

Supplemental On-Line Materials

for

Examining the Predictive Relations between Two Aspects of Self-Regulation and Growth in  
Preschool Children's Early Literacy Skills

## Appendix S1

### **Classroom Observations: Frequency and Quality of Instructional Activities**

Preschool classrooms were observed three times during the school year using a modified version of the Teacher Behavior Rating Scales (TBRS; Landry, Crawford, Gunnewig, & Swank, 2000). The original TBRS included 50 items concerning the quantity and quality of specific teacher behaviors and classroom characteristics that are grouped into 12 subscales. Six subscales relate to overall classroom characteristics or general teaching behavior (e.g., teacher sensitivity, discipline, learning centers), and six subscales relate to specific instructional activities (e.g., book reading, print activities, phonological awareness). Items on each subscale are rated on a 4-point (1 = rarely occurred, 4 = often occurred) quantity scale and 3-point quality scale. The revised TBRS included 12 additional items for phonological awareness activities, including a rating of phonological awareness activities to indicate whether the instruction was explicit (i.e., instructional activities that include modeling and explanation of key terms and concepts, use of scaffolding and corrective feedback when appropriate) or implicit (i.e., simple exposure to different sound patterns and teachers' commenting about shared sounds between words [e.g., "these words start with the same sound"]).

The TBRS-R was completed in the classrooms by trained observers who observed classrooms for a minimum of two hours and a maximum of four hours, depending on the structure of the preschool (mean duration = 168.2 minutes;  $SD = 25.5$ ). Analyses of differences of TBRS-R scores between preschools that were a part of the school district's Title I program and other local preschools that were not affiliated with the school district used all available observations. Analyses were conducted as mixed models in SPSS (Version 19) using classroom and school as random factors (i.e., observations were nested within teachers' classrooms that were nested within schools). Descriptive statistics and effect sizes are shown in Table S1. The Title I preschool classrooms had a higher frequency, quality, or both for oral language activities, print knowledge activities, phonological awareness activities, and math activities than did private preschools classrooms, and classrooms in the Title I classrooms had a higher quality of center activities, more small-group instruction, and more team teaching than did the private preschool classrooms.

**Table S1**

*Comparison of Frequency and Quality of Instructional Activities in District versus Other Preschools using Teacher Behavior Rating Scales-Revised*

TBRS-R Subscale	Preschool Type				Hedges <i>g</i>
	Other		School District		
	Mean	( <i>SD</i> )	Mean	( <i>SD</i> )	
Book Reading Activities					
Frequency	11.21	(7.11)	11.25	(7.89)	.01
Quality	14.01	(9.50)	14.04	(10.32)	.00
Oral Language Activities					
Frequency	20.94	(6.39)	23.06	(7.11)	.31**
Quality	26.42	(9.53)	28.50	(9.90)	.21 <sup>+</sup>
Print Knowledge Activities					
Frequency	9.87	(5.61)	10.98	(5.50)	.20 <sup>+</sup>
Quality	13.53	(8.30)	14.98	(7.89)	.18
Phonological Awareness Activities					
Frequency	12.52	(10.15)	15.46	(11.13)	.27**
Overall Quality	13.13	(11.03)	16.83	(12.70)	.30**
Phonological Unit Size Quality	3.01	(2.82)	4.34	(4.07)	.36***
Number of Explicit Activities	0.56	(0.78)	0.91	(1.02)	.37***
Number of Implicit Activities	0.68	(0.86)	0.72	(0.86)	.05
Writing Activities					
Frequency	6.02	(4.85)	6.15	(4.77)	.03
Quality	7.76	(7.03)	7.87	(6.58)	.02
Mathematics Activities					
Frequency	6.39	(5.79)	8.71	(5.96)	.39***
Quality	8.62	(8.28)	11.48	(8.25)	.35***
Center Activities					
Frequency	4.19	(1.56)	4.51	(1.33)	.23 <sup>+</sup>
Quality	17.50	(6.51)	18.95	(4.96)	.26*
Small Group Instruction	0.39	(0.48)	0.71	(0.45)	.70***
Team Teaching Activities					
Frequency	1.92	(2.01)	3.60	(1.90)	.87***
Quality	7.78	(7.10)	13.30	(5.36)	.92***

*Note.* TBRS-R = Teacher Behavior Rating Scales-Revised.

