Appendices

For Strambler, M. J., Meyer, J. L., Irwin, C. W., & Coleman, G. A. *Kindergarten performance in early literacy: student, teacher, and classroom factors.* New Haven, CT: Partnership for Early Education Research (PEER). December 2018. https://osf.io/vt8am/

Appendix A: Study Methodology

After finalizing a Data Sharing Agreement with Yale University and EDC, Norwalk Public Schools shared demographic and assessment data for all kindergarten students in 2014/15 and 2015/16. The demographic data included English learner (EL) status, special education status, free or reduced-price lunch (FPRL) status, gender, race/ethnicity, and teacher name. The assessment data include DIBELS data from each of three assessment timepoints, specifically, numeric scores (continuous variables) and benchmark scores (categorical variables) for all kindergarten students assessed at the beginning, middle or end of the year. The district shared these data in four separate files: demographic data and DIBELS data for each year.

After receiving the student data, PEER merged the four files together based on state-assigned student identification numbers (SASIDs). PEER used the merged file to compile a list of kindergarten teachers, based on each child's teacher as specified in the demographic data. PEER also used the merged file to calculate three classroom-level values for each teacher: class size, percentage of students eligible for free or reduced-priced lunch, and percentage of students eligible for EL services.

PEER then requested teacher data from the district for the list of teachers compiled from the student data file. The teacher data included level of education (for example, master's degree, sixth year certificate, etc.), teacher certification endorsement area (for example, Elementary K-6, Bilingual PK-12, etc.), and years of teaching experience in the district.

PEER linked teacher and classroom level data with student data by using the name of each student's teacher (as specified in the demographic data) to assign values for the student's teacher and classroom. If the assigned teacher was missing from the demographic data, PEER used the assessing teacher name from the DIBELS data. (In Norwalk, the DIBELS are typically administered by the assigned classroom teacher.)

Although the DIBELS composite scores can be used to compare students to benchmarks, composite scores are difficult to compare across time points because the same scales are not administered at all time points (namely, BOY, MOY, and EOY). For this reason, PEER decided it was not appropriate to do a growth analysis of student scores across time points. Instead, we opted to analyze EOY DIBELS Next benchmark status and correct for BOY DIBELS Next benchmark status.

After linking the student and teacher data, PEER used HLM 7.2 software to conduct analyses using a multilevel modeling (MLM) approach. MLM is designed for handling nested data such as students grouped within classrooms and schools. Under such conditions, the nature of the data violates one of the assumptions required of traditional regression analyses—that each student's score on a measure is independent of other students. In this case, students' scores on a given measure may be partially dependent upon the classroom or school they attend. MLM allows for the proper statistical modeling of such dependencies.

For each MLM model, PEER researchers used the teacher ID as a grouping/cluster variable and end-of-year (EOY) DIBELS benchmark data as an outcome, which was coded as "1" for students who met the benchmark and "0" for students who did not meet the benchmark. Student demographics and beginning-of-year (BOY) DIBELS benchmark scores (coded the same as the EOY DIBELS data) were entered as level-1 variables, or student-level indicators. Specifically, the analyses included variables for English Learner (EL) status, special education status, free or reduced-price lunch (FRPL) status, gender, race/ethnicity, and BOY DIBELS benchmark status.

Teacher-level variables were entered as level-2 variables in the model. These variables consist of a continuous measure of teachers' number of years of experience, an ordinal measure of teachers' level of education (see codes and descriptions in Table B.2a of Appendix B), and a binary variable describing whether a teacher had at least one teacher

certification that included kindergarten. We used the endorsement codes listed for each teacher to determine his/her value for this binary variable. These codes are described Table B.4a, in Appendix B. All models were conducted separately for the 2014-2015 school year and the 2015-2016 school year.

We first conducted an unconditional model for each year to determine the intraclass correlation, which describes the proportion of variability in DIBELS scores among classrooms relative to the total variability in DIBELS scores, where total variability is the sum of within-classroom variability plus among-classroom variability. We did this for DIBELS benchmark status and DIBELS composite scores.

Second, we conducted a model with just the student-level demographic (level-1) variables and examined which of these factors were associated with end-of-year DIBELS benchmark status, controlling for beginning-of-year DIBELS benchmark status. See tables C.4a and C.4b in Appendix C for the results of these analyses.

