easyCBM Beginning Reading Measures:

Grades K-1

Alternate Form Reliability and Criterion Validity

With the SAT-10

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Abstract

We report the results of an alternate form reliability and criterion validity study of kindergarten and grade 1 (*N* = 84–199) reading measures from the easyCBM© assessment system and Stanford Early School Achievement Test/Stanford Achievement Test, 10th edition (SESAT/SAT–10) across 5 time points. The alternate form reliabilities ranged from .31–.94 for the kindergarten measures and from .27–.96 for the grade 1 measures. Multiple regression analyses were used to examine the overall variance explained by the combined measures when predicting end-of-year reading achievement. In kindergarten, the easyCBM© measures accounted for 35–58% of the variance in SAT–10 performance. In grade 1 easyCBM© measures accounted for 14–32% of the variance in SAT–10 performance and 49–56% of the variance in performance on the easyCBM© word reading fluency measure administered at time 5.

easyCBM Kindergarten Beginning Reading Measures: Alternate Form Reliability and Criterion Validity with the SAT-10

Initially developed in 2006 as part of a model demonstration project on Response to Intervention funded by the Office of Special Education Projects, easyCBM© is now in use in every state in the United States. With over 400,000 teachers and 3.9 million students in the system, over 25.9 million tests have been administered since the system's initial release. A critical component of the easyCBM© system is the research base behind each of the measures it offers. In this technical report, we present the results of a study of the easyCBM© beginning reading measures in early literacy. More specifically, we provide the results of a study to gather data on the measures' alternate form reliability and criterion---related validity evidence.

The easyCBM© measures were developed to be General Outcome Measures, for use as screening instruments, to identify students at risk for reading difficulties, and as progress monitoring forms, to track the progress students make over time as they receive targeted instructional interventions aimed at addressing identified skill deficits. Detailed description of the process used to develop the Letter Names (LN), Letter Sounds (LS), and Phoneme Segmenting (PS) measures can be found in Alonzo and Tindal (2007a). The development of the Word Reading Fluency (WRF) measures can be found in Alonzo and Tindal (2007b). Earlier work, examining alternate form and test---retest reliability for a small sub---set of these measures is reported in Alonzo and Tindal (2009). Lai et al. (2010) provide a summary of earlier studies examining the technical adequacy of the measures.

Methods

In this section, we describe the methods used in conducting a study of alternate form reliability and criterion validity of a selection of measures from the easyCBM© assessment system and SESAT/SAT---10.

Settings and Participants

In all, 222 students in kindergarten and 204 students in grade 1 participated in this study. Students came from a convenience sample of three (K---5) schools within the same Pacific Northwest semi---rural district, comprising six kindergarten and eight grade 1 classrooms. All students in attendance on the days that the research team collected data were included in the study. These data were collected as part of a larger study that included grade two through five students, but for which data are not reported here. All kindergarten classes were half--- day, and students attending either AM or PM classes were included in the study.

For kindergarten students, 83.3% were White, 9.5% were reported as two or more races, 2.3% were Black 2.3% were American Indian/Alaskan Native, and two were Asian. Of the kindergarten students in our sample, 20.3% were identified as Hispanic, and 48.6% as female. For grade 1 students, 83.8% were White, 6.4% were American Indian/Alaskan Native, 4.4% were reported as two or more races, 3.4% were Black, and one student each was of Asian and Pacific Islander descent. Of the grade 1 students in our sample, 23.5% were Hispanic, and 44.1% were female.

Data Collectors

Fifteen researchers participated in data collection for this study, administering study assessments following standardized test administration protocols. All but two data collectors tested students for 2-5 time points and also assisted with the SAT-10 data collection. Fourteen data collectors were female; one was male. Background experience varied. Five data collectors had extensive reading assessment experience and were either currently or formerly enrolled in a teacher education or school psychology program. Three were trained in psychology or speech-language pathology. The remaining testers had previous experience administering easyCBM© measures or working with children in kindergarten through fifth grade.

All data collectors were initially trained on general test administration, reading skill measurement, and specific research procedures in a 3-hour session, which included time for group test administration practice. Following training and practice, the administration skills of each data collector were assessed, and sufficient proficiency was required prior to school entry. For each subsequent time point, data collectors were required to participate in a 1- hour "refresher" meeting to minimize test administration drift, provide constructive feedback regarding the previous data collection, and to share project updates. In addition, two data collectors were trained to score all student responses in a standardized manner. Scoring and data entry activities were double-checked for accuracy by the project manager.

