

**Abstract Title Page**  
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**Title: Pre-kindergarten and kindergarten classroom quality and children's social and academic skills in early elementary grades**

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## **Abstract Body**

*Limit 4 pages single-spaced.*

### **Background / Context:**

A growing body of research has shown that high quality early care and education (ECE) is positively related to the development of children's social and academic skills (e.g., Barnett, 2011; Lamb & Ahnert, 2006; NICHD ECCRN, 2006). There is evidence that high quality ECE experiences can improve children's levels of social adjustment (Bierman et al., 2014; Landry et al., 2014) and early academic skills (e.g., Burchinal, Kainz, & Yaping, 2014; Yoshikawa et al., 2013). However, the results from large-scale program evaluations (e.g., Administration for Children and Families, 2010; Lipsey, Hofer, Dong, Farran, & Bilbrey, 2013) and observational studies (e.g., Belsky et al., 2007; Peisner-Feinberg et al., 2001) suggest that the positive effects of high quality ECE tend to diminish in long term. One possible explanation that is given for these fade out effects is that children who are in most need of high quality ECE support often transition from emotionally supportive and structured classrooms into lower quality elementary school environments (e.g., Lee & Loeb, 1995), which may override the positive effects of high quality ECE. What is less known is how the positive effects of high quality ECE may manifest in longer term if they were followed by a high quality kindergarten environment? Could two consecutive years of high quality ECE, experienced during pre-kindergarten and kindergarten years, serve as a buffer that protects children from the fade-out effects that are often reported in the literature?

The importance of transition into formal school for all children, and particularly for children at high risk for social and academic problems, is hard to underestimate. The pre-K to elementary school transition is accompanied by many changes in children's social relationships and their day-to-day routines (Rimm-Kaufman & Pianta, 2000). Children typically attend classrooms with new peers and face higher teacher expectations for their behavioral skills (e.g., resolving interpersonal conflicts with words and sitting on their chair for a long period of time) with less available support. They have to navigate in a new social world in which they are the youngest children and which requires more autonomous functioning. These substantial changes might lead to the reorganization of children's social skills (Ladd, 2005). In addition, children experience an increased academic focus, where children with less academic skills tend to constantly "play catch-up" with their more knowledgeable peers, which can lead to persistent and increasing gap in academic skills. As a result, the transition to kindergarten is described as a sensitive period during which the child is more open to new environmental experiences and influences (Rimm-Kaufman & Pianta, 2000). As such, it is likely that emotionally supportive and structured classroom environments in the pre-kindergarten and kindergarten years may be necessary to prepare children for the successful transition to school and subsequent social and academic functioning.

### **Purpose / Objective / Research Question / Focus of Study:**

*Description of the focus of the research.*

The primary goal of the present study was to explore whether two years of emotionally supportive and structured classroom environments during pre-kindergarten and kindergarten years can predict the initial level and growth of social and academic skills during first, second, and third grades.

### **Setting:**

Data for this observational study were drawn from the Family Life Project (FLP), a large multi-site longitudinal study of ethnically diverse families living in rural areas in the United States. Participants lived in two geographical areas with high poverty rates, Eastern North Carolina and Central Pennsylvania. FLP adopted a developmental epidemiological design, using complex sampling procedures to recruit a representative sample of 1,292 families at the time of birth or study children. FLP used over-sampling to attain adequate representation of racial and/or economic minority families in these geographic areas.

### **Population / Participants / Subjects:**

*Description of the participants in the study: who, how many, key features, or characteristics.*

The sample for the current study included families and their children who participated in at least one data collection time point between 36 months and 3rd grade, resulting in  $N = 1176$ . There were no differences between included and excluded families in terms of demographic characteristics, such as child gender and race, state of residence, or maternal level of education. Of the participating families, 43% were African American, and 50% of the children were boys. Maternal level of education ranged from less than high school to a graduate degree; 14% of participating mothers did not have a high school degree or its equivalent, 70% had an intermediate level of education (e.g., high school diploma or some college), and 16% had a bachelor's or a graduate degree. Mean household income-to-needs ratio at 36 month was 1.90 ( $SD = 1.5$ ) with a ratio of 1.0 corresponding to the federal poverty threshold for that household size and composition.