Third, we added level-2 variables to our analysis. Our third model included the addition of teacher-level variables to the second model, in order to examine the extent to which teacher factors were associated with end-of-year DIBELS benchmark status. Once again, we controlled for beginning-of-year DIBELS benchmark status. See tables C.5a and C.5b in Appendix C for the results of these analyses.

Our fourth model examined those student factors found to be associated with end-of-year DIBELS benchmark status, to explore whether teacher factors explained the relationship (slope) between the student factors and EOY DIBELS benchmark status. We model the slopes as fixed slopes to allow them to vary across classrooms. These were entered to examine random intercepts and not random slopes. See tables C.6a and C.6b in Appendix C for the results of these analyses.

Finally, we examined whether classroom-level factors contributed to students' DIBELS benchmark status at the end of the year. For this analysis, we created classroom-level variables representing the class size (number of students), the percentage of students eligible for free and reduced priced lunch, and the percentage of students with ELL status. These variables were entered as level-2 variables and students' DIBELS composite scores at the beginning of the year were entered as a level-1 variable in a random-intercepts model. This type of model accounts for the variation in these measures across classrooms while controlling for their status at the beginning of the year. See tables C.7a and C.7b in Appendix C for the results of these analyses. We also conducted a separate set of analyses where individual-level student demographics were added as control variables to the previous model. Specifically, we entered Black, Hispanic, and Asian dummy variables, ELL status, and free and reduced lunch dummy variables. See tables C.8a and C.8b in Appendix C for the results of these analyses. As with the prior analyses, separate models were conducted for the 2014-2015 year and the 2015-2016 school year.

Appendix B: Study Sample

Table B.1a: Study sample by English Learner status

	2014-2015		2015-2016	
	Frequency	Percent	Frequency	Percent
No	572	76.2	601	77.4
Yes	179	23.8	175	22.6
Total	751	100.0	776	100.0

Table B.1b: Study sample by Special Education status

	2014-2015		2015-2016	
	Frequency	Percent	Frequency	Percent
No	684	91.1	687	88.5
Yes	67	8.9	89	11.5
Total	751	100.0	776	100.0

Table B.1c: Study sample by Free or Reduced-Price Lunch eligibility

	2014-2015		2015-2016	
	Frequency	Percent	Frequency	Percent
Not eligible	381	50.7	396	51.0
Eligible for reduced price lunch	54	7.2	55	7.1
Eligible for free lunch	316	42.1	325	41.9
Total	751	100.0	776	100.0

Table B.1d: Study sample by gender

	2014-2015		2015-2016	
	Frequency	Percent	Frequency	Percent
Male	395	52.6	406	52.3
Female	356	47.4	370	47.7
Total	751	100.0	776	100.0

Table B.1e: Study sample by race/ethnicity

	2014-2015		2015-2016	
	Frequency	Percent	Frequency	Percent
Hispanic	351	46.7	329	42.4
White	258	34.4	275	35.4
Black	95	12.6	121	15.6
Asian	47	6.3	51	6.6
Total	751	100.0	776	100.0

Table B.2a: Level of education codes for kindergarten teachers

Level of Education code	Alternate Level of Education code	Description	Other info
BA		Bachelor's degree only (none present in this data set)	
BA +15		Bachelor's degree plus 15 additional credit hours (none present in this data set)	
MA		Master's degree	Also referred to as BA +30 in NPS teacher contract
MA +15	MA15	Master's degree plus 15 additional credit hours	
6 YR	6th Year	Advanced certificate/diploma beyond master's degree (specific to education field)	Also referred to as BA +60 in NPS Teacher contract
6Y15	6th Year +15	Sixth Year certificate plus 15 additional credit hours	
7 YR	7th Year	Seems to mean Sixth Year certificate plus 30 additional credit hours	Also referred to as BA +90 in NPS Teacher contract

Table B.2b: Frequencies for kindergarten teacher level of education codes

	2014-2015				2015-2016			
	Frequency	Percent	Valid Percent	Cumulative Percent	Frequency	Percent	Valid Percent	Cumulative Percent
MA	4	8.7	9.1	9.1	7	15.2	15.6	15.6
MA +15	4	8.7	9.1	18.2	3	6.5	6.7	22.2
6th Year	0	0.0	0.0	18.2	0	0.0	0.0	22.2
6th Year +15	3	6.5	6.8	25.0	3	6.5	6.7	28.9
7th Year	33	71.7	75.0	100.0	32	69.6	71.1	100.0
Subtotal	44	95.7	100.0		45	97.8	100.0	
Missing	2	4.3			1	2.2		
Total	46	100.0			46	100.0		