<sup>+</sup>  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Appendix S2****Alternative Parameter Estimates and Results of Alternative Models for Primary Analyses  
Reported in Article**

This appendix provides additional information about the sample and alternative analytic models to rule out possible sources of influence on results reported in the main manuscript that could be due to analytic decisions or peculiarities of the data. Many of these additional analyses were requested by reviewers or conducted to address reviewer questions during the course of peer review.

- 1. Tables S2** provides descriptive statistics for raw scores on all outcome measures used in growth curves at each assessment period.
- 2. Tables S3 and S4** provide unstandardized parameter estimates for predictors in growth models to allow interested readers to estimate how initial status and growth in skills change as a function of predictors in the model.
- 3. Tables S5 and S6** provide parameter estimates for predictors in growth models treating outcomes as censored variables to evaluate the possibility that results of primary analyses were influenced by ceiling effects on some variables at the last assessment point. As seen in the tables, the parameters from models treating outcomes as censored are highly similar to parameters from models treating the outcomes as simple raw scores.
- 4. Tables S7 and S8** provide parameter estimates for predictors in growth models with all variables classroom-mean centered to evaluate the possibility that results of primary analyses were due, in part, to classroom-level effects (e.g., factors responsible for selection into classrooms, teacher reporting effects). Results similar to those reported in Tables S7 and S8 were obtained in two-level growth models but are not reported here. As seen in the tables, parameters in models using classroom-mean-centered data are highly similar to parameters reported in the main article; therefore, results reported in the main article are not due to classroom effects.
- 5. Tables S9 and S10** provide the univariate and multivariate effects of predictor variables with the outcomes in the equivalent of autoregressive models (i.e., models predicting scores on Time 3 assessment of an outcome conditionalized on score from Time 1 assessment of an outcome).

**Table S2***Descriptive Statistics for Raw Scores on Each Outcome at Each Assessment Period*

Outcome	Assessment Period					
	Fall		Winter		Spring	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
PCTOPP Receptive Vocabulary	28.97	(5.31)	31.19	(4.86)	33.07	(4.32)
PCTOPP Definitional Vocabulary	47.47	(13.40)	53.30	(11.81)	56.85	(10.32)
CELF Receptive Language	24.56	(9.02)	25.66	(8.97)	27.23	(8.92)
CELF Expressive Language	24.53	(7.60)	25.95	(7.91)	27.15	(8.11)
PCTOPP Elision	8.62	(3.89)	10.26	(4.18)	11.52	(4.24)
PCTOPP Blending	13.09	(4.44)	14.87	(4.25)	15.97	(4.06)
PCTOPP Print Knowledge	18.24	(9.65)	23.08	(9.66)	26.17	(8.80)
TERA Alphabet	5.33	(4.78)	7.44	(5.60)	9.35	(5.96)
TERA Conventions	3.04	(2.46)	4.27	(2.85)	5.36	(3.15)
TERA Meaning	5.99	(2.81)	6.61	(2.84)	7.22	(2.82)

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; TERA = Test of Early Reading Achievement.

**Table S3**

*Unstandardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models for Language Outcomes*

Outcome		Intercept	Predictor Variables			
			CA	WPPSI IQ	HTKS	CTRS-I
PCTOPPP Receptive Vocabulary	Intercept	---	.05 <sup>+</sup>	1.90 <sup>***</sup>	.09 <sup>***</sup>	-1.76 <sup>***</sup>
	Slope	-.11 <sup>*</sup>	-.01	-.04	-.01	-.08
PCTOPPP Definitional Vocabulary	Intercept	---	.22 <sup>*</sup>	4.56 <sup>***</sup>	.28 <sup>***</sup>	-4.53 <sup>***</sup>
	Slope	-.12 <sup>**</sup>	.06 <sup>+</sup>	-.14	-.02	-.57 <sup>*</sup>
CELF Receptive Language	Intercept	---	-.47 <sup>***</sup>	3.66 <sup>***</sup>	.24 <sup>***</sup>	-2.93 <sup>***</sup>
	Slope	-.04	-.00	-.15	-.01	-.39 <sup>+</sup>
CELF Expressive Language	Intercept	---	-.47 <sup>***</sup>	2.32 <sup>***</sup>	.17 <sup>***</sup>	-2.15 <sup>***</sup>
	Slope	-.02	-.00	.13	.01	-.39 <sup>*</sup>

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

<sup>+</sup>  $p < .10$ ; <sup>\*</sup>  $p < .05$ ; <sup>\*\*</sup>  $p < .01$ ; <sup>\*\*\*</sup>  $p < .001$ .

