (SAT9) (Stanford; Harcourt Brace Educational Measurement, 1996)

- *Test of Adolescent and Adult Language—Fourth Edition* (TOAL-4) (Hammill, Brown, Larsen, Wiederholt, 2007)

- *Test of Silent Reading Efficiency and Comprehension* (TOSREC) (Wagner, Torgesen,

Rashotte, & Pearson, 2010)

- *Test of Silent Word Reading Fluency* (TOSWRF) (Mather, Hammill, Allen, & Roberts, 2004)

- *Test of Word Reading Efficiency* (TOWRE) (Torgesen, Wagner, & Rashotte, 1999)

- *Wide Range Achievement Test, Third Edition* (WRAT-3) (Wilkinson,1993)

- *Woodcock-Johnson III Achievement Test* (WJ III) (Woodcock, McGrew, and Mather, 2001).

This presentation summarizes this research and provides three types of evidence: (a) a review of correlation coefficients showing the relationship between TOSCRF and the criterion measures, (b) a comparison of the means of the TOSCRF and those of the criterion measures, and (c) the results of a series of binary classification analyses.

The results, reported in Tables 2 through 4 and Figure 1, indicate: (1) that the TOSCRF possesses a Large to Very Large relationship with the criterion measures; (2) that for all practical purposes, regardless of the samples' characteristics or the criterion test administered, the standard scores that result from administering the TOSCRF will be similar to those obtained from administering the criterion tests; (3) that the TOSCRF is highly predictive of reading ability.

In summary, professionals recognize the critical role fluency plays in reading proficiency (Kuhn & Stahl, 2003; National Reading Panel, 2000; Wolf, 2001). The TOSCRF incorporates many essential comprehension abilities, including word identification, word meaning (vocabulary), word building (morphology), sentence structure (syntax), and relational meaning (comprehensions). Mastery of these abilities enable the student to mentally "chunk" printed phrases, anticipate the writer's intentions, and automatize words, phrases, and sentences, all of which are necessary for the development of fluent (i.e., accurate and speedy) silent reading of contextual material. While the validation of a measure is always ongoing, the data presented here indicate that the TOSCRF is a promising new measure of reading ability which adds significantly to the assessment of children's reading ability, to the prediction of reading performance across multiple domains (fluency, comprehension, sight recognition), and to directing of interventions (particularly at younger ages when such identification is critical to remediation).

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Table 1 *Characteristics of the Four Samples Used in the Validity Studies*

Sample Characteristic	Study and criterion test						
	1	2	3	4	5	6	7
	WJ III	GORT-4, SAT-9	TOSWRF	TOWRE	TOSWRF, WRAT-III, WJ III	GRADE, TOSREC, TOSWRF, TOWRE, WJ III	TOAL-4
Source of study	Hammill et al. (2006)	Hammill et al. (2006)	Hammill et al. (2006)	Hammill et al. (2006)	Bell et al. (2007)	Texas Center for Learning Disabilities (2007)	Hammill et al. (2007)
Sample size	143	119	243	42	52	1,826	140
Age Range	8-17	8-18	8-17	8-15	9-15	10-16	12-18
Location	TX	TX, NY	TX, FL, AZ	TX, MA	TN	TX	AZ, TX, VA
Sample type	Learning disability	Learning disability	Mixed	Mixed	Remedial reading program	Mixed	Mixed
Gender							
Male	103	116	160	21	36	913	69
Female	40	3	83	21	16	913	71
Race							
White	134	108	212	42	50	NR	122
African American	6	2	21	0	2	NR	5

				Study and criterion test			
	1	2	3	4	5	6	7
Sample Characteristic	WJ III	GORT-4, SAT-9	TOSWRF	TOWRE	TOSWRF, WRAT-III, WJ III	GRADE, TOSREC, TOSWRF, TOWRE, WJ III	TOAL-4
Asian/Pacific Islander	0	6	2	0	0	NR	1
American Indian/Eskimo	0	1	0	0	0	NR	4
Two or more	1	0	5	0	0	NR	6
Other	2	2	3	0	0	NR	2
Hispanic							
Yes	8	9	23	2	0	NR	22
No	135	110	220	40	52	NR	118
Exceptionality Status							
No disability	3	0	30	19	NR	NR	73
Disability	140	119	213	23	NR	NR	67

Note. NR = not reported.

