



Thresholds in the association between quality of teacher–child interactions and preschool children’s school readiness skills



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ABSTRACT

The present study examines the extent to which the association between school readiness skills and preschool classroom quality is higher in classrooms in which quality is above a threshold than when quality is below that threshold. A sample of 222 teachers and 875 children participated in a large, multi-site study. Classroom quality was defined as effective teacher–child interactions and measured by the Classroom Assessment Scoring System. Children’s language, literacy, and inhibitory control were assessed in the fall and spring. Using predetermined thresholds for high quality, associations between quality and children’s skills in inhibitory control and phonological awareness were greater when CLASS Emotional Support was rated higher, while associations between quality and skills in literacy (phonological awareness and print knowledge) were greater in classrooms in which CLASS Classroom Organization scores were higher. Effect sizes were moderate to large ($d = 0.43–0.84$) for associations between outcomes and quality in the higher quality ranges. Empirical approaches to identify thresholds, indicated relations between inhibitory control and both Classroom Organization and Emotional Support as higher when teacher–child interactions were rated as more effective. These results contribute to emerging evidence that features of classroom experience, such as qualities of teacher–child interactions, are more strongly associated with higher levels of children’s school readiness skills when the nature of those experiences (i.e., interactions) are in the upper ranges of the distribution. However, the evidence reported herein do not warrant recommendations for specific thresholds and inconsistencies in the study’s findings in comparison to previous research require further investigation before direct implications for thresholds in quality would be warranted.

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Introduction

Children who experience higher quality early education and care (ECE) have, on average, higher cognitive and social skills—even after considering their experiences at home and family characteristics (Pianta, Barnett, Burchinal, & Thornburg, 2009). Children gain language, literacy, and executive functioning skills when they experience higher quality teacher–child interactions and instruction, and these gains are larger when they attend programs of overall higher quality (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Burchinal, Xue, Tien, Auger, & Mashburn et al., 2011; Weiland, Ulvestad, Sachs, & Yoshikawa, 2013). Limited evidence

also suggests that higher quality classrooms support children’s social and emotional skills (Gormley, Phillips, Newmark, Welti, & Adelstein, 2011). However, the effect sizes for the linear associations between indicators of quality and child outcomes are typically small (Burchinal, Kainz, & Cai, 2011) or non-significant (e.g., Weiland et al., 2013). Furthermore, most indicators of quality are parameterized using measures that are either categorical, multi-component (e.g., incorporating a very wide range of different observed features), or are scaled ordinally and so do not reflect equal intervals in the underlying constructs. For these reasons, it is quite possible that the small magnitude of the overall association of quality and outcomes, estimated using existing measures, may not be linear. The possibility of nonlinearity is also supported by limited evidence of a ‘cut-off’ or differences in magnitude in the association between quality and child outcomes at varying points on the quality distribution, although the study of such cut-offs has yielded inconsistent results (Burchinal, Kainz et al., 2011 for a review).

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The extent of non-linearity or threshold effects in the associations between preschool quality and child outcomes has important policy implications for publically funded programs like Head Start, state pre-kindergarten programs, and quality-improvement initiatives.

Two recent meta-analyses of large preschool and childcare studies provided evidence of thresholds for the magnitude of associations between classroom quality interactions and child outcomes, but such thresholds did not emerge in all analyses (Burchinal, Kainz et al., 2011; Burchinal, Xue et al., 2011). Both these studies relied on similar, albeit not identical, thresholds chosen based on cut-points recommended by the developers or other researchers, used the same analysis strategy, and similar covariates. Factors such as the actual threshold levels tested, how thresholds are derived (empirically or an a priori basis), or the use of different covariates or measures of quality could have influenced the results. Other studies replicate threshold-related findings with some success and also extend the range of outcomes examined (Burchinal, Sideris, Vernon-Feagans, & Pianta, 2013; Weiland et al., 2013). The present study extends this work by investigating thresholds using a priori determined cut-points and through empirical methods examining associations between quality of teacher–child interactions and school readiness skills that include language, literacy, and inhibitory control. It also extends this work by using a recent large, multi-state, study that includes a diverse population and range of preschool classroom settings (e.g., for profit and state funded).

Associations between child development and teacher–child interactions

Inhibitory control

Executive functioning encompasses inhibitory control, working memory, and attention shifting skills (Ursache, Blair, & Raver, 2012), all key components of school readiness and predictors of later success (Cunha & Heckman, 2007). Inhibitory control, one component of executive function, describes an individual's ability to suppress a dominant response in favor of a non-dominant one. Inhibitory control, when assessed in preschool, has demonstrated a unique effect on the quality of subsequent relationships with teachers and peers (Mintz, Hamre, & Hatfield, 2011) as well as later academic success (Ponitz, McClelland, Mathews, & Morrison, 2009). Moreover, as suggested by theory and research, children's inhibitory control skills are affected by classroom interactions.