Measures

easyCBM© measures. Four measures from the easyCBM© assessment system were administered to all students: Letter Names (LN), Letter Sounds (LS), Phoneme Segmenting (PS), and Word Reading Fluency (WRF). Each of these measures is described in more detail below.

Letter Names. In the LN measure, students are presented with a sheet of paper on which letters in both their capital and lower case forms are printed in a table. Students are given 60 seconds to name as many letters as they can, reading across the paper from left to right, then down to the next row. Errors and skipped letters are counted as incorrect while self---corrections and letters read correctly are counted as correct; the student receives one point for each correct response. The approximate maximum score is 100 points.

Letter Sounds. The LS measure is identical to the letter names measure except students are prompted to produce the sound the letter makes rather than its name. In addition, some common digraphs (ph, th, sh) are included on this measure. Students are again given 60 seconds to complete this measure, and the scoring rules are the same as for the letter names measure. Short vowel sounds only were accepted to eliminate confusion concerning whether student responses constituted long vowel letter sounds or letter names. The approximate maximum score is 110 points.

Phoneme Segmenting. The PS measure is administered entirely orally. An assessor reads from a list of words and asks the student to segment each word into its constituent phonemes. Students receive one point for each phoneme segmented correctly. Self---corrections are scored as correct. This measure is administered individually for 60 seconds for an approximate maximum score of 70 points.

Word Reading Fluency. For the WRF measure, students are shown a piece of paper with a variety of decodable and sight-words arranged in a table. They are instructed to read the words aloud, moving left to right and then down to the next row. Errors and skipped words are counted as incorrect while self-corrections and words read correctly are counted as correct. The student receives one point for every correct response and has 60 seconds to complete the measure. The approximate maximum score for kindergarten is 60 and for grade 1 is 120 points.

SAT-10 measures. Two measures from the SAT-10 were administered to students in each grade. Kindergarten students were administered the Sounds and Letters measure (SL) and the Word Reading measure (WR) from the SESAT 2 (spring seasonal measure). First grade students took the Word Reading measure and the Word Study Skills measure (WWS) found in the spring SAT-10.

SESAT 2 Sounds and Letters. The sounds and letters measure is administered orally. An assessor reads direction while the students follow along in a workbook. This subtest assesses matching words that begin or end with the same sound, recognizing letters, and matching letters to sounds.

SESAT 2 Word Reading. Like the sounds and letters measure, the word reading measure was administered orally. Similarly, directions were read orally while students followed along in a workbook. This subtest requires students to identify a printed word that matches either a work presented orally or an illustration.

SAT-10 Word Study Skills. The word study skills measure was administered and scored in the same fashion as the previously-described subtests. This subtest assesses students' ability to identify related sounds and spellings as well as word decoding.

Procedures

easyCBM© data collection. Fluency data were individually collected at five time points across the school year (November, December, February, April, and June), using the test administration procedures previously described. Four different rotations of measures were employed for each grade, in which letter names or letter sounds were always presented first, and the more difficult phoneme segmenting and word reading measures were separated. For those measures for which alternate form reliability data were sought, students were administered two different forms (e.g., LN form 8 and form 13 at Time 1 for Kindergarten) of the same measure, presented in a counterbalanced order.

Students were pulled from classroom instruction during pre-arranged times, in groups of three to five students. Students were tested in large rooms at each school site shared by three to five data collectors; furniture in these rooms was re-arranged to minimize disruption, and a quiet testing environment was maintained as much as possible. Kindergarten administration took approximately 10 minutes for eight measures, and first grade administration took approximately seven minutes for five measures. For struggling students, two frustration rules were implemented: (a) if the student correctly completed fewer than two items on one form of a measure, then the second form was not administered, and (b) if the student could not complete the *letter names* and *letter sounds* measure, then the *word reading* measure was not administered.

In addition, to minimize confusion between letter names and sounds, and because the measures do not include practice items, we added an explanatory prompt to the instructions. For example, at the end of the instructions, for the *letter names* measure, data collectors added, "So I want to you to tell me letter NAMES, like ___(say student's name) begins with the letter __." The same type of prompt was provided for the *letter sounds* measure. If confusion was still evident within the first five items, students were stopped, given the above prompt again and testing was re-started. Re-prompting was not allowed after the first five items. When students stated that they did not know any items, they were encouraged to "check and make sure" (i.e., look at the remaining items on the form).