Table B.3: Frequencies for teacher years of experience

	2014-2015				2015-2016			
	Frequency	Percent	Valid Percent	Cumulative Percent	Frequency	Percent	Valid Percent	Cumulative Percent
0 to 5 years	8	17.4	18.2	18.2	11	23.9	24.4	24.4
6 to 10 years	5	10.9	11.4	29.5	7	15.2	15.6	40.0
11 to 15 years	17	37.0	38.6	68.2	15	32.6	33.3	73.3
16+ years	14	30.4	31.8	100.0	12	26.1	26.7	100.0
Subtotal	44	95.7	100.0		45	97.8	100.0	
Missing	2	4.3			1	2.2		
Total	46	100.0			46	100.0		

Table B.4a. Endorsement codes for teacher certification

ENDORSEMENT CODE	DESCRIPTION	Includes Kindergarten Endorsement
001	Pre-K–Grade 8	Yes
002	Pre-K–Grade 6	Yes
003	Pre-K–Grade 3	Yes
004	Grades 1–8	No
005	Elementary Education, 1-6	No
006	Middle Grades, 4–8	No
008	Pre-K and Kindergarten	Yes
009	Bilingual, PK–12	Yes
013	Elementary, K–6	Yes
065	Comprehensive Special Education, PK–12	Yes
102	Remedial Reading and Remedial Language Arts, 1–12	No
111	Teaching English to Speakers of Other Languages (TESOL), PK–12	Yes
113	Integrated Early Childhood/Special Ed., Nursery–K–Elem., 1–3	Yes

Table B.4b: Frequencies for teacher certification endorsement area

	2014-2015				2015-2016			
	Frequency	Percent	Valid Percent	Cumulative Percent	Frequency	Percent	Valid Percent	Cumulative Percent
Kindergarten Endorsed	37	80.4	84.1	84.1	39	84.8	86.7	86.7
No Kindergarten endorsement	7	15.2	15.9	100.0	6	13.0	13.3	100.0
Subtotal	44	95.7	100.0		45	97.8	100.0	
Missing	2	4.3			1	2.2		
Total	46	100.0			46	100.0		

Appendix C: Supplemental Tables

Table C.1: Descriptive statistics for beginning-of-year and end-of-year DIBELS composite scores

	2014-2015					2015-2016				
	N	Min	Max	Mean	Std. Dev.	N	Min	Max	Mean	Std. Dev.
Beginning of Year	751	0	122	34.04	24.75	776	0	118	35.66	24.14
End of Year	751	1	329	148.54	43.59	776	3	332	150.01	43.37

Table C.2: Frequencies for beginning-of-year and end-of-year DIBELS benchmark scores

		2014-2015		2015-2016	
		Frequency	Percent	Frequency	Percent
Beginning of Year	Not Met	311	41.4	294	37.9
	Met	440	58.6	482	62.1
	Total	751	100.0	776	100.0
End of Year	Not Met	131	17.4	140	18.0
	Met	620	82.6	636	82.0
	Total	751	100.0	776	100.0

Table C.3: Descriptive statistics for teacher years of experience

	N	Minimum	Maximum	Mean	Std. Deviation
2014-2015	44	0	33	12.9	7.1
2015-2016	45	1	34	12.2	7.9

Table C.4a: Multilevel model examining student effects on DIBELS benchmark status for 2014-2015

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Student-level effects							
Intercept	1.689464	0.351668	4.804	43	<0.001	5.416578	(2.665,11.010)
EL Status	-0.734809	0.318303	-2.309	721	0.021	0.479597	(0.257,0.896)
Special Education Status	-1.710911	0.352636	-4.852	721	<0.001	0.180701	(0.090,0.361)
Free lunch eligibility	-0.437893	0.250074	-1.751	721	0.08	0.645395	(0.395,1.055)
Reduced-price lunch eligibility	0.810613	0.647812	1.251	721	0.211	2.249286	(0.630,8.028)
Gender	0.330089	0.268069	1.231	721	0.219	1.391092	(0.822,2.355)
Hispanic/Latino	-0.479197	0.34525	-1.388	721	0.166	0.619281	(0.314,1.220)
African American/Black	-0.735229	0.490848	-1.498	721	0.135	0.479395	(0.183,1.257)
Asian	0.154656	0.660381	0.234	721	0.815	1.167256	(0.319,4.270)
BOY DIBELS Benchmark Status	2.372109	0.272064	8.719	721	<0.001	10.71998	(6.283,18.292)

Note: Student effects are examined using a random intercept model with fixed effects.

