

Preschool Early Literacy Indicators (PELI™): Establishing Benchmark Goals

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Introduction

What Is the PELI™?

The Preschool Early Literacy Indicators (PELI) is an experimental measure that was developed for use in an Outcomes-Driven Model of early education to universally screen all students in preschool programs, progress monitor students identified as needing intervention, and inform individual and system-wide instructional practices. The PELI measures four early literacy subskills: Alphabet Knowledge, Phonological Awareness, Vocabulary and Oral Language, and Comprehension. These skills were chosen based on current converging research showing these early literacy skills are important foundational pre-reading skills (Neuman & Carta, 2011; Lonigan & Shanahan, 2008; Snow, Burns, & Griffin, 1998). All test items are presented in a storybook format that center around common preschool themes (e.g., On the Farm, Trip to the Grocery Store). The storybook format is designed to be familiar and comfortable for the preschool child. Administration and scoring procedures for the PELI are provided in the PELI Assessment Manual.

Technical Adequacy of the PELI

The reliability and validity of the PELI has been investigated in a series of studies from 2009–13 to the present. Inter-rater reliability of various PELI forms ranges from .96 to .99. Alternate form reliability for the composite score range from .75 to .96. Criterion related validity for the Vocabulary and Oral Language subtest of various forms of the PELI with standardized norm-referenced tests of language development (e.g., Peabody Picture Vocabulary Test-IV, Clinical Evaluation of Language Fundamentals PreK, Expressive Language Index (CELF PreK ELI) ranges from .36 to .72. Criterion-related validity of the early literacy subtests of various forms of the PELI with criterion measures of early literacy (e.g., Test of Preschool Early Literacy, Get Ready to Read) range from .28 to .92.

Method

Sample

Sites included 217 classrooms from 37 early childhood programs in 9 states from the Southwest, South Atlantic, Northeast, Midwest, and Pacific Northwest regions of the country. A total of 2,746 children participated in two cohorts. Cohort 1 (N = 274) consisted of children who were 3/4-years old at the beginning of the school year (2 years from kindergarten) and the second cohort of children (N = 2,472) were 4/5-year olds (1 year from kindergarten). Demographic surveys were completed by approximately 46% of the sample. Of the survey respondents, 46% were female and 54% were male across cohorts. With respect to race, the majority of the respondents, 77%, were white, 17% were Hispanic, and 8% were Black.

Measures

The external criterion measures were the beginning of year Kindergarten DIBELS® Composite Score (DCS) of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS Next®) assessment (Good et al., 2010) and the Core Language Score (CLS) of the Clinical Evaluation of Language Fundamentals Preschool (CELF Pre-K; Wiig, Secord, & Semel, 2004). The DCS is comprised of the DIBELS First Sound Fluency (FSF) and Letter Naming Fluency (LNF) measures. The CLS is comprised of the Sentence Structure (SS), Word Structure (WS), and Expressive Vocabulary (EV) subtests.

Procedures

The PELI was administered to all participating students three times during the year, at the beginning, middle, and end of the school year. The DIBELS and CELF were administered at the end of the school year.

All assessment data were collected by site-based teachers and staff trained in administration and scoring procedures for each of the measures.

Analyses

- Benchmark goals and cut points for risk were established by examining the predictive validity of a score on the PELI at a particular point in time, compared to later PELI measures and to the external criterion measures (i.e., DIBELS Next and CELF), in the following steps.
- We first obtained the external criterion that would represent adequate early literacy/language skills at the end of the year for 4–5 year olds. The beginning of kindergarten benchmark goal for the DIBELS Next Composite Score (DCS) was used as the criterion for early literacy skills. The 40th percentile on the CELF Core Language Scale (CLS) was used as the criterion for language skills.
- Next we specified the benchmark goal and cut point for risk on the end-of-year PELI composite score with respect to the end-of-year external criterion. The primary specification for PELI benchmark goals was to establish a level of skill where students scoring at or above the benchmark have favorable odds (80%–90%) of achieving end-of-year early literacy/language outcomes. The primary specification for a PELI cut point for risk was a level of skill where children scoring below that level have low odds (10%–20%) of achieving subsequent literacy outcomes.
- Then, using the PELI Composite end-of-year goal as an internal criterion, we established preliminary benchmark goals and cut points for risk on the middle-of-year PELI Composite score.
- Finally, we established the benchmark goals and cut points for risk on the beginning-of-year PELI Composite Score, using the middle-of-year PELI Composite Score as an internal criterion.
- Once the benchmark goals and cut points for risk were established for the PELI Composite Score, they were used to establish the specific goals and cut points for risk for each PELI subtest.
- The same step-by-step process was used for determining PELI goals and cut points for 3–4 year-olds using the 4–5 year-old beginning-of-year PCS as the starting point.
- In addition to the considerations above, we also considered: (a) the logistic regression predicting the odds of scoring at or above benchmark on the criterion based on their score on the predictor; (b) the pattern of student performance in the scatterplot; (c) the receiver operator characteristic (ROC) curve analysis; (d) other metrics for decision utility including sensitivity, specificity, negative predictive power, positive predictive power, percent accurate classification, and Kappa.
- We specified benchmark goals and cut points for risk as an overall evaluative judgment of all design specifications. No single specification was used in isolation from other considerations. Concurrent correlations between PELI scores and criterion measures are presented in *Table 1*. Odds for achieving subsequent early literacy goals based on benchmark score category are summarized in *Table 2*. The benchmark goals and cut points for risk are summarized in *Tables 3 and 4*.
- Each benchmark goal and cut point for risk is supported by detailed analyses including scatterplots, contingency tables, logistic regression analyses, ROC curves, and summaries of other decision-utility metrics including sensitivity, specificity, positive and negative predictive power, and accuracy of classification. Sample analyses are provided in *Figure 1*.