All students were required to use a plain 2-inch wide manila place marker, supplied by data collectors, to help with tracking and to eliminate confusion with items located below the target row. This procedure also facilitated accurate recording of items when item skipping occurred. When students completed all items before the 60 second time limit, they were quickly prompted to "start again at the top" of the page (with finger prompting to indicate the first item). The total number correct was recorded, including the items read twice.

All students receiving instruction in general education classrooms (as opposed to self-contained classrooms) and listed on classroom rosters were tested, unless requested otherwise by school staff. To minimize disruption to classroom activities, kindergarten testing was accomplished in one-hour blocks of time across two consecutive days. Within each time point, testing of students across days or data collectors was discouraged. When possible, student absences were made-up within one week of the scheduled testing session.

SAT-10 administration. Data collection occurred during the month of May in students' classrooms with all students present on the day of testing. Make-up testing for absent students was not possible. Students completed items using SAT-10 booklets and project-supplied pencils and place markers (i.e., the same manila markers used for the easyCBM© data collection). Student seating was re-arranged as necessary to maximize response privacy. Standardized practice items were administered prior to testing. One lead tester read the standardized instructions, managed the testing environment, and walked students through the group standardized test administration. Although teachers were present in the room, they did not participate in the testing and engaged in other activities at their desks. One to two additional data collectors acted as test monitors, supporting student on-task behavior while completing the test. Prior to classroom entry, all lead data collectors participated in a specialized training and test monitors received detailed guidelines related to their test administration responsibilities.

Students were given small incentives for their participation (e.g., fancy erasers and pencils). Students who did not participate in the easyCBM© data collection did not participate in the SAT-10 testing. Teachers were requested to find an alternative activity for these students in a room other than the classroom. However, these students received the same incentive as their peers.

Kindergarten testing took approximately 45 minutes on two consecutive days; students took the *Sounds and Letters* and *Word Reading* tests. First grade testing took

approximately 45 minutes on one day of testing; students took the *Word Study Skills* and *Word Reading* tests. Once testing was complete, response booklets were cleaned for stray marks and shipped back to the publisher for machine scoring.

Data preparation and analysis

Data were screened for outlying cases using visual analysis (i.e., boxplots, histograms, and scatterplots) and z---score comparisons. Raw scores were converted to z--scores, and those falling below ---3 or above +3 were considered outliers. In addition to screening for outliers, the assumptions of linearity and normality were examined. The linearity assumption was tested using a visual examination of the shape scatterplots. The normality assumption was examined using the Shapiro Wilk test of normality. The null hypothesis for this test is that the data are normally distributed. Inspection of the data indicated that for most of the fluency measures, these assumptions were met. The exceptions were data from the Kindergarten Word Reading measure and grade one Phoneme Segmenting measure. Therefore, the Spearman's rank correlation, a non---parametric statistic, was used instead for analyzing the data from these measures. The Pearson's coefficient (*r*), measures the strength and direction of the linear relationship between two measures: *r* can range from ---1 to +1, with ---1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation at all. Similar to the Pearson correlation, the Spearman's coefficient (r_s) also indicates the strength of a pair of measures, but specifically the monotonic relation between paired data. The interpretation of r_s is similar to the interpretation of a Pearson correlation coefficient; with the closer r_s is to ±1, the stronger the c relationship. To determine the severity of outlying cases, results from the correlation analyses were examined after removing each outlying case. Most outlying cases were not sufficiently severe to warrant removal, and thus were kept in the sample for each analysis. One student was determined to have an impact on the results and was removed.

Criterion validity was assessed with a standard multiple regression of easyCBM© measures on the SESAT/SAT---10 measures. Because there was no a priori hypothesis about the order in which to enter the independent variables, they were entered into the regression at the same time, and the order was not the focus of the model. One kindergarten student was removed from the regression with the time 4 SAT--10 Word Reading because they were an influential outlier. In the initial regression of first grade scores, the assumption of normality was not met, potentially due to this extreme influential outlier. The same student was classified as influential for all time points. Upon removal, while there was some improvement, the same assumption failed to be tenable, possibly due to the apparent ceiling effect, a maximum score of 565, prevalent on the SAT---10 *Word Reading* measure. Examination of predicted values versus studentized residuals yielded a nonrandom pattern, indicating a violation of the assumption of independence of errors also. Lastly, across time, phoneme segmenting violated the assumption of linearity. In order to make these assumptions tenable, easyCBM© Word Reading Fluency was removed as an IV at all time points from the kindergarten data. Similarly, WRF was also removed from the grade 1 regressions and replaced with the easyCBM© Word Reading Fluency measure administered at Time 5 as

the dependent variable. This change greatly improved the tenability of the assumptions and eliminated all influential outliers for grade 1.