Table C.4b: Multilevel model examining student effects on DIBELS benchmark status for 2015-2016

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Student-Level Effects							
Intercept	3.828939	0.352778	10.854	43	<0.001	46.01368	(22.587,93.737)
EL Status	-0.403428	0.22662	-1.78	750	0.075	0.668026	(0.428,1.043)
Special Education Status	-1.924613	0.388186	-4.958	750	<0.001	0.145932	(0.068,0.313)
Free lunch eligibility	-1.06592	0.231114	-4.612	750	<0.001	0.344411	(0.219,0.542)
Reduced-price lunch eligibility	-0.131582	0.500221	-0.263	750	0.793	0.876707	(0.328,2.342)
Hispanic/Latino	-0.680031	0.36055	-1.886	750	0.06	0.506601	(0.250,1.028)
African American/Black	-0.485065	0.439679	-1.103	750	0.27	0.615657	(0.260,1.460)
Asian	-0.970726	0.588751	-1.649	750	0.1	0.378808	(0.119,1.204)
BOY DIBELS Benchmark Status	3.110821	0.344575	9.028	750	<0.001	22.43945	(11.405,44.149)

Note: Student effects are examined using a random intercept model with fixed effects.

Table C.5a: Multilevel model examining teacher and student effects on DIBELS benchmark status for 2014-2015

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Teacher-Level Effects							
Intercept	1.893645	0.848954	2.231	40	0.031	6.643538	(1.194,36.975)
Teacher Years of Experience	-0.012059	0.032534	-0.371	40	0.713	0.988013	(0.925,1.055)
Teacher Education Level	0.096177	0.128257	0.75	40	0.458	1.100954	(0.849,1.427)
Teacher kindergarten endorsement status	-0.661854	0.553051	-1.197	40	0.238	0.515894	(0.169,1.578)
Student-Level Effects							
EL Status	-0.636812	0.321521	-1.981	43	0.054	0.528976	(0.277,1.012)
Special Education Status	-1.763022	0.352571	-5	678	<0.001	0.171526	(0.086,0.343)
Free lunch eligibility	-0.407062	0.265649	-1.532	678	0.126	0.665603	(0.395,1.122)
Reduced-price lunch eligibility	0.772721	0.638793	1.21	678	0.227	2.16565	(0.618,7.594)
Gender	0.366395	0.275397	1.33	678	0.184	1.442524	(0.840,2.478)
Hispanic/Latino	-0.460718	0.355506	-1.296	678	0.195	0.630831	(0.314,1.268)
African American/Black	-0.690554	0.507873	-1.36	678	0.174	0.501298	(0.185,1.359)
Asian	0.12791	0.645252	0.198	678	0.843	1.136451	(0.320,4.036)
BOY DIBELS Benchmark Status	2.443018	0.269441	9.067	678	<0.001	11.50772	(6.779,19.535)

Note: Teacher and student effects are examined using a random intercept model with fixed effects

Table C.5b: Multilevel model examining teacher and student effects on DIBELS benchmark status for 2015-2016

