Exploring the Contribution of Spelling to Predicting Reading Risk

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Introduction

Research indicates that difficulties with spelling are linked to dyslexia (Lohvansuu et al., 2021; O'Brien et al., 2011). Further, according to Moats (2005), when a student knows how to spell a word it facilitates fluent reading of that word. As such, spelling assessment may provide critical information helpful in screening for reading difficulties and for instructional planning within an MTSS service delivery system in schools. In particular, the assessment of spelling in the early stages of reading development (e.g., kindergarten) may provide information about student application of phonemic awareness and alphabetic principle skills to reading and reading-related tasks (Clemens et al., 2013).

Purpose and Research Questions

The purpose of this study was to evaluate the utility of a new spelling assessment, Acadience® Spelling, for use in kindergarten and first grade. Research questions were:

What are the descriptive statistics and distributions of Acadience Spelling Correct Spelling Sequences (CSS) and Correctly Spelled Words (CSW) scores at each grade and time of year? 2 What is the relationship between performance on Acadience Spelling and Acadience Reading measures?

3 What preliminary cut points for risk for Acadience Spelling may be useful for identifying students who need additional instructional support?

Method

Participants

Data used for this research consisted of Acadience Spelling and Acadience Reading scores for students in grades K–2 entered into Acadience Data Management from 2018–2019 through mid-year 2021–2022. Inclusion criteria were (a) data for at least two time points, (b) Acadience Spelling scores and an Acadience Reading Composite Score (RCS), and (c) an RCS at a later time point. Analyses took place at different points in time, thus, sample sizes vary. The distributions and concurrent and predictive correlations with Acadience Reading K–6 were based upon an initial analysis, while descriptive statistics and the cut points for risk were derived from a second analysis which included more students at Grade 1 beginning of year (BOY). Otherwise, the samples overlapped. Sample sizes for the cut points for risk were 109 kindergarten students at middle of year (MOY), 649 students at Grade 1 BOY, and 116 Grade 1 students at MOY. Other sample sizes are noted in the tables and figures.

Measures

Acadience Spelling

Acadience Spelling is designed based on the principles of General Outcome Measurement, and is administered from the middle of kindergarten through the end of first grade. Two scores are calculated for Acadience Spelling: Correctly Spelled Words (CSW) and Correct Spelling Sequences (CSS). Samples of Acadience Spelling administration forms are shown in *Figure 1*. For more information, see the Acadience Spelling Administration & Scoring Guide (Powell-Smith et al., 2021), available at www.acadiencelearning.org.

FIGURE]

Acadience [®] Spelling Word List and Scoring Key Grade K Middle-of-Year Form 1							Acadience [®] Spelling Word List and Scoring K Grade 1 Beginning-of-Ye Form 1	Key ear
mber	Time	Word and Sentence	Scoring	CSS [cumulative]	Number	mber Time Word and Sentence		
1	(start)	Nap. Time for a nap. Nap.	^n^a^p^	4 [4]	1	(start)	Do. We do our best. Do.	^d^o^
2	0:12	Man. The man had a beard. Man.	^m^a^n^	4 [8]	2	0:10	Nests. Birds build nests. Nests.	^n^e^s^t^s^
3	0:24	Make. I will make dinner. Make.	m^a^k^e^	5 [13]	3	0:20	Ate. I ate lunch. Ate.	^a^t^e^
4	0:36	Cup. We put milk in a cup. Cup.	^c^u^p^	4 [17]	4	0:30	Plus. One plus one is two. Plus.	^p^l^u^s^
5	0:48	Down. She sat down. Down.	d^o^w^n^	5 [22]	5	0:40	Sled. They sled on the snow. Sled.	^s^l^e^d^
6	1:00	Dog. The dog barked. Dog.	^d^o^g^	4 [26]	6	0:50	We. We had fun at camp. We.	^w^e^
7	1:12	Met. We met yesterday. Met.	^ m^e^t ^	4 [30]	7	1:00	Fly. Birds fly in the sky. Fly.	^f^l^y^
8	1:24	Tin. He used a tin cup. Tin.	$^{t^{n}}$	4 [34]	8	1:10	Shops. My dad shops for food. Shops.	^s^h^o^p^s^
9	1:36	Fit. The shoe doesn't fit. Fit.	^f^i^t^	4 [38]	9	1:20	Pass. I can pass the test. Pass.	^p^a^s^s^
10	1:48	Go. Let's go outside. Go.	^ g^o^	3 [41]	10	1:30	Pond. Fish are in the pond. Pond.	^p^o^n^d^
	2:00	Stop. Put your pencils down.			11	1:40	Mask. The clown wore a mask. Mask.	^m^a^s^k^
		Total CS	W Possible	10	12	1:50	Path. Follow the path home. Path.	^p^a^t^h^
		Total CS	SS Possible	41		2:00	Stop. Put your pencils down.	
							То	tal CSW Possible
							Тс	otal CSS Possible

Acadience Reading K–6

The Acadience Reading measures collected in this study were First Sound Fluency (FSF), Letter Naming Fluency (LNF), Phoneme Segmentation Fluency (PSF), Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), and the Reading Composite Score (RCS). Additional information on the design specifications of Acadience Reading measures and the formulas for calculating the RCS are available in the Acadience Reading K–6 Technical Manual (Good et al., 2019), available at www.acadiencelearning.org.