Table 1. Concurrent Validity Coefficients with Criterion Measures for 4- and 5-year-olds

PELI Measure	Criterion Measure						
	SS	WS	EV	CLS	FSF	LNF	DCS
Alphabet Knowledge	.17*	.11†	.16*	.09†	.49	.73	.68
Comprehension	.41	.32	.50	.40	.44	.32	.42
Phonological Awareness	.36	.33	.24**	.25	.65	.46	.61
Vocabulary	.42	.40	.51	.48	.29	.17	.26
PELI Composite Score	.48	.42	.51	.45	.60	.51	.62

Note: SS=CELF Pre-K Sentence Structure, WS=CELF Pre-K Word Structure, EV=CELF Pre-K Expressive Vocabulary, CLS=CELF Pre-K Core Language Score, FSF=DIBELS First Sound Fluency, LNF=DIBELS Letter Naming Fluency, DCS=DIBELS Composite Score. All measures were administered at the end of the school year. PELI form administered was *Grandma's Birthday*. Unless otherwise marked, correlation significant at $p < .001$. ** = $p < .01$; * = $p < .05$; † = not significant. Sample size for correlations with the CELF and subtests (SS, WS, EV) range from 174 to 181. Sample sizes for correlations with FSF and LNF range from 770 to 775, and 769 for correlations with the DCS. PCS = 2*AK + 4*Comp + 4*PA + 3*VOL.

Table 2. Odds of Achieving Subsequent Early Literacy Goals Based on Benchmark Score Category

Odds of Achieving Subsequent Early Literacy Goals	Score Level	Likely Need for Support
80% to 90%	At or Above Benchmark scores at or above the benchmark goal	Likely to Need Regular Support
40% to 60%	Below Benchmark scores below the benchmark goals and at or above the cut point for risk	Likely to Need Additional Support
10% to 20%	Well Below Benchmark scores below the cut point for risk	Likely to Need Significant Support

Table 3. PELI Benchmark Goals and Cut Points for Risk for 3/4 Year-Old Preschool Children

PELI Measure	PELI Score Level	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
PELI Composite Score	At or Above Benchmark	Likely to Need Core Support	70+	110+	140+
	Below Benchmark	Likely to Need Strategic Support	45–69	80–109	100–139
	Well Below Benchmark	Likely to Need Intensive Support	0–44	0–79	0–99
Alphabet	At or Above Benchmark	Likely to Need Core Support	2+	6+	9+
	Below Benchmark	Likely to Need Strategic Support	0–1	2–5	3–8
	Well Below Benchmark	Likely to Need Intensive Support		0–1	0–2
Comprehension	At or Above Benchmark	Likely to Need Core Support	7+	10+	12+
	Below Benchmark	Likely to Need Strategic Support	4–6	7–9	9–11
	Well Below Benchmark	Likely to Need Intensive Support	0–3	0–6	0–8
Phonological Awareness	At or Above Benchmark	Likely to Need Core Support	1+	2+	5+
	Below Benchmark	Likely to Need Strategic Support	0	0–1	1–4
	Well Below Benchmark	Likely to Need Intensive Support			0
Vocabulary/Oral Language	At or Above Benchmark	Likely to Need Core Support	10+	14+	16+
	Below Benchmark	Likely to Need Strategic Support	6–9	10–13	11–15
	Well Below Benchmark	Likely to Need Intensive Support	0–5	0–9	0–10