Theory suggests that there is a relationship between classroom interactions and child inhibitory control. Specially, classrooms with intentionally crafted learning opportunities, supportive management of time and behavior, opportunities to encourage student autonomy, and responsive interactions should promote the development of executive function skills (Downer, Sabol, & Hamre, 2010). There is some, albeit limited, evidence suggesting that these types of interactions are linked with children's inhibitory control. Evidence that supports this linear association suggests that children in preschool classrooms in which teachers positively facilitate activities, provide interesting and creative materials, as well as offer consistent behavior expectations display higher inhibitory control (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). However, mixed evidence also exists. In an examination of the effectiveness of an intensive curriculum and teacher support program, prekindergarten children demonstrated small, but significant gains in inhibitory control ($d=0.20$; Weiland & Yoshikawa, 2013). However, a subset of the children from this sample did not demonstrate significantly higher inhibitory control skills after accounting for the quality of teacher–child interactions. Further, other studies report small and/or non-significant

correlations between process quality and inhibitory control (Hong, Howes, Marcella, Zucker, & Huang, 2015; Williford, Maier, Downer, Pianta, & Howes, 2013) suggesting that the relations between teacher–child quality and children's inhibitory control either do not exist or may not be linear.

In the same study that reported non-linear effects between classroom quality and children's inhibitory control, Weiland et al. (2013) also provide initial evidence of non-linear associations between teacher–child interaction quality and inhibitory control. Children in classrooms deemed to be high quality, according to Instructional Support, Classroom Organization, or Emotional Support, as measured by the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008) displayed better inhibitory control compared to children in classrooms with lower CLASS scores (e.g., Emotional Support below a 5.5). Burchinal, Vernon-Feagans, Vitiello, Greenberg, and The Family Life Project Key Investigators (2014) also report evidence of thresholds as children in classrooms above a 5 in Classroom Organization (as defined by the CLASS) showed higher behavioral competence than children below the threshold. Continuing to examine classroom interactions in a non-linear manner may illustrate explanations as to why there is a dearth of significant linear associations between teacher–child interactions and children's inhibitory control.

Language and literacy

Preschool children's language and literacy skills are a strong predictor of later academic success (Catts, Fey, Zhang, & Tomblin, 2001; National Early Literacy Panel, 2009; NICHD, 2005) and social skills (Leonard, Milich, & Lorch, 2011). Evidence from large-scale studies of pre-kindergarten programs suggests that features of teacher–child interactions modestly predict children's academic skill gains in early childhood and into elementary school (Pianta et al., 2009). Experimental studies suggest that higher quality interactions, particularly the quality and intensity of instructional, language-rich interactions, have a moderate to large impact on early academic and cognitive skills (Hindman & Wasik, 2012; Pianta, Mashburn, Downer, Hamre, & Justice, 2008). In a meta-analysis of evaluations of 20 early childhood programs that involved experimental or quasi-experimental designs Karoly, Kilburn, and Cannon (2005) present evidence of significant effects in approximately two-thirds of the programs, particularly those that were more educationally intensive and focused on instruction.

Frequent, responsive, and stimulating teacher–child interactions promote language and literacy skills (Nix, Bierman, Domitrovich, & Gill, 2013). More specifically, qualities of teacher's instructional interactions are related to children's language and literacy skills even after accounting for specific language and literacy-related stimuli and materials (Guo, Justice, Kaderavek, & McGinty, 2012). Large, multi-site studies indicate that children demonstrate larger gains on language and literacy outcomes when teacher–child interactions are more responsive and sensitive (Howes et al., 2008; NICHD ECCRN, 2000; NICHD & Duncan, 2003), and when teachers provide intensive language opportunities during interactions (Dickinson & Porche, 2011).

In an intensive language and literacy coaching intervention within Head Start classrooms, children made more gains in receptive vocabulary, phonological awareness, and alphabet knowledge when features of teachers' instructional interactions improved (Hindman & Wasik, 2012). It has also been noted that, when frequency of discrete literacy teaching interactions is lower, more general features of teacher–child interactions are important predictors of children's literacy skills (McGinty, Justice, Piasta, Kaderavek, & Fan, 2012). Guo et al. (2012) report a similar association between the physical environment and classroom interactions such that environmental affordances for literacy experiences predict

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