Table 2 *Corrected (and Uncorrected) Coefficients Representing the Relationship Between TOSCRF Forms and Criterion Reading Measures*

Criterion Reading Tests	Score	Type of Reading	Study	n	TOSCRF Forms				Average[a]	Magnitude[b]
					A	B	C	D		
WJ III	Broad Reading	Gen	1	143	.63 (.55)	.73 (.65)	.74 (.66)	.63 (.59)	.69	Large
GORT–4	Oral Reading	Gen	2	119	.75 (.52)	.67 (.47)	.61 (.45)	.65 (.47)	.67	Large
SAT-9	Total Reading	Gen	2	119	.76 (.54)	.65 (.45)	.64 (.47)	.66 (.47)	.68	Large
TOSWRF	Silent Reading Fluency	WI, F	3	243	.81 (.71)	.84 (.75)	.89 (.79)	.85 (.77)	.85	Very Large
TOWRE	Word Reading Efficiency	F	4	42	.64 (.80)	.75 (.86)	.73 (.85)	.68 (.84)	.70	Very Large
TOSWRF	Silent Reading Fluency	WI, F	5	52	.71 (.51)	.88 (.71)			.81	Very Large
WJ III	Reading Fluency, Form A	F	5	52	.67 (.58)	.76 (.66)			.72	Very Large
WJ III	Reading Fluency, Form B	F	5	52	.68 (.54)	.76 (.61)			.72	Very Large
WRAT-III	Blue Reading	WI	5	52	.78 (.58)	.86 (.67)			.82	Very Large
GRADE	Passage Comprehension	Comp	6	1,826	.74 (.46)				.74	Very Large
TOSREC	Silent Reading Fluency	Comp	6	1,826	.76 (.57)				.76	Very Large
TOWRE	Phonemic Decoding	Dec	6	1,826	.62 (.48)				.62	Large
TOWRE	Sight Word Reading	WI, F	6	1,826	.78 (.55)				.78	Very Large
TOWRE	Word Reading Efficiency	WI, F	6	1,826	.64 (.54)				.64	Large
WJ III	Letter-Word Identification	WI	6	1,826	.74 (.57)				.74	Very Large
WJ III	Passage Comprehension	Comp	6	1,826	.83 (.57)				.83	Very Large
WJ III	Word Attack	WI	6	1,826	.78 (.49)				.78	Very Large

Criterion Reading Tests	Score	Type of Reading	Study	n		TOSCRF Forms				Average[a]	Magnitude[b]
TOAL-4	Written Language	Gen	7	140	.58 (.45)					.58	Large
			Average[a]		.72	.78	.74	.71		.74	Very Large
			Magnitude[b]		Very Large	Very Large	Very Large	Very Large		Very Large	

Note. Gen = general reading; WI = word identification; F = fluency; Comp = comprehension; Dec = decoding. Blank spaces in the table indicate that the researcher did not report the data or that it was otherwise unavailable. Values in the parentheses are observed correlation coefficients; all others are corrected for attenuation due to range restriction and reliability of the criterion. All coefficients are significant at the *p* < .0001 level.

[a]Fisher's average of the corrected coefficients across samples.

[b]Magnitude of the averaged corrected coefficients; based on Hopkins's (2002) criteria for interpreting correlation coefficients.

Table 3
Standard Score Means (and Standard Deviations) and Related Statistics for the TOSCRF and Criterion Tests

TOSCRF/ criterion test	Score	Study	n	Mean	(SD)	Descriptive Terms	t		Effect Size	Magnitude[a]
TOSCRF	Silent Reading Fluency	1	134	99	(12)	Average	-6.56	***	0.43	Small
WJ III	Broad Reading			105	(16)	Average				
TOSCRF	Silent Reading Fluency	2	119	87	(11)	Below Average	7.06	***	-0.48	Small
GORT-4	Oral Reading			81	(14)	Below Average				
TOSCRF	Silent Reading Fluency	2	103	87	(11)	Below Average	-2.19	*	0.16	Very Small
SAT-9	Total Reading			89	(14)	Below Average				
TOSCRF	Silent Reading Fluency	3	243	98	(13)	Average	-1.55	ns	0.07	Very Small
TOSWRF	Silent Reading Fluency			99	(15)	Average				
TOSCRF	Silent Reading Fluency	4	42	99	(21)	Average	0.46	ns	-0.05	Very Small
TOWRE	Word Reading Efficiency			98	(18)	Average				
TOSCRF	Silent Reading Fluency	5	52	92	(12)	Average	-1.70	ns	0.17	Very Small
TOSWRF	Silent Reading Fluency			94	(12)	Average				
TOSCRF	Silent Reading Fluency	5	52	92	(12)	Average	0.68	ns	-0.07	Very Small
WJ III	Reading Fluency Form A			91	(16)	Average				
TOSCRF	Silent Reading Fluency	5	52	92	(12)	Average	-5.38	***	0.54	Small
WJ III	Reading Fluency Form B			99	(14)	Average				
TOSCRF	Silent Reading Fluency	5	52	92	(12)	Average	-2.97	**	0.28	Small
WRAT III	Reading			99	(12)	Average				