**Table S4**

*Unstandardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models for Code-related Outcomes*

Outcomes		Intercept	Predictor Variables			
			CA	WPPSI IQ	HTKS	CTRS-I
PCTOPPP Elision	Intercept	---	.02	1.14***	.10***	-1.13***
	Slope	-.15***	-.01	.20*	.01 <sup>+</sup>	-.43***
PCTOPPP Blending	Intercept	---	.05	1.40***	.08***	-.82***
	Slope	-.04	-.01	-.07	-.01	-.22 <sup>+</sup>
PCTOPPP Print Knowledge	Intercept	---	.28***	3.02***	.15***	-4.62***
	Slope	-.18***	-.01	.03	-.01	-1.32***
TERA Alphabet	Intercept	---	.09*	1.44***	.07***	-1.55***
	Slope	-.09***	.03	.21*	.02*	-.84***
TERA Conventions	Intercept	---	.03	.81***	.04***	-.68***
	Slope	.04	.01	.10	.00	-.26**
TERA Meaning	Intercept	---	.04 <sup>+</sup>	.75***	.05***	-.79***
	Slope	-.08	.00	-.05	-.00	-.13 <sup>+</sup>

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; TERA = Test of Early Reading Achievement; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

<sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table S5**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models for Language Outcomes with Outcomes Treated as Censored Variables*

Outcome		Intercept	Predictor Variables				$R^{2a}$
			CA	WPPSI IQ	HTKS	CTRS-I	
PCTOPPP Receptive Vocabulary	Intercept	---	.05 <sup>+</sup>	.37 <sup>***</sup>	.24 <sup>***</sup>	-.29 <sup>***</sup>	.46 <sup>***</sup>
	Slope	-.41 <sup>**</sup>	-.02	-.02	-.07	-.05	.19 <sup>**</sup>
PCTOPPP Definitional Vocabulary	Intercept	---	.07 <sup>*</sup>	.32 <sup>***</sup>	.27 <sup>***</sup>	-.27 <sup>***</sup>	.42 <sup>***</sup>
	Slope	-.67 <sup>***</sup>	-.10	-.05	-.10	-.20 <sup>**</sup>	.49 <sup>*</sup>
CELF Receptive Language	Intercept	---	-.22 <sup>***</sup>	.38 <sup>***</sup>	.34 <sup>***</sup>	-.25 <sup>***</sup>	.50 <sup>***</sup>
	Slope	-.19	-.01	-.08	-.08	-.17 <sup>+</sup>	.07 <sup>+</sup>
CELF Expressive Language	Intercept	---	-.26 <sup>***</sup>	.29 <sup>***</sup>	.27 <sup>***</sup>	-.23 <sup>***</sup>	.35 <sup>***</sup>
	Slope	-.06	.01	.07	.08	-.16 <sup>+</sup>	.04

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale. <sup>a</sup>Because analyses were conducted controlling for clustering of children in schools, the values reflect the pseudo- $R^2$ , a metric related to but not identical to  $R^2$ .

<sup>+</sup> $p < .10$ ; <sup>\*</sup> $p < .05$ ; <sup>\*\*</sup> $p < .01$ ; <sup>\*\*\*</sup> $p < .001$ .



**Table S6**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models for Code-related Outcomes with Outcomes Treated as Censored Variables*

Outcomes		Intercept	Predictor Variables				$R^{2a}$
			CA	WPPSI IQ	HTKS	CTRS-I	
PCTOPPP Elision	Intercept	---	.03	.30***	.34***	-.25***	.43***
	Slope	-.32**	-.02	.15*	.15*	-.25***	.10*
PCTOPPP Blending	Intercept	---	.06	.39***	.30***	-.18**	.45***
	Slope	.01	-.07	-.05	-.02	-.17*	.03
PCTOPPP Print Knowledge	Intercept	---	.12***	.28***	.19***	-.35***	.41***
	Slope	-.48***	-.02	.01	-.02	-.32***	.19***
TERA Alphabet	Intercept	---	.07*	.27***	.19***	-.24***	.27***
	Slope	-.24***	.06	.10*	.10*	-.34***	.15***
TERA Conventions	Intercept	---	.05	.35***	.25***	-.25***	.41***
	Slope	.07	.08	.14	.07	-.28***	.20*
TERA Meaning	Intercept	---	.07 <sup>+</sup>	.30***	.25***	-.27***	.38***
	Slope	-.39 <sup>+</sup>	.02	-.08	-.03	-.18*	.16 <sup>+</sup>