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Teacher-Level Effects							
Intercept	2.20696	0.795852	2.773	40	0.008	9.088049	(1.818,45.430)
Teacher Years of Experience	0.028107	0.025419	1.106	40	0.275	1.028506	(0.977,1.083)
Teacher Education Level	0.033313	0.123684	0.269	40	0.789	1.033874	(0.805,1.328)
Teacher certification	-1.139875	0.388298	-2.936	40	0.005	0.319859	(0.146,0.701)
Student-Level Effects							
EL Status	-0.371484	0.229092	-1.622	749	0.105	0.68971	(0.440,1.082)
Special Education Status	-1.976082	0.396418	-4.985	749	<0.001	0.138611	(0.064,0.302)
Free lunch eligibility	-1.118921	0.227431	-4.92	749	<0.001	0.326632	(0.209,0.511)
Reduced-price lunch eligibility	-0.070869	0.496101	-0.143	749	0.886	0.931584	(0.352,2.468)
Gender	0.571673	0.347391	1.646	749	0.1	1.771228	(0.895,3.504)
Hispanic/Latino	-0.642047	0.366857	-1.75	749	0.081	0.526214	(0.256,1.082)
African American/Black	-0.520908	0.437494	-1.191	749	0.234	0.593981	(0.252,1.403)
Asian	-1.146133	0.580693	-1.974	749	0.049	0.317864	(0.102,0.994)
BOY DIBELS Benchmark Status	3.23581	0.364916	8.867	749	<0.001	25.42697	(12.418,52.066)

Note: Teacher and student effects are examined using a random intercept model with fixed effects

Table C.6a: Multilevel model examining teacher factors associated with student effects on DIBELS benchmark status for 2014-2015

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Teacher-Level Effects							
Intercept	1.885107	0.976298	1.931	40	0.061	6.587056	(0.915,47.427)
Teacher Years of Experience	-0.027877	0.036377	-0.766	40	0.448	0.972508	(0.904,1.047)
Teacher Education Level	0.180911	0.141937	1.275	40	0.21	1.198309	(0.899,1.597)
Teacher kindergarten endorsement status	-0.692315	0.640824	-1.08	40	0.286	0.500416	(0.137,1.828)
Teacher-level factors predicting EL effect							
Intercept	0.700359	1.381638	0.507	715	0.612	2.014476	(0.134,30.383)
Teacher Years of Experience	0.055095	0.029469	1.87	715	0.062	1.056641	(0.997,1.120)
Teacher Education Level	-0.396814	0.306701	-1.294	715	0.196	0.672459	(0.368,1.228)
Teacher kindergarten endorsement status	-0.528691	0.533569	-0.991	715	0.322	0.589376	(0.207,1.681)
Teacher-Level factors predicting Special Education effect							
Intercept	-1.735439	1.280014	-1.356	715	0.176	0.176323	(0.014,2.178)
Teacher Years of Experience	0.056284	0.062875	0.895	715	0.371	1.057898	(0.935,1.197)
Teacher Education Level	-0.292673	0.198107	-1.477	715	0.14	0.746266	(0.506,1.101)
Teacher kindergarten endorsement status	0.540107	0.841428	0.642	715	0.521	1.71619	(0.329,8.959)
Student-Level Effects							
Free lunch eligibility	-0.369965	0.270276	-1.369	715	0.171	0.690758	(0.406,1.175)

Reduced-price lunch eligibility	0.782921	0.659909	1.186	715	0.236	2.187854	(0.599,7.996)
Gender	0.33506	0.27455	1.22	715	0.223	1.398024	(0.815,2.397)
Hispanic/Latino	-0.52409	0.373839	-1.402	715	0.161	0.592094	(0.284,1.234)
African American/Black	-0.748685	0.509084	-1.471	715	0.142	0.472988	(0.174,1.286)
Asian	0.218599	0.738462	0.296	715	0.767	1.244332	(0.292,5.307)
BOY DIBELS Benchmark Status	2.460741	0.279067	8.818	715	<0.001	11.71349	(6.771,20.264)

Note: Student and teacher effects are examined using a random intercept model with fixed effects.

Table C.6b: Multilevel model examining teacher factors associated with student effects on DIBELS benchmark status for 2015-2016