TOSCRF/ criterion test	Score	Study	*n*	Mean	(*SD*)	Descriptive Terms	t		Effect Size	Magnitude[a]
TOSCRF	Silent Reading Fluency	6	1,737	91	(12)	Average	-12.28	***	0.20	Small
GRADE	Passage Comprehension			96	(12)	Average				
TOSCRF	Silent Reading Fluency	6	1,753	91	(12)	Average	2.18	**	0.04	Very Small
TOSREC	Total Score			90	(15)	Average				
TOSCRF	Silent Reading Fluency	6	1,635	91	(12)	Average	-16.84	***	0.28	Small
TOWRE	Phonemic Decoding			99	(15)	Average				
TOSCRF	Silent Reading Fluency	6	1,667	92	(12)	Average	-9.62	***	0.16	Small
TOWRE	Sight Word Reading			96	(12)	Average				
TOSCRF	Silent Reading Fluency	6	1,632	91	(12)	Average	-12.62	***	0.22	Small
TOWRE	Total Score			97	(15)	Average				
TOSCRF	Silent Reading Fluency	6	1,668	92	(12)	Average	-13.29	***	0.22	Small
WJ III	Letter-Word Identification			98	(14)	Average				
TOSCRF	Silent Reading Fluency	6	1,668	92	(12)	Average	2.41	**	0.04	Very Small
WJ III	Passage Comprehension			91	(12)	Average				
TOSCRF	Silent Reading Fluency	6	1,667	92	(12)	Average	-16.84	***	0.28	Small
WJ III	Word Attack			99	(12)	Average				

TOSCRF/ criterion test	Score	Study	*n*	Mean	(*SD*)	Descriptive Terms	t		Effect Size	Magnitude[a]
TOSCRF	Silent Reading Fluency	7	140	105	(14)	Average	2.48	**	0.15	Small
TOAL-4	Written Language			101	(13)	Average				
Median TOSCRF Score		1-7	192	92	(12)	Average	-2.58	*	0.16	Small
Median Criterion Score				98	(14)	Average				

[a]Magnitude of the effect size based on Hopkins's (2002) criteria for interpreting correlation coefficients.

* *p* < .05

** *p* < .01

*** *p* < .001

Table 4
Binary Classification Matrix Demonstrating TOSCRF's Ability to Predict Reading Ability

	Reading Ability	
TOSCRF	Below average	Average or above
Below average	188 True positives	90 False positives
Average or above	31 False negatives	456 True negatives

N = 765; Percent agreement = .84; Sensitivity index = .86; Specificity index = .84; Positive predictive value = .68; Negative predictive value = .94.

Figure 1
Results of the ROC analysis.

ROC Curve
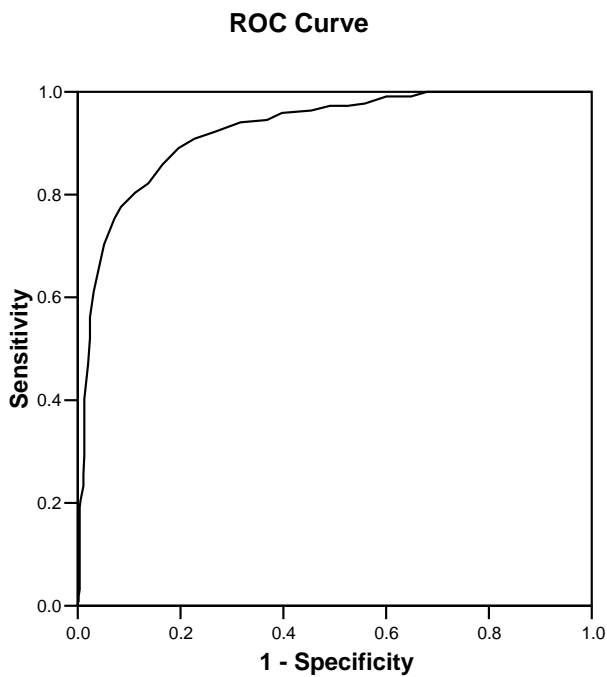
Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): TOSCRFSS

			Asymptotic 95% Confidence Interval	
Area	Std. Error(a)	Asymptotic Sig.(b)	Lower Bound	Upper Bound
.925	.010	.000	.905	.945

a Under the nonparametric assumption
b Null hypothesis: true area = 0.5