Results

Between 108 and 199 students participated in each grade at each time point. In this section, we first present descriptive statistics for the easyCBM© measures, and then the results of our alternate form reliability study, and the results of our validity study.

Alternate Form Reliability

Descriptive Statistics

Descriptive statistics from the kindergarten and grade 1 easyCBM© measures at each time point are presented in Tables 1–8. The mean scores for the kindergarten measures ranged from 25---45 for LN, 14–39 for LS, 22---45 for PS, and 6---17 for WRF. As expected, the mean scores for each measure increased for grade 1. The grade 1 mean was 50---70 for LN, 41–58 for LS, 47---55 for PS, and 20---54 for WRF.

Kindergarten. Results for the kindergarten measures across time comparing performance on 1 to 2 different forms per measure are presented in tables 9 – 12. As expected, nearly all of the measures had the highest correlation with the alternate form administered at the same time (r = .81---.94). In addition, correlations tended to decrease with time, regardless of form or measure, as is to be expected. We found a moderate to strong positive relation between the alternate forms of the LN measure, with correlations ranging from r = .61–.90. We also found a moderate to strong positive relation between the alternate forms of the LS measure, with correlations ranging from r =.54 ---.92. There was a weak to strong positive relation between the alternate forms of the PS measures, with correlations ranging from r =.31---.90. There was a moderately strong positive relation between the alternate forms of the WRF measures, with correlations ranging from r =.74–.94.

Grade 1. Results from the grade 1 measures across time comparing performance on 1 to 2 different forms per measure are reported in tables 13---16. The first grade measures showed a similar pattern as the kindergarten measures with moderate to strong positive relations across time for the LN, LS, and WRF measures and a small to moderate relation for phoneme segmenting. Like the kindergarten measures, nearly all of the measures had the highest correlation with the alternate form administered at the same time (r =.85–.90), and correlations tended to decrease with time regardless of form or measure. There was a moderately strong positive relation between the LN measures, with correlations ranging from r = .66–.89. There was a weak to strong positive relation between the LS measures, with correlations ranging from r =.40---.83. There was a weak relation between the PS measures, with correlations ranging from r = .27–.45. There was a moderately---strong positive relation between the WRF measures, with correlations ranging from r =.73–.96.

Validity

Descriptive Statistics

Descriptive statistics from the kindergarten easyCBM© measures and the SAT‑‑‑10 measures at each time point are presented in Tables 17‑‑‑36. Descriptive statistics from the Grade 1 easyCBM© measures and the SAT‑‑‑10 measures at each time point are presented in Tables 37‑‑‑56. Because Time 5 was administered after the SAT‑‑‑10, data from this time point were not analyzed. For some analyses, the *sample size reported* in the descriptive statistics tables does not align with the sample size reported in the regression table due to listwise deletion of students during analysis.

Kindergarten. Results for the criterion validity of the kindergarten easyCBM© measures can be found in tables 18 and 19. The first model regressed easyCBM© LN, LS, and PS from time 1 to time 4 on SAT‑‑10 Sounds and Letters. The overall variance explained by the model across time ranged from 35%‑‑‑40%. For all time points, LN scores were a significant predictor of Sounds and Letters performance. LS scores were significant predictors only at Time 3 (February) and PS was a significant predictor for all time points except Time 3. The unique variance in performance explained by LN ranged from .16%‑‑‑.64%. LS and PS both explained .03% of the unique variance across time. The second model regressed the same independent variables on the SAT‑‑‑10 Word Reading measure. The overall model explained 48%‑‑‑58% of the variance of the dependent variable. LN was a significant predictor for all time points except Time 2 (December). LS scores were significant for all time points, while PS was a non‑‑‑significant predictor across all the time points. The variance of SAT‑‑‑10 Word Reading uniquely explained by LN ranged from .01%‑‑‑.81% and the variance uniquely explained by LS ranged from .16%‑‑‑.64%.