### **Intervention / Program / Practice:**

*Description of the intervention, program, or practice, including details of administration and duration.*

Quality of ECE environment during children's prekindergarten and kindergarten years was defined as emotionally supportive and structured classroom experiences, and was measured through domains of Emotional Support and Classroom Organization of the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). The classroom quality that children experienced during the pre-kindergarten and kindergarten years was operationalized as following. First, for each classroom, we averaged the scores on the emotional support domain ( $M = 5.33$ ,  $SD = 0.73$  at Pre-K;  $M = 5.21$ ,  $SD = 0.84$  at K) and the classroom organization domain ( $M = 4.79$ ,  $SD = 0.83$  at pre-K;  $M = 5.09$ ,  $SD = 0.86$  at K). Next, we dichotomized the mean scores, so that a score of 5 or higher represented a high quality ECE environment and a score below 5 represented a not high quality ECE environment. This (moderately) high quality label was used in prior studies investigating threshold effects of high quality ECE environments (Burchinal, Kainz, et al., 2014; Burchinal, Vernon-Feagans, et al., 2014). In total, 57% of the observed pre-kindergarten year center-based classrooms and 65% of the observed kindergarten classrooms within our sample were classified as high quality. Next, children with available data about the quality of their classroom experiences during the pre-kindergarten (PK) and kindergarten (K) years ( $n=886$ ) were categorized into one of four groups (coded as 0/1 variables): *High quality PK&K* group (18%); *High quality PK only* group (9%); *High quality K only* group (46%); and *Not high quality PK&K* group (27%).

### **Research Design:**

*Description of the research design.*

Two-level longitudinal HLM examined change over first, second, and third grades in social and academic skills in separate analysis, where:

$$\begin{aligned} \text{Level 1 } \gamma_{ij} &= \pi_{0i} + \pi_{1j} \times \text{Grade} + e_{ij}; \\ \text{Level 2 } \pi_{0i} &= \beta_{00} + \beta_{01} \times \text{Group}_i + \beta_{02} \times \gamma_{ij}(\text{time}-1) + \beta_{03} \times \text{Covs} + \sigma_{0i} \\ \pi_{1i} &= \beta_{10} + \beta_{11} \times \text{Group} + \sigma_{1i} \end{aligned}$$

### **Data Collection and Analysis:**

*Description of the methods for collecting and analyzing data.*

Data were collected at the 36- and 58- month home visits, the pre-kindergarten year child care visit, and the kindergarten, first, second, and third grade school visits. All visits were conducted by trained research assistants. During the home visits, parents completed questionnaires about their family and child characteristics, and were observed while playing with the child. At pre-kindergarten and kindergarten years, trained researchers observed the quality of classroom experiences. During the spring semesters of the first, second, and third grades trained researchers assessed study children's academic skills using four subtests of the Woodcock–Johnson Psycho-Educational Battery–III (WJ–III; Woodcock, McGrew, & Mather, 2001): Letter-Word Identification, Applied Problems, Picture Vocabulary, and Passage Comprehension. The standardized mean of four W-scores represented the level of academic skill at each grade. Children's social skills were measured as a standardized mean of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), reported by teachers during the spring semesters of the first, second, and third grades. For the purposes of this study, the higher SDQ scores represent higher level of social skills. The descriptive data for the study variables are presented in Table 1. All analyses were conducted in SAS 9.3. Missing data were estimated through residual maximum likelihood.