Analyses

Data analyses included descriptive statistics, distributions of Acadience Spelling scores, concurrent and predictive correlations between Acadience Spelling and Acadience Reading, and logistic regression.

Results

Descriptive Statistics

Descriptive statistics are presented in Tables 1 and 2 for CSS, CSW, and RCS for students who were assessed with Acadience Spelling and had an RCS score.

• Acadience Spelling scores increase across grades and time points.

• The sample was high performing, with most Acadience Reading scores in the At or Above Benchmark and Above Benchmark ranges.

TABLE 1

Descriptive Statistics of Acadience Spelling Correct Spelling Sequences (CSS) and Correctly Spelled Words (CSW) by Grade and Time of Year

	n	Μ	SD	Min	Max				
Kindergarten Middle of Year									
CSS CSW	130 130	19.32 3.60	10.66 2.50	0 0	37 8				
Grade 1 Beginning of Year									
CSS CSW	649 649	23.291 2.22	14.72 2.44	0 0	54 11				
Grade 1 Middle of Year									
CSS CSW	116 116	38.12 5.27	11.11 2.93	0 0	57 12				

TABLE 2

Descriptive Statistics of the Reading Composite Score by Grade and Time of Year

	Reading Composite Score							
	n	Μ	SD	Min	Max			
Kindergarten Middle of Year	109	117.5	67.5	0	259			
Grade 1 Beginning of Year	649	102.6	51.7	0	280			
Grade 1 Middle of Year	116	162.2	92.1	0	419			

Distributions of Acadience Spelling CSS and CSW

The distributions of CSS and CSW by grade and time of year are reported in *Figures 2* and 3, respectively. There do not appear to be strong floor effects for CSS or CSW at any of the evaluated time points.

FIGURE 2

Distributions of Acadience Spelling Correct Spelling Sequences (CSS) for Middle of Kindergarten and Middle and End of First Grade



Note: Distributions for the end of kindergarten and first grade are not reported due to insufficient sample sizes. Samples sizes as follows. Kindergarten middle of year = 130. Grade 1 beginning of year = 197. Grade 1 middle of year = 116.

FIGURE 3

Distributions of Acadience Spelling Correctly Spelled Words (CSW) for Middle of Kindergarten and Middle and End of First Grade



Note: Distributions for the end of kindergarten and first grade are not reported due to insufficient sample sizes. Samples sizes as follows. Kindergarten middle of year = 130. Grade 1 beginning of year = 196. Grade 1 middle of year = 116.

Concurrent and Predictive Validity of Acadience Spelling Results of the correlational analyses are reported in *Tables* 3 and 4.

The concurrent and predictive correlations between Acadience Spelling and Acadience Reading measures are mostly in the moderate to strong range, with some weaker correlations for certain grades and measures.

• Overall, the highest correlations are between the Acadience Spelling scores and the RCS and are in the strong range.

TABLE 3

Concurrent Validity of Acadience Spelling with Acadience Reading

		Acadience Reading Measure							
	FSF	LNF	PSF	NWF CLS	NWF WWR	ORF Words Correct	ORF Accuracy	RCS	
Kindergarten Middle of Year									
CSS CSW	.59 .55	.63 .61	.60 .58	.53 .53	.23 .20*	-	-	.70 .67	
Grade 1 Beginning of Year									
CSS CSW	-	.34 .14†	.43 .42	.43 .71	.39 .63	-	-	.55 .65	
Grade 1 Middle of Year									
CSS CSW	-	-	-	.52 .54	.59 .64	.51 .55	.65 .66	.61 .65	

Note: FSF = First Sound Fluency; PSF = Phoneme Segmentation Fluency; NWF CLS = Nonsense Word Fluency Correct Letter Sounds; NWF WWR = Nonsense Word Fluency Whole Words Read; ORF = Oral Reading Fluency; RCS = Reading Composite Score; CSS = Correct Spelling Sequences; CSW = Correctly Spelled Words. Dashes indicate the Acadience Reading measure is not administered at the specified grade and time of year. Correlations for the end of kindergarten and first grade are not reported due to insufficient sample sizes. Pairwise samples sizes as follows. Kindergarten middle of year = 130. Grade 1 beginning of year = 194–197. Grade 1 middle of year = 95–115. Unless marked, correlations significant, p <.0001; * *p* <.05; † Not significant.