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; TERA = Test of Early Reading Achievement; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale. <sup>a</sup>Because analyses were conducted controlling for clustering of children in schools, the values reflect the pseudo- $R^2$ , a metric related to but not identical to  $R^2$ .

<sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table S7**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models for Language Outcomes with All Variables Classroom-mean Centered*

Outcome		Intercept	Predictor Variables				$R^{2a}$
			CA	WPPSI IQ	HTKS	CTRS-I	
PCTOPPP Receptive Vocabulary	Intercept	---	.10**	.37***	.18***	-.27***	.42***
	Slope	-.47**	.01	-.05	-.05	.02	.28
PCTOPPP Definitional Vocabulary	Intercept	---	.12***	.32***	.19***	-.27***	.39***
	Slope	-.68***	-.04	-.08	-.04	-.21**	.46***
CELF Receptive Language	Intercept	---	-.22***	.36***	.31***	-.25***	.43***
	Slope	-.26*	.01	.03	.03	-.17*	.06 <sup>+</sup>
CELF Expressive Language	Intercept	---	-.24***	.26***	.26***	-.19***	.26***
	Slope	-.14	.03	.11 <sup>+</sup>	.06	-.15*	.06*

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale. <sup>a</sup>Because analyses were conducted controlling for clustering of children in schools, the values reflect the pseudo- $R^2$ , a metric related to but not identical to  $R^2$ .

<sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table S8**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models for Literacy Outcomes with All Variables Classroom-mean Centered*

Outcome		Intercept	Predictor Variables				$R^{2a}$
			CA	WPPSI IQ	HTKS	CTRS-I	
PCTOPPP Elision	Intercept	---	.06	.30***	.30***	-.24***	.39***
	Slope	-.35**	-.02	.12 <sup>+</sup>	.16*	-.23***	.11 <sup>+</sup>
PCTOPPP Blending	Intercept	---	.11**	.39***	.25***	-.19***	.42***
	Slope	-.18	-.03	-.14	-.06	-.17	.06
PCTOPPP Print Knowledge	Intercept	---	.13***	.26***	.16***	-.36***	.39***
	Slope	-.59***	-.01	.04	.01	-.32***	.25***
TERA Alphabet	Intercept	---	.09*	.24***	.14***	-.25***	.25***
	Slope	-.27***	.06	.12**	.12**	-.36***	.19***
TERA Conventions	Intercept	---	.08	.38***	.21***	-.22***	.41***
	Slope	.30	.15 <sup>+</sup>	.05	.07	-.35***	.44
TERA Meaning	Intercept	---	.13**	.28***	.19***	-.27***	.34***
	Slope	-.38 <sup>+</sup>	.02	.01	.02	-.15	.11

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; TERA = Test of Early Reading Achievement; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale. <sup>a</sup>Because analyses were conducted controlling for clustering of children in schools, the values reflect the pseudo- $R^2$ , a metric related to but not identical to  $R^2$ .

<sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table S9**

*Partial Correlations, Controlling for Start-of-Preschool Scores, between Predictor Variables and End-of-Preschool Scores for All Language and Code-related Outcomes*

Outcome Variable	Predictor Variables			
	CA	WPPSI IQ	HTKS	CTRS-I
PCTOPPP Receptive Vocabulary	.04	.18***	.11***	-.19***
PCTOPPP Definitional Vocabulary	-.02	.13***	.08*	-.22***
CELF Receptive Language	-.03	.11***	.08**	-.18***
CELF Expressive Language	-.01	.17***	.16***	-.20***
PCTOPPP Elision	.05	.22***	.11***	-.26***
PCTOPPP Blending	.05 <sup>+</sup>	.22***	.18***	-.22***
PCTOPPP Print Knowledge	.00	.10**	.04	-.30***
TERA Alphabet	.09**	.18***	.15***	-.29***
TERA Conventions	.12***	.26***	.20***	-.28***
TERA Meaning	.06 <sup>+</sup>	.13***	.13*	-.19***