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Teacher-Level Effects							
Intercept	1.851574	1.027175	1.803	40	0.079	6.369839	(0.798,50.832)
Teacher Years of Experience	0.004133	0.02612	0.158	40	0.875	1.004142	(0.952,1.059)
Teacher Education Level	0.134191	0.167943	0.799	40	0.429	1.143612	(0.814,1.606)
Teacher kindergarten endorsement status	-0.939718	0.40019	-2.348	40	0.024	0.390738	(0.174,0.878)
Teacher-level factors predicting special education effect							
Intercept	-2.544781	1.200171	-2.12	718	0.034	0.07849	(0.007,0.829)
Teacher Years of Experience	-0.012874	0.037596	-0.342	718	0.732	0.987209	(0.917,1.063)
Teacher Education Level	-0.082265	0.210998	-0.39	718	0.697	0.921028	(0.609,1.394)
Teacher kindergarten endorsement status	1.159822	0.655582	1.769	718	0.077	3.189364	(0.880,11.558)
Teacher-Level factors predicting free-lunch effect							
Intercept	-0.385278	1.072904	-0.359	718	0.72	0.680262	(0.083,5.595)
Teacher Years of Experience	0.036397	0.038721	0.94	718	0.348	1.037068	(0.961,1.119)
Teacher Education Level	-0.137612	0.223495	-0.616	718	0.538	0.871437	(0.562,1.352)
Teacher kindergarten endorsement status	-0.732446	0.467046	-1.568	718	0.117	0.480732	(0.192,1.203)
Student-Level Effects							
Reduced-price lunch eligibility	-0.230646	0.461675	-0.5	718	0.618	0.794021	(0.321,1.966)
Gender	0.597309	0.347159	1.721	718	0.086	1.817223	(0.919,3.594)
Hispanic/Latino	-0.752889	0.375395	-2.006	718	0.045	0.471004	(0.225,0.985)
African American/Black	-0.465049	0.4596	-1.012	718	0.312	0.628104	(0.255,1.549)
Asian	-1.361019	0.54943	-2.477	718	0.013	0.256399	(0.087,0.754)
BOY DIBELS Benchmark Status	3.321518	0.367906	9.028	718	<0.001	27.70237	(13.450,57.059)

Note: Student and teacher effects are examined using a random intercept model with fixed effects.

Table C.7a: Multilevel model examining classroom effects on DIBELS benchmark status for 2014-2015, not controlling for demographic variables

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Classroom-Level Effects							
Intercept	-0.465934	2.152062	-0.217	38	0.83	0.627549	(0.008,49.008)
Class size	0.028892	0.088011	0.328	38	0.745	1.029313	(0.861,1.230)
Percentage of class with Special Education status	-0.005503	0.027586	-0.2	38	0.843	0.994512	(0.940,1.052)
Percentage of class eligible for reduced-price lunch	0.015787	0.018458	0.855	38	0.398	1.015912	(0.979,1.055)
Percentage of class eligible for free lunch	0.018242	0.030157	0.605	38	0.549	1.018409	(0.958,1.083)
Percentage of class with EL Status	-0.011707	0.013571	-0.863	38	0.394	0.988361	(0.962,1.016)
Student-Level Effects							
BOY DIBELS Benchmark status	2.6318	0.217395	12.106	809	<0.001	13.89876	(9.071,21.297)

Note: Classroom and student effects are examined using a random intercept model with fixed effects.

Table C.7b: Multilevel model examining classroom effects on DIBELS benchmark status for 2015-2016, not controlling for demographic variables

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Classroom-Level Effects							
Intercept	3.403261	0.876704	3.882	38	<0.001	30.06198	(5.093,177.432)
Class size	-0.0533	0.047238	-1.128	38	0.266	0.948095	(0.862,1.043)
Percentage of class with Special Education status	0.018655	0.027062	0.689	38	0.495	1.01883	(0.964,1.076)
Percentage of class eligible for reduced-price lunch	-0.00897	0.022982	-0.39	38	0.698	0.99107	(0.946,1.038)
Percentage of class eligible for free lunch	0.010012	0.014214	0.704	38	0.486	1.010062	(0.981,1.040)
Percentage of class with EL Status	-0.022728	0.011787	-1.928	38	0.061	0.977529	(0.954,1.001)
Student-Level Effects							
BOY DIBELS Benchmark status	3.204618	0.280113	11.44	804	<0.001	24.64608	(14.222,42.712)

Note: Classroom and student effects are examined using a random intercept model with fixed effects.

Table C.8a: Multilevel model examining classroom effects on DIBELS benchmark status for 2014-2015, controlling for demographic variables

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Classroom-Level Effects							
Intercept	-1.53342	2.70511	-0.567	38	0.574	0.215796	(0.001,51.647)
Class size	0.077968	0.107641	0.724	38	0.473	1.081088	(0.869,1.344)
Percentage of class with Special Education Status	0.033677	0.034013	0.99	38	0.328	1.03425	(0.965,1.108)
Percentage of class eligible for reduced-price lunch	0.03151	0.021326	1.478	38	0.148	1.032012	(0.988,1.078)
Percentage of class eligible for free lunch	0.022019	0.036785	0.599	38	0.553	1.022263	(0.949,1.101)
Percentage of class with EL Status	-0.00566	0.015333	-0.369	38	0.714	0.994356	(0.964,1.026)
Student Level Effects							
EL Status	-0.777769	0.319056	-2.438	721	0.015	0.45943	(0.246,0.860)
Special Education Status	-1.766717	0.366361	-4.822	721	<0.001	0.170893	(0.083,0.351)
Free lunch eligibility	-0.496121	0.254317	-1.951	721	0.051	0.608888	(0.370,1.003)
Reduced-price lunch eligibility	0.740263	0.616735	1.2	721	0.23	2.096487	(0.624,7.039)
Gender	0.330376	0.281226	1.175	721	0.24	1.391491	(0.801,2.417)
Hispanic/Latino	-0.501395	0.358331	-1.399	721	0.162	0.605685	(0.300,1.224)
African-American/Black	-0.749898	0.503389	-1.49	721	0.137	0.472415	(0.176,1.270)
Asian	0.09993	0.660324	0.151	721	0.88	1.105093	(0.302,4.042)
BOY DIBELS Benchmark status	2.410324	0.282653	8.527	721	<0.001	11.13757	(6.393,19.404)

Note: Classroom and student effects are examined using a random intercept model with fixed effects.

Table C.8b: Multilevel model examining classroom effects on DIBELS benchmark status for 2015-2016, controlling for demographic variables

Fixed Effect	Coefficient	Standard Error	*t*-ratio	Approx. *d.f.*	*p*-value	Odds Ratio	Confidence Interval
Classroom-level effects							
Intercept	4.400916	1.187013	3.708	38	<0.001	81.52554	(7.369,902.002)
Class size	-0.077316	0.068281	-1.132	38	0.265	0.925598	(0.806,1.063)
Percentage of class with Special Education Status	0.049136	0.033381	1.472	38	0.149	1.050363	(0.982,1.124)
Percentage of class eligible for reduced-price lunch	-0.006919	0.027911	-0.248	38	0.806	0.993105	(0.939,1.051)
Percentage of class eligible for free lunch	0.024227	0.017356	1.396	38	0.171	1.024523	(0.989,1.061)
Percentage of class with EL Status	-0.014834	0.014385	-1.031	38	0.309	0.985276	(0.957,1.014)
Student-level effects							
EL Status	-0.371873	0.234094	-1.589	750	0.113	0.689442	(0.435,1.092)
Special Education Status	-2.057869	0.381205	-5.398	750	<0.001	0.127726	(0.060,0.270)
Free lunch eligibility	-1.171028	0.247667	-4.728	750	<0.001	0.310048	(0.191,0.504)
Reduced-price lunch eligibility	-0.19495	0.522888	-0.373	750	0.709	0.822876	(0.295,2.298)
Hispanic/Latino	-0.66063	0.369666	-1.787	750	0.074	0.516526	(0.250,1.068)
African-American/Black	-0.48036	0.450987	-1.065	750	0.287	0.618561	(0.255,1.500)
Asian	-0.999452	0.606596	-1.648	750	0.1	0.368081	(0.112,1.212)
BOY DIBELS Benchmark status	3.168207	0.343857	9.214	750	<0.001	23.76485	(12.096,46.691)

Note: Classroom and student effects are examined using a random intercept model with fixed effects.

Table C.9a: Descriptive statistics for teacher years of experience in 2014-2015 for teachers with and without kindergarten endorsement

Teacher Endorsement Status	N	Minimum	Maximum	Mean	Std. Deviation
Teachers with kindergarten endorsement	37	0	33	12.78	7.63
Teachers without kindergarten endorsement	7	12	20	13.57	2.94

Table C.9b: Descriptive statistics for teacher years of experience in 2015-2016 for teachers with and without kindergarten endorsement

Teacher Endorsement Status	N	Minimum	Maximum	Mean	Std. Deviation
Teachers with kindergarten endorsement	39	1	34	11.79	8.33
Teachers without kindergarten endorsement	6	13	21	14.67	3.20

Appendix D: Understanding the Evolution of a Young Research-Practice Partnership

PEER was launched in 2014 with a grant from the Institute of Education Sciences. PEER's grant application proposed three original research projects; this brief describes the third of these projects. PEER's knowledge about available data has evolved considerably over the first years since its launch, and this project has evolved as a result.