We estimated two mixed models predicting (1) intercept and slope of children's social skills in first, second, and third grades, and (2) intercept and slope of children's academic skills in first, second, and third grades. Both models included the quality of ECE experienced in prekindergarten and kindergarten years as predictor of interest, along with prior level of skills and an extensive set of covariates (child race, gender, state of residence, maternal education level, family income-to-needs ration, quality of parenting observed at 36 month, and the level of child negative social adjustment at 36 month).

### **Findings / Results:**

*Description of the main findings with specific details.*

Analyses of social skills from grades 1-3, after accounting for all covariates, indicated that children who experienced high quality ECE in pre-kindergarten and kindergarten years (i.e., *High quality PK&K* group) had a significantly higher levels of social skills in first grade comparing to children who did not experience high quality ECE in pre-kindergarten and kindergarten years (i.e., *Not high quality PK&K* group;  $\beta=.39$ ,  $SE=.13$ ,  $p=.003$ ) and comparing to children who had high quality ECE in kindergarten only (i.e., *High quality K only* group;  $\beta=.33$ ,  $SE=.12$ ,  $p=.005$ ). Moreover, those differences remained significant over time ( $\beta=.23$ ,  $SE=.09$ ,  $p=.01$ ; and  $\beta=.29$ ,  $SE=.09$ ,  $p=.001$ , respectively). The slopes for all four quality groups were non-significant, indicating that over the two-year period of time from the first to third grade the levels of children's social skills did not change significantly from their initial levels (see Figure 1).

Analyses of academic skills, after accounting for all covariates, indicated that children who experienced high quality ECE in pre-kindergarten and kindergarten years (i.e., *High quality PK&K* group) had a higher level of academic skills at first grade comparing to children who did not have high quality ECE in pre-kindergarten and kindergarten years (i.e., *Not high quality*

*PK&K* group;  $\beta=.19$ ,  $SE=.09$ ,  $p=.02$ ); but those differences did not sustain over time ( $\beta=.12$ ,  $SE=.09$ ,  $p=.17$ ). Moreover, there were no significant slopes for any of the four groups, nor slope differences between the groups (see Figure 2).

### **Conclusions:**

*Description of conclusions, recommendations, and limitations based on findings.*

Based on the results of the current study, it appears that in terms of children's social skills, there is no evidence of fade-out effects associated with emotionally supportive and structured classroom environment and that children who experienced high quality ECE in pre-kindergarten and kindergarten years had the highest level of social skills during first, second, and third grades comparing to children who did not have high quality ECE in pre-kindergarten and kindergarten or had high quality ECE in kindergarten only.

In terms of children's academic skills, we observed small initial differences at first grade between children who experienced emotionally supportive and structured classroom environment in pre-kindergarten and kindergarten years, but those differences did not sustain over-time, indicating presence of "fade-out" effects.

Overall, the results suggest that high levels of emotional support and classroom organization in both pre-kindergarten and kindergarten years appear to have long term impacts on children's social skills, but not on academic skills. Limitations of the current study include inability to fully account for potential selection bias as well as potential biases due to missing data.

If replicated in future research, the findings from this study may be used as a basis for intervention and policy decisions.

## Appendices

### Appendix A. References

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## Appendix B. Tables and Figures

Table 1. *Descriptive statistics for study variables; total sample and by ECE quality group*