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; TERA = Test of Early Reading Achievement; CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

<sup>+</sup>  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table S10**

*Standardized Parameters from Autoregressive Multivariate Prediction Models for End-of-Preschool Scores for All Language and Code-related Outcomes*

Outcome Variable	Predictor Variables					$R^{2a}$
	T1	CA	WPPSI IQ	HTKS	CTRS-I	
PCTOPPP Receptive Vocabulary	.47***	.01	.13***	.06*	-.14***	.41***
PCTOPPP Definitional Vocabulary	.66***	-.03	.07**	.04	-.15***	.61***
CELF Receptive Language	.63***	-.06*	.08**	.06*	-.13***	.59***
CELF Expressive Language	.66***	-.06*	.09**	.09***	-.12***	.62***
PCTOPPP Elision	.32***	.00	.15***	.11***	-.15***	.28***
PCTOPPP Blending	.35***	-.00	.14***	.16***	-.20***	.39***
PCTOPPP Print Knowledge	.60***	-.00	.04	.00	-.25***	.59***
TERA Alphabet	.56***	.04 <sup>+</sup>	.08***	.07***	-.21***	.55***
TERA Conventions	.41***	.06*	.18***	.11***	-.19***	.45***
TERA Meaning	.35***	.03	.07 <sup>+</sup>	.08*	-.15***	.25***

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; TERA = Test of Early Reading Achievement; CA = chronological age (months); T1 = score on outcome variable at initial assessment; WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale. <sup>a</sup>Because analyses were conducted controlling for clustering of children in schools, the values reflect the pseudo- $R^2$ , a metric related to but not identical to  $R^2$ .

<sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

### Appendix S3

#### Evaluation of Possible Differences in Sample Cohorts Due to Differences in Inclusion/Screening Criteria between Cohort 1 and Cohorts 2 and 3

Although the sample in this study is not representative of the general population of preschoolers because the majority of children were selected from preschools most likely to serve children at risk for later reading difficulties, slightly different inclusion criteria were used in Cohort 1 versus Cohort 2 and 3. Whereas the additional screening strategy used with children in Cohorts 2 and 3 from the private preschool centers (i.e., R-GRTR! scores < 80th percentile) was very liberal and excluded only a few very high scoring children, it is possible that these differences in inclusion criteria between cohorts may have resulted in cohort differences that affected results. As reported in the main article, analyses of raw score on outcomes and predictors revealed just two significant differences between cohorts. Children in Cohort 1 had higher WPPSI Block Design scores than did children in Cohorts 2 and 3, and Children in cohort 1 had lower HTKS scores than Cohort 1--but neither Cohort 1 and Cohort 2 nor Cohort 3 and Cohort 2 differed from each other.

To evaluate if the different screening procedures affected the results of the growth-prediction models, we conducted multi-sample models for all outcomes in which the relevant parameters related to this question were constrained to equality between Cohort 1 and Cohorts 2/3. Each of these models included eight constraints in these models, including Intercept and Slope means, Intercept and Slope variances, and covariances between HTKS scores and CTRS Inattention scores with Intercept and Slope. For just two outcomes did the model with the eight constraints provide a significantly worse fit to the data than a fully unconstrained model. All other models with these eight constraints fit as well as the fully unconstrained models ( $ps > .10$ ;  $df = 8$ ). For the PCTOPPP Print Knowledge subtest, the Slope for Cohort 1 (3.33,  $p < .001$ ) was lower than the Slope for Cohorts 2/3 (4.08,  $p < .001$ ), and the correlation between HTKS scores and the Intercept was higher for Cohort 1 (.44,  $p < .001$ ) than it was for Cohorts 2/3 (.34,  $p < .001$ ). For the Meaning subtest of the TERA, the Intercept for Cohort 1 (6.32,  $p < .001$ ) was higher than the Intercept for Cohorts 2/3 (5.83,  $p < .001$ ), and the correlation between HTKS scores and the Intercept was higher for Cohort 1 (.49,  $p < .001$ ) than it was for Cohorts 2/3 (.36,  $p < .001$ ). For both outcomes, releasing these two constraints resulted in models that fit as well as the fully unconstrained models ( $ps > .12$ ;  $df = 6$ ).