For example, this project was originally intended to examine data from the 2010-2011 to 2013-2014 school years from all three PEER communities. The questions PEER proposed in 2014 for this project were:

1. How do the teacher factors such as level of education, preschool certification, number of years of teaching at the current level, and number of total years of teaching predict preschool and kindergarten performance?
2. How do school factors such as school or center-based status, class size, length of day, teacher-child ratio, and SES predict preschool and kindergarten performance?

PEER soon learned that in Connecticut in that era, students generally did not receive a state-assigned student identifier until they enrolled in a school district. For children that attend community-based preschools, that meant it was extremely difficult, if not impossible, to follow children from preschool into kindergarten.

As a result, PEER proposed that it would examine child performance across the preschool years, using the Connecticut Preschool Assessment Framework (CT-PAF), which all preschool programs were required to use at the time. PEER soon learned from the Office of Early Childhood (OEC) that the CT-PAF is intended only to inform instruction at the individual and classroom level. The OEC indicated that it would be inappropriate to use the CT-PAF to examine the growth of children over time.

In response, PEER proposed examining child performance across the kindergarten year, using the Developmental Reading Assessment, Second Edition (DRA-2) which districts were required to administer between 2009-10 and 2013-2014. Upon speaking with district partners, PEER soon learned that the DRA-2 had been conducted in a pencil and paper format. All three districts reported that student level data from this assessment were not available in a usable, electronic format.

When the state phased out the DRA-2 requirement in 2013-2014, districts were left to select their own assessments, such that there was no common kindergarten assessment across PEER communities. However, Norwalk Public Schools had already begun to introduce a new assessment for use in grades K-3 as part of the Connecticut K-3 Literacy Initiative (CK3LI): the Dynamic Indicators of Basic Early Literacy Next (DIBELS Next). Because Norwalk administers the DIBELS Next through the mCLASS online platform, the assessment data is available in electronic format. For this reason, PEER decided to focus its study on kindergarten classes in Norwalk. In 2016, the revised research questions for this project were:

1. How do the teacher factors such as level of education, certification, number of years of teaching at the kindergarten level, and number of total years of teaching predict kindergarten performance in literacy?
2. How do school factors such as class size, teacher-child ratio, and socioeconomic status predict kindergarten performance in literacy?

The first research question identifies four teacher-level variables: level of education, teacher certification endorsement area, number of years of teaching at the kindergarten level, and number of total years teaching. As PEER worked with the district to execute a data-sharing agreement and attain the requested data, it became clear that personnel records included only the number of years teaching in the district. Because it was not possible for the district to provide data for number of years at the kindergarten level specifically or number of years teaching in any district, we agreed to focus on the years of teaching experience in the district.

The second question identifies three classroom-level variables: class size, teacher-child ratio, and socioeconomic status. The district provided teacher name and FRPL status for each child, which allows for the calculation of class size and classroom-level FRPL eligibility, in terms of the percentage of students in the class who are eligible for free- or reduced-price lunch (FRPL). In terms of teacher-child ratios, the district advised us that because all kindergarten classrooms

typically have one teacher and one paraprofessional. Because this meant that teacher-child ratios would be proportional to class size, we decided that it would not add value to focus on teacher-child ratios.

Finally, PEER decided that it was critical to examine student characteristics in tandem with teacher-level variables and classroom level variables. Specifically, we thought it was important to examine the association of English learner status, special education status, free or reduced-price lunch status, gender, and race/ethnicity with kindergarten performance in literacy. As a result, the final research questions in 2017 were:

1. How do student factors such as English learner status, special education status, free or reduced-price lunch status, gender, and race/ethnicity predict kindergarten performance in literacy?
2. How do the teacher factors such as level of education, teacher certification endorsement area, and years of teaching experience in the district predict kindergarten performance in literacy?
3. How do school factors such as class size, percentage of students eligible for free or reduce-price lunch, and percentage of English learner students predict kindergarten performance in literacy?