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Does higher peer socio-economic status predict children's language and executive function skills gains in prekindergarten?

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ABSTRACT

Because most public preschool programs are means tested, children enrolled in these programs accordingly have peers from predominantly low-income families who present lower cognitive skills and more behavioral problems, on average. The present study examined the role of having a higher percentage of peers from higher-SES families on gains in children's receptive vocabulary and executive function skills at the end of prekindergarten. Participants included 417 children attending a prekindergarten program that is not means tested. Findings indicated that having a higher percentage of peers from higher-SES families showed small, positive associations with greater gains in end-of-prekindergarten receptive vocabulary and executive function skills. Results are discussed in the context of current proposals to increase access to publicly funded preschool for higher-income families.

The majority of public preschool dollars in the U.S. are spent on programs targeted to or exclusively limited to children from low-income backgrounds (Barnett, 2010). Out of 40 states with public prekindergarten programs, only 8 were open to families of all income levels in 2011 (Barnett et al., 2010). The largest federal preschool program, Head Start, is likewise targeted to children from low-income backgrounds. Because children's early cognitive skills and behavior are correlated with family income, children enrolled in these programs are accordingly surrounded by peers from low-income families who present lower cognitive skills and more behavioral problems, on average. The average ability and behavioral differences in young children by family income are not trivial (Chatterji, 2006; Duncan & Magnuson, 2005). At kindergarten entry, children with family incomes in the bottom quintile are 1.38 standard deviations behind children at the top quintile in reading and 1.34 standard deviations behind in math. The gap by family income for antisocial and externalizing behaviors is smaller, but approximately 0.26 of a standard deviation (Duncan & Magnuson, 2011).

Among older students, on balance, having a higher percentage of peers from lower socio-economic (SES) backgrounds is associated with negative effects on children's cognitive outcomes (van Ewijk & Sleegers, 2010). At the preschool level, evidence on the effects of mixed-SES versus low-SES peer groups in preschool on children's cognitive skills is just emerging. One study found that children from low-income families showed statistically significantly greater vocabulary growth in preschool when they experienced peers from mixed-income versus low-income families (Schechter & Bye, 2007). The study, however, did not control for potential confounders like teacher education and experience, or other peer characteristics like peer home language. Two other studies of peer SES in preschool (which drew from same dataset but posed somewhat different questions) used an extensive set of control variables and found small positive effects of having a higher proportion of peers who were not from low-income families on most but not all of the child language, literacy, and mathematics outcomes examined for both poor and non-poor children (Miller, Votruba-Drzal, & Shaw, 2013; Reid & Ready, 2013). Other studies of peer effects in preschool have focused on the effects of peer cognitive skills and have found evidence of small positive effects of having peers with higher cognitive abilities (e.g., expressive language or a composite measure of numeracy, literacy, and language skills) on individual children's numeracy, language, and literacy skills (Henry & Rickman, 2007; Mashburn, Justice, Downer, & Pianta, 2009). Given the strong correlation between family SES and young children's cognitive skills, the authors of these latter studies have interpreted their results as possible evidence that grouping together low-income children in preschool may not be optimal policy.

These studies touch on a longstanding debate in early childhood policy — whether preschool interventions should be targeted exclusively to the poor. Some studies suggest that most of the cognitive benefits of preschool interventions accrue to disadvantaged students (Brooks-Gunn, Gross, Kraemer, Spiker, & Shapiro, 1992; Currie, 2001). Further, many lower-income families also face public preschool waiting lists and other access problems. Overall, less than half of children in

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poverty attend publicly funded preschool (Barnett, 2010; Schulman & Blank, 2011). Without additional spending, expanding access to higher-income families may entail shutting out those who arguably need and may benefit more from a given intervention. Indeed, although the Head Start program allows for 10% of children to attend with higher family incomes than the general criterion of 130% of the federal poverty threshold, in practice this generally does not occur, as program directors focus on serving the most disadvantaged (Zigler & Styfco, 2010). On the other hand, evidence suggests that while more advantaged children benefit less than their disadvantaged peers, they nonetheless show robust gains when enrolled in public preschool programs (e.g., children not eligible for free or reduced-price lunch; Gormley, Gayer, Phillips, & Dawson, 2005; Weiland, & Yoshikawa, 2013). If having peers from higher-income families results in positive effects for children from lower-income families in preschool, this may also be a reason to adopt a more universal approach. Studies of cognitive peer effects among older children find that disadvantaged children benefit the most from having higher-ability peers (Hanushek, Kain, Markman, & Rivkin, 2003; Zimmer & Toma, 2000).

The present study uses data from a public prekindergarten program that is not means tested to contribute to the universal versus targeted debate and to the emerging preschool peer effects literature. Specifically, the program is located in the Boston Public Schools (BPS); it has been shown to have moderate-to-large positive impacts on children's language, literacy, and early mathematics skills, and small positive impacts on children's executive function skills (Weiland, & Yoshikawa, 2013). Using data from the 2009–2010 school year, we examined the role of peer socio-economic status in promoting growth in children's cognitive skills (receptive vocabulary and executive functioning) in the prekindergarten year. We also examined whether there was a threshold or cutpoint above which the effect of having a larger percentage of peers from higher SES families is stronger. These latter results potentially are highly policy relevant, as they may aid in identifying a more versus less optimal balance of peers by SES. Finally, to replicate findings in the nascent preschool peer effects research, we also examined whether the effects of having a larger percentage of peers from higher SES families are explained by the higher cognitive skills of these peers at prekindergarten entry. We also extended prior findings in two main ways. First, peers' effects on children's executive function, defined as a set of cognitive processes integral to the emerging self-regulation of behavior and the development of social and cognitive competence in young children (Blair, 2002), has not yet been explored among preschoolers. Theory and some empirical evidence suggest that there may be such a link. Second, peer effects on children's cognitive skills may differ according to the specifics of the preschool program. It is not clear in prior preschool peer effects studies whether examined child developmental domains were targeted in the programs, and if so, to what degree. In the present study, we are able to provide specific details that clarify the conditions under which peer effects were or were not observed. Specifically, for the outcomes of interest in the present study, one (children's language skills) was directly targeted by the Boston preschool program, whereas the other (children's executive function skills) was not.

Theory and empirical evidence: Peer effects in preschool

An important theoretical and conceptual question in exploring peer effects in preschool is what constitutes an ideal or optimal set of peers. Several prominent theories provide different answers to this question (Yudron, Jones, & Raver, in press). For example, Piaget argued that children learn best in same-age peer groups because they need to master the skills at one level of development before advancing to the next (Piaget, 1983). Vygotsky's theory of proximal development conversely advanced the idea that children learn best when they are challenged by their peers and therefore, mixed age groups are optimal (Vygotsky, 1987). Because age is correlated with cognitive abilities, these two theories map directly onto the literature regarding effects of having peers with lower versus higher cognitive abilities. Consistent with Vygotsky, several studies have found positive peer effects for lower-ability children who have higher-ability peers in their classrooms (Hanushek et al., 2003; Justice, Petscher, Schatschneider, & Mashburn, 2011). Higher-ability peers in those studies, in contrast, appeared not to have been affected by the range of cognitive abilities in the classroom. In Vygotskyian terms, there may have been a peer "zone of proximal development" for the lower-ability children but not for the higher-ability peers.

Other conceptualizations of peer effects concentrate on whether the pathways by which they occur are direct or indirect (Justice et al., 2011). Children may learn from directly interacting with each other. If so, they are likely to learn more from higher- versus lower-performing peers, while they are unlikely to "unlearn" from lower-performing peers. The classroom composition may affect the instructional learning opportunities teachers offer students in ways that promote or hinder individual children's development. If so, this would constitute an indirect peer effect.

The specific mechanisms by which peer effects operate are not known at the preschool level. Nonetheless, there are theoretical and empirical reasons to believe that initial peer capacities in the specific domains of interest in this study – receptive vocabulary and executive function (EF) skills – may be an explanatory mechanism. Both peer language and peer EF are arguably part of the proximal ecological context experienced by children enrolled in preschool programs (Bronfrenbrenner & Morris, 1998). As reviewed extensively in Mashburn et al. (2009), teacher training, early childhood curricula, and early childhood program standards often emphasize the importance of peer-to-peer interactions and conversations. Preschool classroom schedules in the U.S. are typically structured in ways that facilitate such interactions. For example, children usually spend blocks of time in centers, in which they often engage in activities with a peer or peers (e.g., dramatic play, blocks, or games). They also typically spend time in whole-group activities like story time, in which child participation is expected and encouraged. Such classroom structures and routines present opportunities for learning from both peers' language and EF capacities. For example, peers with a strong vocabulary may introduce new words to a child. Peers with strong EF skills may model strong self-regulatory skills like inhibiting their dominant response to call out when the teacher asks a question in favor of raising their hands instead.

There may also be cross-domain mechanisms. Research suggests that children's own EF skills contribute to their growth in language skills in preschool (Blair & Razza, 2007; Weiland, Barata, & Yoshikawa, 2014; Welsh, Nix, Blair, Bierman, & Nelson, 2010). Peer EF skills may do so as well. For example, peers with higher EF skills (e.g., working memory) may more frequently retain and use new vocabulary words introduced by the teacher or other children in the classroom. These peer vocabulary and EF inputs over time may contribute to the child's development in these domains.

Given the noted strong correlation between family income and young children's cognitive skills, having peers with higher SES may operate along the same pathways as having peers with higher cognitive skills. It also possible, however, that low peer SES might negatively affect individual children's cognitive outcomes due to the positive correlation between lower child SES and more behavior problems and lower self-regulatory skills in early childhood (Smith-Donald, Raver, Hayes, & Richardson, 2007; Zelazo, Muller, Frye, & Marcovitch, 2003). Compared to children from higher SES families, children from lower SES families can present more internalizing, externalizing, and antisocial problem behaviors at kindergarten entry (Duncan & Magnuson, 2011) and lower ability to self regulate (Raver et al., 2011). This behavioral account of the relation between peer SES and child cognitive skills has support in the peer effects literature across three studies that examined both behavioral and cognitive peer effects. For example, Neidell