None of these significant differences affected the relations that are the primary focus of the study--i.e., the unique associations of HTKS and CTRS with growth in early literacy skills. No covariance between HTKS or CTRS and slope varied systematically as a function of the cohorts in which the screening procedure was or was not used. The differences for the slope parameter for the PCTOPPP Print Knowledge subtest is consistent with the overall pattern that children who started the preschool year with higher scores on most outcomes experienced less growth on that outcome, and, along with the differences for the intercept parameter for the TERA Meaning subtest, suggest that the screening procedure resulted in recruitment of a slight more at risk sample in Cohorts 2 and 3 than in Cohort 1.

### Appendix S4

#### Results of Models for Primary Analyses Reported in Article Controlling for Family SES-related Variables

Analyses reported in Appendix S4 address the degree to which results reported in the main article could have been due, in part, to an omitted variable bias (e.g., both self-regulation outcomes and early literacy outcomes associated with family (i.e., SES-related variables) or child factors (i.e., sex, race).

As a part of the larger project, children's parents were asked to complete a questionnaire concerning their language use in the home and family background. Multiple attempts were made during children's preschool year to obtain this information from families. Approximately 70% of the sample returned questionnaires with at least some responses. For these analyses, questions concerning SES-related variables were used. For most of these questionnaire items, parents indicated the response to specific questions by selecting the response nearest to that which described them or their family (e.g., annual income was described in ranges, education was described in attainments). Based on the 70% of the sample for which parents returned questionnaires (not all questions in this set was answered by all parents), 53% of families were single-parent households, and the median number of children in home was 2 (range 1 - 7). Median reported household income was between \$30,000 and \$40,000, and 40% of sample reported less than \$30,000 per year. Median reported maternal and paternal education was completion of high school; 28% of mothers and 24% of fathers had attained a bachelors degree or higher. For analyses, the highest level of education achieved by either the mother or the father was used as the parental education level.

As shown in Table S11, family SES-related variables were modestly but significantly correlated with the four predictor variables use in the primary analyses. To determine the effect of these SES-related variables and child factors, structural models were examined in which the intercept and slope were simultaneously regressed on the four primary predictor variables--as well as these family SES-related variables and variables representing sex and race of child (children classified as neither white nor black served as the reference category), and slope was regressed on intercept were examined. The unique contributions of all variables to each of the outcomes are shown in Table S12 for language outcomes, Table S13 for code-related outcomes measured with the PCTOPPP, and Table S14 for code-related outcomes measured with the TERA.

As seen in the tables, the inclusion of these variables had mostly minor effects on the specific values of the parameters (cf., Tables 4 and 5 in main article). The predictor variable most affected by inclusion of these variables was WPPSI IQ, which tended to have lower parameter values when family SES-related variables and child factor variables were included in the models; however, the main predictors that were significantly related to intercepts in the primary analyses continued to be significantly related to intercepts. Similarly, inclusion of these variables had limited effects on the relations between the main predictors of slope. With the exception of CTRS scores and the Blending subtest and CTRS scores and the TERA Meaning subtest, the pattern of significance reported in the primary analyses was replicated. For the Blending subtest, the minor variation in the parameter value for CTRS scores caused the significant relation to become marginally significant, and for the TERA Meaning subtest, the minor variation in the parameter value for CTRS scores caused the marginally significant relation to become statistically significant.



**Table S11***Zero-order Correlations between Predictor Variables and Family SES-related Variables*

Family SES Variable	Predictor Variable			
	CA	WPPSI IQ	HTKS	CTRS-I
Income	-.06	.18 <sup>***</sup>	.17 <sup>***</sup>	-.13 <sup>***</sup>
Parental Education	-.09 <sup>*</sup>	.18 <sup>***</sup>	.12 <sup>***</sup>	-.12 <sup>**</sup>
Single Parent Home	-.06	.14 <sup>**</sup>	.05	-.05
N Children in Home	.07 <sup>*</sup>	-.02	-.03	.04

*Notes.* CA = chronological age (months); WPPSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table S12**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models Including SES-related and Additional Child Variables for Language Outcomes*