	Total Sample			High PK&K n = 160 (18%)		High PK only n = 76 (9%)		High K only n = 408 (46%)		Not high PK&K n = 242 (27%)	
	<i>n</i>	<i>M(SD)</i>	range	<i>N</i>	<i>M(SD)</i>	<i>n</i>	<i>M(SD)</i>	<i>n</i>	<i>M(SD)</i>	<i>n</i>	<i>M(SD)</i>
Gender, Boy %	1175	50	-	160	50	76	52	408	51	242	54
Race, Black %	1175	43	-	160	46	76	46	408	40	242	45
State, PA %	1175	40	-	160	34	76	40	408	42	242	47
Maternal education, years	1163	12.9 (1.9)	7 – 20	160	13.0 (1.9)	76	13.0 (1.6)	408	13.1 (2.1)	242	12.6 (1.9)
INR, 36m	1163	1.9 (1.5)	0 – 12.5	160	1.8 (1.5)	76	2.0 (1.5)	408	1.9 (1.3)	242	1.8 (1.6)
Positive parenting, 36m	1055	2.9 (0.7)	1 – 4.6	154	2.8 (0.7)	74	2.9 (0.8)	380	2.9 (0.7)	225	2.8 (0.7)
Mean SDQ, 36m	1093	0.6 (0.3)	0 – 1.4	159	0.6 (0.3)	73	0.6 (0.3)	388	0.6 (0.3)	230	0.7 (0.3)
SDQ Social skills, G1	985	0 (1.0)	-3.7 – 1.2	142	0.2 (0.9)	66	0.1 (1.0)	361	0.0 (1.0)	213	-0.2 (1.0)
SDQ Social skills, G2	928	0 (1.0)	-3.1 – 1.2	141	0.2 (0.9)	70	0.0 (0.9)	353	-0.1 (1.0)	203	-0.1 (1.0)
SDQ Social skills, G3	840	0 (1.0)	-3.5 – 1.3	130	0.1 (1.0)	63	0.0 (1.0)	310	0.0 (1.0)	201	-0.1 (1.0)
WJ Academic skills, G1	1042	0 (0.9)	-5.4 – 2.5	156	0.8 (0.9)	74	0.1 (0.7)	395	0.0 (0.9)	235	-0.1 (.8)
WJ Academic skills, G2	1047	0 (0.9)	-5.6 – 2.2	155	0.3 (0.9)	74	0.1 (0.6)	394	0.0 (0.9)	231	-0.1 (.8)
WJ Academic skills, G3	904	0 (0.9)	-5.4 – 3.4	140	0.1 (1.0)	66	0.1 (0.9)	339	0.0 (0.9)	206	-0.1 (.8)

Note: In total, 886 children could be assigned to the one of the combined pre-K and kindergarten quality groups

SDQ Social skills and WJ academic skills scores are standardized

Figure 1. Random effects for Social Skills, by quality group

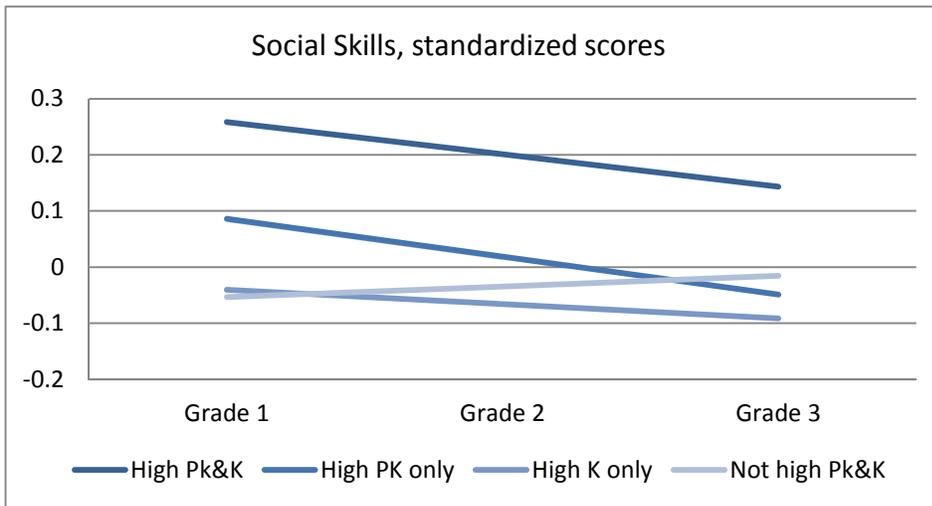


Figure 2. Random effects for Academic Skills, by quality group