TABLE 4

Predictive Validity of Acadience Spelling with Acadience Reading

	Acadience Reading Measure								
	LNF	PSF	NWF CLS	NWF WWR	ORF Words Correct	ORF Accuracy	RCS		
Middle of Kindergarten to Beginning of Grade 1									
CSS CSW	.57 .54**	.50*** .44***	.52** .52**	.42*** .48***	-	-	.63 .60		
Beginning to Middle of Grade 1									
CSS CSW	-	-	.44 .67	.51 .68	.35 .63	.46 .61	.46 .71		
Beginning to End of Grade 1									
CSS CSW	-	-	.49 .69	.53 .67	.64 .71	.67 .58	.69 .74		
Middle to End of Grade 1									
CSS CSW	-	-	.48** .50**	.51** .55	.64 .72	.75 .74	.75 .80		
Middle of Grade 1 to Beginning of Grade 2									
CSS CSW	-	-	.58 .58	.58 .63	.55 .56	.65 .67	.66 .69		

Note: PSF = Phoneme Segmentation Fluency; NWF CLS = Nonsense Word Fluency Correct Letter Sounds; NWF WWR = Nonsense Word Fluency Whole Words Read; ORF = Oral Reading Fluency; RCS = Reading Composite Score; CSS = Correct Spelling Sequences; CSW = Correctly Spelled Words. Dashes indicate the Acadience Reading measure is not administered at the specified grade and time of year. Correlations for (a) middle to end of kindergarten, (b) end of kindergarten to beginning and middle of first grade, (c) end of first grade to beginning of second grade, and (d) end of first grade to middle of second grade are not reported due to insufficient sample sizes. Pairwise samples sizes as follows. Middle of kindergarten to beginning of first grade = 41. Beginning to middle of first grade = 176–187. Beginning to end of first grade = 57. Middle to end of first grade = 44. Middle of first grade to beginning of second grade = 71-83. Unless marked, correlations significant, p < .0001; ** p < .001; *** p < .01.

Preliminary Cut Points for Risk

Cut points for risk were created by examining the logistic regression curve for predicting a concurrent or subsequent RCS. Using this logistic regression, we examined the probability that a student was meeting reading goals given a specific CSS or CSW score. The cut points corresponding to At- versus Some-Risk and Some-versus Low-Risk are 40% and 60% respectively. Students who score at the cut point separating At-Risk and Some-Risk have a 40% chance of meeting later reading goals and students who score at the cut point separating Some-Risk and Low-Risk have a 60% chance of meeting later goals. Two sample logistic regression curves are shown in *Figure 4*. The preliminary cut points are presented in *Table 5*.

FIGURE 4



Note: G1 = Grade 1; MOY = middle of year; AAB = At or Above Benchmark; CSS = Correct Spelling Sequences; CP = cut point for risk; BM = benchmark.





TABLE 5

Acadience Spelling	Preliminary Cut Point	ts for Risk			
Grade	Time of Year	Risk Category	Correct Spelling Sequences	Correctly Spelled Words	
Kindergarten	Middle of Year	At-Risk Some-Risk Low-Risk	0-7 8-11 12+	0 1 2+	
Crada 1	Beginning of Year	At-Risk Some-Risk Low-Risk	0-20 21-31 32+	0-1 2 3+	
Grade I	Middle of Year	At-Risk Some-Risk Low-Risk	0-31 32-39 40+	0-3 4-5 6+	

Discussion

This study provides initial evidence to support the use of Acadience Spelling. Acadience Spelling scores are sensitive to increasing spelling skills over that time span, and validity coefficients are consistent with those reported in previous CBM Spelling studies (Deno et al., 1980; Marston, 1982). Acadience Spelling is moderately to strongly related to concurrent and future overall reading performance, which is important because difficulties with spelling are often observed in students with dyslexia (Lohvansuu et al., 2021) and spelling is frequently cited as a necessary component of dyslexia screening. Finally, the Acadience Spelling preliminary cut points provide educators with an additional piece of information useful for identifying students who are at increased risk with respect to their literacy outcomes and for identifying additional targets for instruction.

Implications

- Students who earn Acadience Spelling scores in the Low-Risk range are unlikely to be at additional risk, provided their scores on other Acadience Reading K–6 measures are At or Above Benchmark and they are receiving high-quality, evidence-based core reading instruction.
- Students whose Acadience Spelling scores fall in the Some-Risk range may be at increased risk, in particular if their scores on other Acadience Reading measures fall into the Below or Well Below Benchmark range. These students may need strategic or intensive support to achieve important reading outcomes in the future.
- Students who earn Acadience Spelling scores in the At-Risk range are at increased risk of reading difficulties, in particular if their scores on other Acadience Reading measures fall in the Below or Well Below Benchmark range. These students likely will need intensive support to meet subsequent reading outcomes.

Limitations

- The measures were administered under uncontrolled conditions; however, they represent the way these measures are used in practice.
- The data collected may not be representative of national or local demographics and performance, potentially limiting generalizability of results.
- This study included data gathered during the COVID-19 pandemic and did not differentiate between mode of administration (i.e., remote vs. in-person). It is possible there may be differences in scores as a result of these factors.

Future Research

- Replicate these analyses with a larger, more diverse sample of students
- Evaluate results when the sample is limited to data from schools that used Acadience Spelling as a universal screener
- Examine the contribution of Acadience Spelling in predicting future reading outcomes relative to other Acadience Reading measures
- Explore the reliability of the Acadience Spelling assessment and obtain user feedback

References available by contacting the authors.