Grade 1. Results for the criterion validity study of the grade 1 easyCBM© measures can be found in tables 20 and 21. The first model regressed easyCBM© LN, LS, PS, and WRF from time 1 to time 4 upon SAT‑‑10 WSS. The variance explained by the whole model at each time point varied from 14%‑‑‑32%. WRF was a significant predictor of SAT‑‑10 WSS for all time points, and PS was significant for Time 4 (April) only. LN and LS were not significant predictors of SAT‑‑‑10 WSS at any time point. The variance uniquely explained by PS at Time 4 was 2.0%, and the unique variance explained by WRF ranged from 13.0%‑‑‑21.2%. The second model used the same independent variables, but substituted easyCBM WRF at Time 4 for SAT‑‑‑10 WSS. The variance explained by the model across time ranged from 49%‑‑‑56%. LN performance was a significant predictor of easyCBM WRF performance at Time 4 for all time points, and LS was significant for Times 2 (December) and 3 (February). PS was not a significant predictor of WRF performance at Time 4 at any time point. The variance in easyCBM© WRF score at Time 4 uniquely explained by LN ranged from 14.4%‑‑41.0%, and the variance in easyCBM© WRF performance at Time 4 uniquely explained by LS performance ranged from 1.4 %‑‑‑2.3%.

Discussion

The findings of this study provide evidence of the reliability of the alternate forms of the easyCBM© reading measures. A moderate to strong correlation between alternate forms of the measures across time was found for nearly all the measures. Some exceptions were weak correlations found between forms for kindergarten and grade 1 phoneme segmenting. In general, the relations among alternate forms of letter names, letter sounds, phoneme segmenting, and word reading fluency were significant. As expected, the strength of the relation was greater for measures administered more closely together, decreasing as additional time elapsed between measurement instances.

The results of the validity study provide evidence of the relation between the easyCBM© battery of reading measures and a compilation of some of the sub---tests from a standardized test of reading, the SAT---10. At each time point, student performance on the easyCBM© measures explained 40---50% of the variance on the SAT---10 measures. When used in conjunction with one another, easyCBM© LN, LS, PS, and WRF explain significantly more variance than they do as stand---alone measures. Additionally, easyCBM© measures accounted for more variance when the criterion outcome was limited to word reading (SAT---10 WR for kindergarten and easyCBM© WRF at time 5 for grade 1) rather than constructs other than word reading (SAT---10 SL for Kindergarten or SAT---10 WSS for grade 1).

Nearly half the variance in performance on a standardized reading assessment (SAT--10) was accounted for by performance on the easyCBM© early literacy measures. The remaining variance is yet to be explained. A plausible explanation for some of the remaining unexplained variance is differences in test format. The SAT--10 Sounds & Letters and Word Reading measures were picture---based and group administered, while the easyCBM© measures presented students with the letters and/or words themselves, and were individually administered. In addition, the one---minute timed fluency---based easyCBM© measures may tap into students' underlying processing speed, whereas processing speed might not affect performance on the untimed SAT---10.

References

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Tables

Table 1

Descriptive Statistics: Kindergarten Letter Names

Time/Measure/Form	n	M	SD
Time 1 LN form 8	192	24.96	16.05
Time 1 LN form 13	194	25.41	15.41
Time 2 LN form 11	198	30.45	16.22
Time 2 LN form 16	197	30.34	16.22
Time 3 LN form 9	196	33.09	16.34
Time 3 LN form 14	199	33.62	15.90
Time4 LN form 12	194	41.24	16.73
Time 4 LN form 17	195	40.78	16.81
Time 5 LN form 10	197	44.24	18.69
Time 5 LN form 15	197	44.76	18.00

Table 2

Descriptive Statistics: Kindergarten Letter Sounds

Time/Measure/Form	*n*	*M*	*SD*
Time 1 LS form 8	182	14.26	11.35
Time 1 LS form 13	175	14.65	11.25
Time 2 LS form 11	195	18.56	11.94
Time 2 LS form 16	194	19.25	13.04
Time 3 LS form 9	196	27.28	14.24
Time 3 LS form 14	197	25.49	14.26
Time 4 LS form 12	199	34.47	15.00
Time 4 LS form 17	197	33.19	15.72
Time 5 LS form 10	198	38.79	16.73
Time 5 LS form 15	198	37.83	15.61

Table 3

Descriptive Statistics: Kindergarten Phoneme Segmenting

Time/Measure/Form	n	M	SD
Time 1 PS form 5	172	22.19	15.63
Time 1 PS form 11	168	23.29	15.66
Time 2 PS form 8	183	27.61	16.68
Time 2 PS form 14	184	28.16	17.03
Time 3 PS form 6	194	32.93	14.82
Time 3 PS form 12	191	35.27	13.36
Time 4 PS form 10	199	42.35	13.05
Time 4 PS form 15	197	41.37	12.64
Time 5 PS form7	197	45.26	13.01
Time 5 PS form 13	198	45.05	13.76