Growth Parameter	PCTOPPP Outcomes		CELF Outcomes	
Predictor	Receptive Vocabulary	Definitional Vocabulary	Receptive Language	Expressive Language
<b>Intercept</b>				
CA	.09**	.11***	-.18***	-.20***
WPSSI IQ	.33***	.28***	.34***	.24***
HTKS	.22***	.25***	.32***	.26***
CTRS-I	-.26***	-.25***	-.23***	-.19***
Income	-.10*	-.08	.03	-.01
Parental Education	.19***	.13**	.07*	.09*
Single Parent Home	.01	.08	.02	-.04
N Children in Home	-.12**	-.12***	.01	-.04
Sex (1 = female)	.05	.03	.06*	.10
White	.32***	.35***	.34***	.44***
Black	.12	.13*	.09*	.11*
<b>Slope</b>				
Intercept	-.34*	-.56***	.03	.02
CA	-.03	-.13	.04	.04
WPSSI IQ	-.09	-.09	-.18	.03
HTKS	-.12	-.14	-.19	.03
CTRS-I	-.01	-.18**	-.17	-.18*
Income	.19	.15	-.06	.14
Parental Education	-.05	-.03	-.04	.03
Single Parent Home	-.07	-.15	-.05	.11
N Children in Home	.06	.15	-.06	-.07
Sex (1 = female)	.05	-.08	-.07	-.03
White	-.02	-.14	-.11	-.28
Black	-.05	-.10	-.11	-.15

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CELF = Clinical Evaluation of Language Fundamentals; CA = chronological age (months); WPSSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table S13**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models Including Family SES-related and Additional Child Variables for Code-related Outcomes from PCTOPPP*

Growth Parameter	PCTOPPP Outcome/Subscale		
Predictor	Elision	Blending	Print Knowledge
Intercept			
CA	.05	.11**	.14***
WPSSI IQ	.27***	.34***	.26***
HTKS	.33***	.30***	.17***
CTRS-I	-.24***	-.17**	-.32***
Income	-.02	-.11	.00
Parental Education	.01	.14*	.17***
Single Parent Home	.00	.02	.01
N Children in Home	-.06	-.07	-.08*
Sex (1 = female)	.00	.01	.07**
White	.25***	.34***	.18***
Black	.06	.03	.20***
Slope			
Intercept	-.46***	-.02	-.54***
CA	.00	-.09	-.01
WPSSI IQ	.13*	-.14	.01
HTKS	.14*	-.12	-.03
CTRS-I	-.27***	-.18 <sup>+</sup>	-.30***
Income	.07	.09	.01
Parental Education	.05	-.12	-.03
Single Parent Home	.04	.17	.02
N Children in Home	.01	.10	.01
Sex (1 = female)	.01	-.03	.03
White	.17	-.11	.05
Black	.10	.00	.02

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; CA = chronological age (months); WPSSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

<sup>+</sup>  $p < .05$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table S14**

*Standardized Parameters for Endogenous and Exogenous Predictors of Intercepts and Slopes in Latent Growth Models Including SES-related and Additional Child Variables for Code-related Outcomes from TERA*

Growth Parameter Predictor	TERA Outcome/Subscale		
	Alphabet	Conventions	Meaning
Intercept			
CA	.10***	.09*	.11**
WPSSI IQ	.25***	.32***	.27***
HTKS	.16***	.23***	.23***
CTRS-I	-.22***	-.23***	-.23***
Income	.02	.05	-.02
Parental Education	.14**	.09	.14*
Single Parent Home	.00	-.02	-.01
N Children in Home	-.09**	-.07	-.07*
Sex (1 = female)	.04	.04	.10**
White	.13**	.21***	.30***
Black	.15***	.07	.13*
Slope			
Intercept	-.22***	.17	-.30
CA	.06	.08	-.01
WPSSI IQ	.10*	.12	-.07
HTKS	.11*	.06	-.02
CTRS-I	-.34***	-.29**	-.21*
Income	-.15*	-.12	-.12
Parental Education	.09	.10	.02
Single Parent Home	.11*	.12	.00
N Children in Home	.03	-.05	.01
Sex (1 = female)	.01	.02	-.13
White	.03	-.02	-.13
Black	.02	.08	-.08

*Notes.* PCTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; TERA = Test of Early Reading Achievement; CA = chronological age (months); WPSSI = Wechsler Preschool and Primary Scales of Intelligence; HTKS = Head-Toes-Knees-Shoulders Task; CTRS-I = Connors Teacher Rating Scale, Inattention subscale.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .