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The role of elementary school quality in the persistence of preschool effects☆

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ABSTRACT

Long-term evaluations of preschool programs have yielded mixed findings regarding the persistence of preschool effects. Data from the Early Childhood Longitudinal Study Kindergarten Cohort of 1998 (n = 15,070) were used to estimate the extent to which the academic benefits of preschool persist as a function of the quality of the elementary school children subsequently experience. Results from propensity score models revealed that the academic benefits of preschool were largely sustained through the end of fifth grade when children subsequently attended a high quality elementary school. In contrast, less than one quarter of these benefits persisted when children attended a low quality elementary school. Taken together, these results point to the role of elementary schools in maintaining the long-term academic benefits of preschool.

In light of the mounting evidence that the K-12 education system might be too little and too late to redress existing disparities in children's early learning and development (Heckman, 2006; Reardon, 2011), there has been increased interest in the early childhood years, and preschool programs in particular, as a means of ensuring that all children succeed in school (Duncan & Magnuson, 2013; Phillips et al., 2017; Yoshikawa et al., 2013). This increased recognition, coupled with the large investments being made in preschool programs across the United States, have spawned growing—and potentially unrealistic—expectations that preschool programs not only prepare children academically for kindergarten, but provide sustained benefits through middle childhood and beyond. That is, preschool programs are increasingly being viewed as a remedy for educational inequality throughout the life course.

Although evaluations of some contemporary preschool programs in the United States report academic benefits for children throughout middle childhood and adolescence (Ansari et al., 2017; Muschkin, Ladd, & Dodge, 2015; Vandell, Burchinal, & Pierce, 2016), there is a general consensus that these academic benefits tend to diminish over time and have declined as programs have gone to scale (Magnuson & Duncan, 2014; Phillips et al., 2017). These conflicting claims and ambiguity in the early childhood literature has led to increased speculation around the success of contemporary preschool programs and whether they have lived up to the promises of classic early childhood education and intervention programs (e.g., Abecedarian Project, Chicago Child-Parent Center Program, and Perry Preschool; Campbell & Ramey, 1994; Reynolds, Temple, Robertson, & Mann, 2001; Schweinhart et al., 2005). As a result, government agencies, including the Institute for Educational Sciences (2016), have been increasingly interested in trying to understand *why* the initial academic benefits of preschool programs do not result in longer-term success in elementary school and beyond.

It seems important, when evaluating the benefits of preschool, to be clear in terms of how any given study conceptualizes the success of these programs. Is it assumed, for example, that preschool confers a lasting academic benefit as a function of altering some core capacity that would not have eventually developed in the counterfactual condition, which the child then carries into subsequent situations and confers benefits there as well (e.g., models of skill building and cascading processes; Cunha & Heckman, 2007; Masten & Cicchetti, 2010)? Or, is later school success more contingent on children's experiences in subsequent environments that help sustain any early gains? Although a variety of processes have been outlined for understanding the persistence of preschool effects (or lack thereof), one long-standing hypothesis has been that children's subsequent experiences moderate the benefits that result from investments in early childhood programs (Bailey, Duncan, Odgers, & Yu, 2017). That is, although preschool programs help prepare children academically for kindergarten (Phillips et al., 2017; Yoshikawa et al., 2013), the quality of children's subsequent life experiences are vital for maintaining these initial advantages and, absent of high quality opportunities in the future, investments in early childhood programs might prove to be unproductive in the long-term.

One such example includes the school environment to which

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children are exposed after the completion of preschool (Brooks-Gunn, 2003). Indeed, developmental theory has long suggested that continued high quality educational environments are necessary in order for children's developmental capacities to increase (Bronfenbrenner & Morris, 2006). High quality schools after the completion of preschool can, therefore, play an important role in this cascading process as they can continue to foster the early academic gains or provide the resources necessary to keep children engaged in their education and, in doing so, make preschool experiences even more effective. Put another way, although preschool programs prepare children for kindergarten (Phillips et al., 2017; Yoshikawa et al., 2013), their benefits are likely to lessen over time in poor quality schools because these schools may—for a variety of reasons—impose a ceiling on higher achieving students, thereby, constraining future advantages. Thus, investing in preschool programs is likely only part of the answer in addressing long-term inequality, and if children end up in lower quality or inferior schools, those initial positive academic benefits may be undermined. Unfortunately, even though this possibility is intuitive, due to data limitations, there has been little experimental, quasi-experimental, or correlational research that considers how the benefits of early investments in preschool are affected by children's subsequent educational experiences.

In the present investigation, we seek to fill in these gaps in knowledge and build on the existing early childhood literature by testing the conditional nature of the academic benefits of preschool education among 15,070 children who participated in the Early Childhood Longitudinal Study Kindergarten (ECLS-K) Cohort of 1998 (Tourangeau, Nord, Lê, Sorongon, & Najarian, 2009). The premise of this study is that children's subsequent elementary school experiences will play an important role in determining the degree to which the academic benefits of preschool persist over time as children progress through their educational careers. Our guiding hypothesis is that a greater share of these preschool benefits will be maintained in higher quality elementary schools as opposed to lower quality ones, where the initial academic advantages may diminish over time (Bailey et al., 2017).