Table 4

Descriptive Statistics: Kindergarten Word Reading

Time/Measure/Form	n	M	SD
Time1 WR form 1	114	6.20	12.38
Time1 WR form 12	108	6.55	13.32
Time2 WR form 10	140	6.75	12.57
Time2 WR form 15	132	7.48	14.37
Time3 WR form 6	173	8.27	14.22
Time3 WR form 13	155	10.94	16.65
Time4 WR form 11	187	13.57	18.41
Time4 WR form 17	182	14.85	17.31
Time5 WR form 9	187	17.13	19.27
Time5 WR form 14	190	17.03	19.62

Table 5

Descriptive Statistics: Grade 1 Letter Names

Time/Measure/Form	*n*	*M*	*SD*
Time 1 LN form 8	184	49.91	17.15
Time 1 LN form 13	184	50.86	16.10
Time 2 LN form 11	189	57.85	18.02
Time 2 LN form 16	189	56.03	17.32
Time 3 LN form 9	186	59.93	17.12
Time 3 LN form 14	187	59.85	17.99
Time 4 LN form 12	188	68.04	18.68
Time 4 LN form 17	187	68.03	18.28
Time 5 LN form 10	187	69.91	18.80
Time 5 LN form 15	186	68.59	18.84

Table 6

Descriptive Statistics: Grade 1 Letter Sounds

Time/Measure/Form	*n*	*M*	*SD*
Time 1 LS form 8	184	41.48	12.93
Time 2 LS form 17	189	46.95	14.12
Time 3 LS form 10	187	52.49	15.74
Time 4 LS form 15	187	53.82	14.97
Time 5 LS form 12	187	57.83	16.93

Table 7

Descriptive Statistics: Grade 1 Phoneme Segmenting

Time/Measure/Form	*n*	*M*	*SD*
Time 1 PS form 5	183	46.87	13.77
Time 2 PS form 16	189	50.87	12.41
Time 3 PS form 12	181	48.92	10.75
Time 4 PS form 17	187	51.49	11.24
Time 5 PS form 15	187	54.58	11.07

Table 8

Descriptive Statistics: Grade 1 Word Reading

Time/Measure/Form	n	M	SD
Time 1 WR form 10	183	20.15	18.20
Time 2 WR form 16	189	25.38	20.33
Time 3 WR form 12	186	34.41	22.03
Time 4 WR form 17	187	47.59	23.83
Time 5 WR form 14	187	53.78	24.15

Table 9

Correlation Between Alternate Forms of Kindergarten Letter Name Measures Across Time

Time/Measure/Form	Time 1 LN form 13	Time 1 LN form 8	Time 2 LN form 16	Time 2 LN form 11	Time 3 LN form 14	Time 3 LN form 9	Time 4 LN form 17	Time 4 LN form 12	Time 5 LN form 15
Time 1 LN form 8	**.87****								
Time 2 LN form 16	.82**	.84**							
Time 2 LN form 11	.84**	.87**	**.89****						
Time 3 LN form 14	.76**	.77**	.83**	.83**					
Time 3 LN form 9	.77**	.77**	.81**	.81**	**.88****				
Time 4 LN form 17	.66**	.69**	.74**	.72**	.80**	.78**			
Time 4 LN form 12	.68**	.74**	.74**	.70**	.79**	.74**	**.90****		
Time 5 LN form 15	.61**	.62**	.65**	.64**	.73**	.74**	.84**	.83**	
Time 5 LN form 10	.64**	.67**	.71**	.68**	.79**	.76**	.85**	.84**	**.90****

Note. **p < 0.01. Bolded correlations represent alternate forms taken on the same day.

Table 10

Correlation Between Alternate Forms of Kindergarten Letter Sounds Measures Across Time

Time/Measure/Form	Time 1 LS form 13	Time 1 LS form 8	Time 2 LS form 16	Time 2 LS form 11	Time 3 LS form 14	Time 3 LS form 9	Time 4 LS form 17	Time 4 LS form 12	Time 5 LS form 15
Time 1 LS form 8	**.89****								
Time 2 LS form 16	.81**	.78**							
Time 2 LS form 11	.86**	.83**	**.92****						
Time 3 LS form 14	.75**	.72**	.81**	.82**					
Time 3 LS form 9	.74**	.69**	.82**	.82**	**.92****				
Time 4 LS form 17	.64**	.61**	.67**	.71**	.79**	.83**			
Time 4 LS form 12	.58**	.53**	.61**	.67**	.77**	.77**	**.88****		
Time 5 LS form 15	.60**	.55**	.63**	.69**	.77**	.79**	.89**	.87**	
Time 5 LS form 10	.57**	.54**	.62**	.66**	.75**	.75**	.87**	.85**	**.91****

Note. $**p < 0.01$. Bolded correlations represent alternate forms taken on the same day.