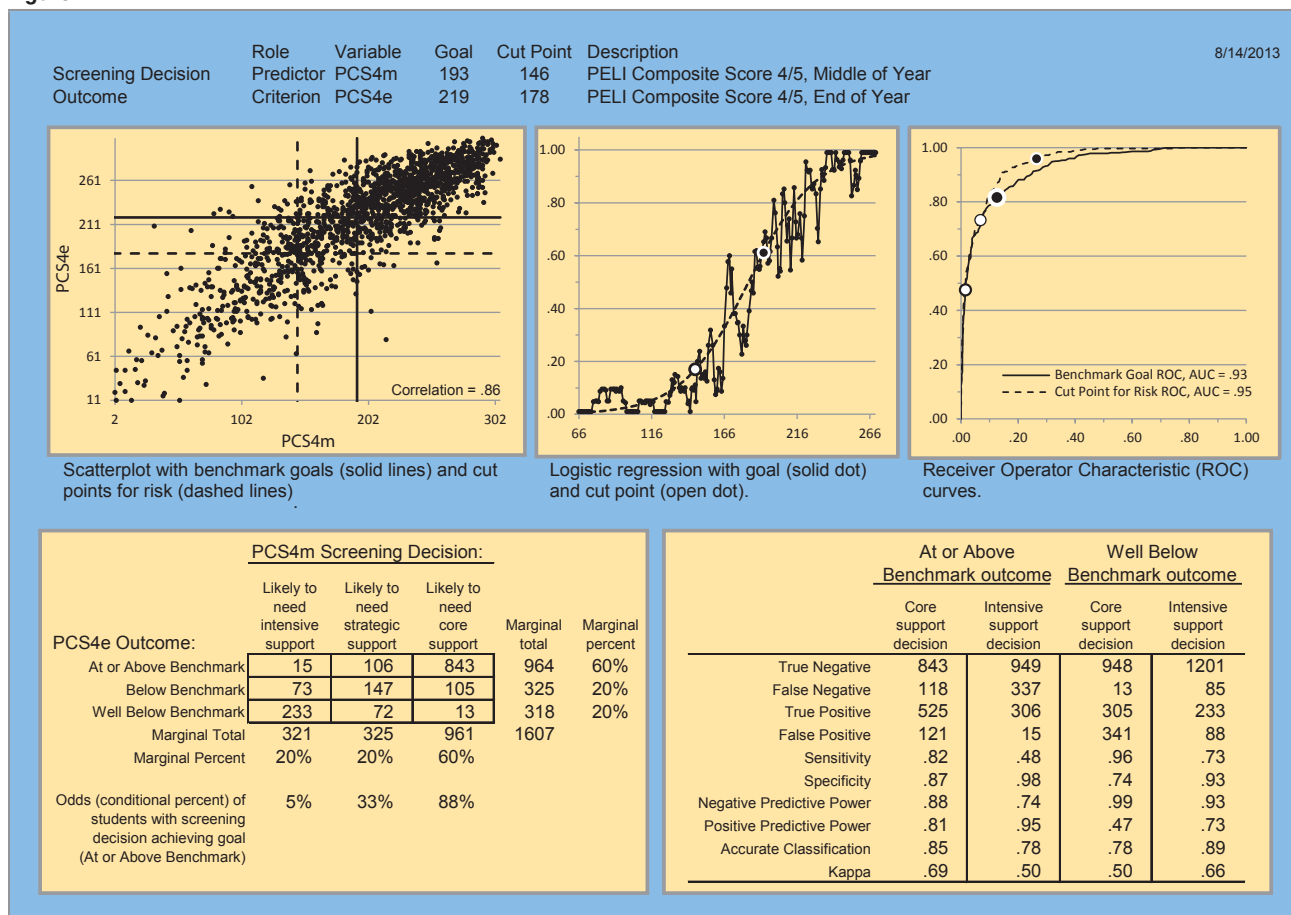
Note: The benchmark goal is the number provided in the At or Above Benchmark row. The cut point for risk is the first number provided in the Below Benchmark row.

Table 4. PELI Benchmark Goals and Cut Points for Risk for 4/5 Year-Old Preschool Children

PELI Measure	PELI Score Level	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
PELI Composite Score	At or Above Benchmark	Likely to Need Core Support	140+	193+	219+
	Below Benchmark	Likely to Need Strategic Support	100–139	146–192	178–218
	Well Below Benchmark	Likely to Need Intensive Support	0–99	0–145	0–177
Alphabet	At or Above Benchmark	Likely to Need Core Support	7+	20+	24+
	Below Benchmark	Likely to Need Strategic Support	2–6	7–19	14–23
	Well Below Benchmark	Likely to Need Intensive Support	0–1	0–6	0–13
Comprehension	At or Above Benchmark	Likely to Need Core Support	13+	15+	17+
	Below Benchmark	Likely to Need Strategic Support	9–12	12–14	13–16
	Well Below Benchmark	Likely to Need Intensive Support	0–8	0–11	0–12
Phonological Awareness	At or Above Benchmark	Likely to Need Core Support	4+	10+	12+
	Below Benchmark	Likely to Need Strategic Support	1–3	4–9	9–11
	Well Below Benchmark	Likely to Need Intensive Support	0–0	0–3	0–8
Vocabulary/Oral Language	At or Above Benchmark	Likely to Need Core Support	19+	22+	24+
	Below Benchmark	Likely to Need Strategic Support	12–18	15–21	18–23
	Well Below Benchmark	Likely to Need Intensive Support	0–11	0–14	0–17

Note: The benchmark goal is the number provided in the At or Above Benchmark row. The cut point for risk is the first number provided in the Below Benchmark row.

Figure 1.



References

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