In testing this hypothesis, we focus on a multidimensional measure of the school setting, which reflects the three central components of social settings set forth Tseng and Seidman (2007). These three components include: (a) *school resources*, including the characteristics of the individuals and the availability and quality of physical resources; (b) *organization of school resources*, including the representation of different types of people and resources; and (c) *social and relational processes*, including the relationships that characterize the school and the participation of individuals in the school's activities and routines. In support of these three dimensions, a number of educational studies have shown that these features of schools are linked with children's school success (e.g., Aikens & Barbarin, 2008; Chen, 2007; Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Hedges, Laine, & Greenwald, 1994; Sampson, Morenoff, & Gannon-Rowley, 2002), represent potential malleable targets for intervention (Lowenstein et al., 2015), and collectively, they represent a dynamic system that can prove crucial for maintaining the initial skill advantages that result from preschool enrollment (Currie & Thomas, 2000).

In focusing on a more comprehensive school-level measure of quality, our work moves beyond the standard examination of structural features of the classroom as moderators of preschool effects (Bassok, Gibbs, & Latham, 2015; Claessens, Engel, & Curran, 2014; Magnuson, Ruhm, & Waldfogel, 2007), which have *not* consistently explained variation in long-term preschool effects. That is, studies that have focused on the classroom ecology have found little evidence to suggest that the classroom environment after preschool account for the long-term convergence seen in prior studies of preschool education. In contrast, our focus on the broader school setting as a potential moderator of preschool effects has received comparatively little attention, but is in line with a handful of other studies that suggest that where children end up matters (Currie & Thomas, 2000; Johnson & Jackson, 2017; Lee & Loeb, 1995; Zhai, Raver, & Jones, 2012). More specifically, what these studies have generally found is that the benefits of preschool are more pronounced when followed up with better quality elementary schools. This type of empirical inquiry that considers the ramifications of broader school characteristics is also of note because children targeted by educational policy are often from disadvantaged backgrounds and, consequently, at greater risk of attending poor quality schools (Lee & Loeb, 1995; Pigott & Israel, 2005). For these very reasons, school-level factors that more holistically capture children's day-to-day experiences might prove to be more potent moderators of the long-term academic benefits of preschool programs as compared with classroom-level markers of experience, which are oftentimes limited by issues of measurement (e.g., teacher report of math and reading instruction at one point in time).

Thus, although previous studies with the ECLS-K have shown that preschool enrollment is linked with higher academic test scores throughout middle childhood (e.g., Bassok et al., 2015; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Magnuson et al., 2007), the current investigation sought to push the early childhood field forwarding by examining variation in the long-term academic effects of preschool as a function of children's subsequent educational experiences. And, in addressing this question, we focus on thresholds of elementary school quality that above or below which, the long-term associations between preschool enrollment and children's academic outcomes may be stronger or weaker (for similar analyses see: Burchinal, Vandergrift, Pianta, & Mashburn, 2010; NICHD ECCRN, 2000, 2006). Our thresholds could indicate that the preschool-outcome associations persist equally above a given level of elementary school quality, or that a minimum level of quality is necessary for long-term positive associations between preschool and outcomes to be observed. When taken together, our work seeks to provide insight into the academic benefits of preschool education relative to two pertinent issues: (a) how we evaluate the long-term benefits of preschool and the role of children's subsequent educational experiences as part of these evaluations and (b) what is (and what is not) realistic to expect from a one-year education program.

1. Method

Data were drawn from the ECLS-K 1998 Cohort (Tourangeau et al., 2009), a national sample of over 21,000 kindergarteners followed from kindergarten entry through the end of middle school. Information was collected from parents and teachers as well as direct assessments of children. For the purposes of the present investigation, we focused on the elementary school years (fall and spring of kindergarten and the spring of first, third, and fifth grade) and restricted our sample to children who were first time kindergartners (n = 16,752) and had valid kindergarten data and preschool information (n = 16,637). In keeping with prior publications with the these data (e.g., Curenton, Dong, & Shen, 2015; Loeb et al., 2007; Magnuson et al., 2007) and other preschool evaluations (e.g., Zhai, Brooks-Gunn, & Waldfogel, 2011), Head Start was removed from the preschool category for three reasons: (1) it is widely regarded as different than standard center-based care or state-funded pre-K; (2) it was not possible to achieve optimal balance across the Head Start and preschool conditions when using propensity scores (see also: Magnuson et al., 2007); and (3) prior studies with the ECLS-K have shown that there are no added benefits of Head Start as compared with informal care (e.g., Curenton et al., 2015; Magnuson et al., 2007). The above exclusion criteria resulted in a final analytic sample of 15,070 children. See Appendix Table 1 for unweighted sample descriptives before and after propensity score matching (propensity scores are discussed in more depth below).