Table 11

Correlation Between Alternate Forms of Kindergarten Phoneme Segmenting Measures Across Time

Time/Measure/Form	Time 1 PS form 11	Time 1 PS form 5	Time 2 PS form 14	Time 2 PS form 8	Time 3 PS form 12	Time 3 PS form 6	Time 4 PS form 15	Time 4 PS form 10	Time 5 PS form 13
Time 1 PS form 5	**.81**								
Time 2 PS form 14	.42**	.49**							
Time 2 PS form 8	.51**	.52**	**.90**						
Time 3 PS form 12	.40**	.37**	.43**	.41**					
Time 3 PS form 6	.39**	.35**	.45**	.52**	**.83**				
Time 4 PS form 15	.42**	.39**	.45**	.53**	.34**	.46**			
Time 4 PS form 10	.39**	.39**	.41**	.48**	.42**	.51**	**.83**		
Time 5 PS form 13	.48**	.49**	.40**	.49**	.38**	.54**	.59**	.57**	
Time 5 PS form 7	.44**	.41**	.31**	.43**	.35**	.48**	.51**	.50**	**.86**

Note. **p* < 0.01. Bolded correlations represent alternate forms taken on the same day.

Table 12

Correlation Between Alternate Forms of Kindergarten Word Reading Measures Across Time

Time/Measure/Form	Time 1 WR form 12	Time 1 WR form 1	Time 2 WR form 15	Time 2 WR form 10	Time 3 WR form 13	Time 3 WR form 6	Time 4 WR form 17	Time 4 WR form 11	Time 5 WR form 14
Time 1 WR form 1	**.84****								
Time 2 WR form 15	.81**	.77**							
Time 2 WR form 10	.83**	.78**	**.91****						
Time 3 WR form 13	.75**	.70**	.86**	.89**					
Time 3 WR form 6	.76**	.77**	.84**	.87**	**.90****				
Time 4 WR form 17	.77**	.80**	.85**	.88**	.86**	.86**			
Time 4 WR form 11	.75**	.78**	.84**	.85**	.84**	.86**	**.92****		
Time 5 WR form 14	.75**	.79**	.82**	.84**	.85**	.86**	.90**	.91**	
Time 5 WR form 9	.74**	.76**	.81**	.82**	.81**	.84**	.89**	.90**	**.94****

Note. **p < 0.01. Bolded correlations represent alternate forms taken on the same day.

Table 13

Correlation Between Alternate Forms of Grade 1 Letter Names Measures Across Time

Time/Measure/Form	Time 1 LN form 13	Time 1 LN form 8	Time 2 LN form 16	Time 2 LN form 11	Time 3 LN form 14	Time 3 LN form 9	Time 4 LN form 17	Time 4 LN form 12	Time 5 LN form 15
Time 1 LN form 8	**.88****								
Time 2 LN form 16	.84**	.85**							
Time 2 LN form 11	.82**	.82**	**.90****						
Time 3 LN form 14	.75**	.75**	.78**	.77**					
Time 3 LN form 9	.74**	.75**	.77**	.75**	**.85****				
Time 4 LN form 17	.69**	.69**	.75**	.74**	.81**	.82**			
Time 4 LN form 12	.68**	.73**	.78**	.76**	.81**	.81**	**.89****		
Time 5 LN form 15	.67**	.70**	.75**	.70**	.81**	.81**	.84**	.86**	
Time 5 LN form 10	.66**	.67**	.73**	.70**	.80**	.76**	.82**	.85**	**.87****

Note. **p < 0.01. Bolded correlations represent alternate forms taken on the same day.

Table 14

Correlation Between Grade 1 Letter Sounds Measures Across Time

Time/Measure/Form	Time 1 LS form 8	Time 2 LS form 17	Time 3 LS form 10	Time 4 LS form 15
Time 2 LS form 17	.80**			
Time 3 LS form 10	.64**	.71**		
Time 4 LS form 15	.40**	.49**	.71**	
Time 5 LS form 12	.49**	.55**	.75**	.83**

Note. **$p < 0.01$.

Table 15

Correlation Between Grade 1 Phoneme Segmenting Measures Across Time

Time/Measure/Form	Time 1 PS form 5	Time 2 PS form 16	Time 3 PS form 12	Time 4 PS form 17
Time 2 PS form 16	.42**			
Time 3 PS form 12	.41**	.38**		
Time 4 PS form 17	.14	.31**	.33**	
Time 5 PS form 15	.27**	.45**	.41**	.45**

Note. **$p < 0.01$.

Table 16

Correlation Between Grade 1 Word Reading Measures Across Time

Time/Measure/Form	Time 1 WR form 10	Time 2 WR form 16	Time 3 WR form 12	Time 4 WR form 17
Time 2 WR form 16	.96**			
Time 3 WR form 12	.89**	.94**		
Time 4 WR form 17	.79**	.85**	.92**	
Time 5 WR form 14	.73**	.80**	.87**	.94**

Note. **$p < 0.01$.

Table 17

Descriptive Statistics SAT---10 Sounds and Letters, Word Reading, and Word Study Skills

	Measures	*n*	*M*	*SD*
Kindergarten	Sounds & letters	166	533.00	44.64
	Word reading	164	452.74	52.40
Grade 1	Word reading	172	543.39	45.79
	Word study skills	162	583.45	48.42

Table 18

Grade Kindergarten Regression Models Predicting SAT---10 Sounds and Letters

easyCBM © measures	Time 1			Time 2			Time 3			Time 4		
	B	®	Part	*B*	®	Part	*B*	®	Part	*B*	®	Part
Letter names	0.88*	0.34*	.04	0.98*	0.35*	.04	0.90*	0.33*	.04	1.13**	0.42**	.08
Letter sounds	0.61	0.16	.01	0.74	0.20	.01	0.86*	0.28*	.03	0.47	0.16	.01
Phoneme segmenting	0.54*	0.20*	.03	0.52*	0.19*	.03	0.33	0.11	.01	0.59*	0.17*	.03
R^2		.35			.39			.39			.40	
N		124			141			151			160	

Note. *$p < .05$, **$p < .001$, Part = Semipartial correlations.

Table 19

Grade Kindergarten Regression Models Predicting SAT‑‑‑10 Word Reading

easyCBM © measures	Time 1			Time 2			Time 3			Time 4		
	B	®	Part	*B*	®	Part	*B*	®	Part	*B*	®	Part
Letter names	1.62**	0.49**	.09	0.64	0.19	.01	1.18**	0.36**	.05	0.96*	0.30*	.04
Letter sounds	1.46*	0.30*	.04	2.33**	0.52**	.08	1.44**	0.39**	.06	1.45**	0.42**	.08
Phoneme segmenting	0.02	0.01	.00	0.14	0.05	.00	0.19	0.05	.00	0.26	0.06	.00
R^2		.58			.49			.53			.48	
N		123			138			150			156	

Note. *p < .05, **p < .001, Part = Semipartial correlations.

Table 20

Grade 1 Regression Models Predicting SAT---10 Word Study Skills

easyCBM © measures	Time 1			Time 2			Time 3			Time 4		
	B	®	Part	*B*	®	Part	*B*	®	Part	*B*	®	Part
Letter names	0.09	0.03	.16	-0.09	-0.03	-.02	-0.37	-0.13	-.08	-0.33	-0.12	-.08
Letter sounds	0.34	0.09	.08	0.61	0.18	.12	0.15	0.05	.03	0.04	0.01	.01
Phoneme segmenting	0.10	0.03	.07	0.01	0.00	.00	0.64	0.14	.13	0.64*	0.15*	.14
Word reading fluency	1.04**	0.43**	.36	1.01**	0.45**	.38	1.15**	0.54**	.45	1.23**	0.61**	.46
R^2		.14			.28			.28			.32	
N		148			153			149			161	

Note. *p < .05, **p < .001, Part = Semipartial Correlation.

Table 21

Grade 1 Regression Models Predicting the easyCBM© Word Reading Fluency measure at Time 5

easyCBM © measures	Time 1			Time 2			Time 3			Time 4		
	B	®	Part	*B*	®	Part	*B*	®	Part	*B*	®	Part
Letter names	0.86**	0.63**	.42	0.80**	0.61**	.40	0.73**	0.53**	.38	1.01**	0.78**	.64
Letter sounds	0.23	0.13	.09	0.31*	0.19*	.12	0.34*	0.22*	.15	‑0.14	‑0.09	‑.07
Phoneme segmenting	0.13	0.08	.07	‑0.20	‑0.10	‑.09	-0.06	0.13	‑.03	-0.15	-0.07	‑.06
R^2		.56			.54			.49			.53	
N		170			175			171			184	

Note. *$p < .05$, **$p < .001$, Part = Semipartial Correlation.