



Effect of the tools of the mind kindergarten program on children's social and emotional development

Clancy Blair*, Rachel D. McKinnon, M. Paula Daneri

Department of Applied Psychology, New York University, 246 Greene Street, Kimball Hall, 8th floor, New York, NY 10003, United States



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ABSTRACT

Social-emotional competence in early childhood and the elementary grades is foundational for children's short- and long-term academic, social, mental health, and employment outcomes. This study examined the effects of a large-scale ($N = 715$) cluster randomized controlled trial of a comprehensive kindergarten program, Tools of the Mind, on teachers' reports of children's social-emotional competence at the end of kindergarten with follow-up in first grade. Results indicated that at the end of kindergarten, children in classrooms in schools randomly assigned to the treatment condition had reduced teacher reported behavior problems and aggression and improved self-regulation, social-emotional competence, and positive teacher-child relationships relative to children in classrooms in schools randomly assigned to the control condition. No differences were detected for teacher-reported academic competence. Sustained effects in first grade were seen only for first grade teachers' reports of aggression and conduct problems. This study adds to a growing literature demonstrating positive effects of educational programs focusing on children's social-emotional as well as academic competence.

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It is well established that social-emotional competence in early childhood and throughout the elementary grades is essential for positive life outcomes (Weissberg, Durlak, Domitrovich, & Gullotta, 2015). Two prominent long-term longitudinal studies demonstrate that indicators of social-emotional wellbeing in childhood robustly predict outcomes in adulthood (Jones, Greenberg, & Crowley, 2015; Moffitt et al., 2011). In one of these, kindergarten teachers' ratings of children's prosocial behaviors (e.g., cooperates with peers, is helpful to others) were found to be associated with outcomes in early adulthood, including increased educational attainment and employment and reduced need for public assistance, involvement in criminal activity, and likelihood of substance abuse, over and above a host of relevant covariates. In the second, a composite of observational and parent and teacher ratings primarily of child self-control and inattention as well as social-emotional competence measured between age 3–11 years was positively associated with socioeconomic status and physical health and reduced likelihood of criminal activity and substance dependence, among other outcomes (Moffitt et al., 2011). Additionally, a small but notable research base indicates that self-control and social-emotional skills, so-called “noncognitive” factors broadly construed (e.g., factors

other than general mental ability), can be enhanced by high-quality early education with wide-ranging benefits to the individual that are sustained into adulthood (Cunha & Heckman, 2008).

1. The integration of cognition and emotion in educational contexts

A highly salient aspect of research on social-emotional and noncognitive skill formation in educational contexts is the integrated nature of academic and social-emotional competence (Blair & Raver, 2015). It is increasingly well established that social-emotional wellbeing is integral to school readiness and early academic growth. Meta-analysis of experimental and quasi-experimental evaluations of 213 elementary and secondary school-based programs to promote social-emotional competence in children ages 5–18 years found moderate effects on academic outcomes in addition to large effects on social and emotional indicators (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

A primary reason for these associations has to do with the centrality of both cognitive and social-emotional self-regulation to the learning of academic material (Raver & Blair, 2016). Not only do children need to regulate cognitive resources such as memory and attention when engaging with academic material, they also need to regulate emotional responses to such material, such as rising anxiety or growing boredom, and also regulate

* Corresponding author at: Department of Applied Psychology, New York University, 196 Mercer Street, 8th floor, New York, NY 10012, United States.

E-mail address: clancy.blair@nyu.edu (C. Blair).

social interactions with teachers and peers as academic material is being introduced. Traditionally, aspects of cognitive competence that undergird learning have been characterized separately from aspects of social-emotional competence that promote effective learning of complex material. Indicators of social-emotional competence, however, including the effective regulation of emotion as well as effective social interactions with teachers and peers, are also essential to academic learning.

The integrated and interdependent nature of cognitive and social-emotional responses to learning situations is clearly seen in what can be considered the neurobiology of self-regulation. Briefly, as activity increases in brain areas associated with the experience and expression of emotion, specifically, stress and anxiety, this response potentiates activity in areas of the brain associated with higher-order thinking skills such as working memory (Vijayraghavan, Wang, Birnbaum, Williams, & Arnsten, 2007). As levels of activity in brain areas associated with stress and anxiety increase beyond a moderate level, however, they reduce activity in brain areas associated with higher-order thinking and learning (Arnsten, 2009; Gagnon & Wagner, 2016). In keeping with this neurobiology, behavioral data indicate that the ability to effectively regulate social, emotional, and physiological responses to stimulation are associated with higher levels of cognitive regulation, such as working memory, and with increased academic competence (Berry, Blair, Willoughby, Granger, & the Family Life Project Investigators, 2012; Trentacosta & Izard, 2007, Ursache, Blair, Stifter, Voegtline, & the Family Life Project Investigators, 2013).

Notably, experimental evaluations of several early childhood programs have demonstrated associations between social-emotional competence and academic ability, by either focusing primarily on one or the other aspect of readiness or by combining a focus on the two. For example, the Chicago School Readiness Project (CSRP) provided behavior management training and coaching as well as a mental health consultant to teachers in federally-subsidized Head Start prekindergarten classrooms in Chicago. A randomized controlled trial evaluation found moderate to large effects of this coaching and consultation in the spring of the prekindergarten year not only on children's behavioral and emotional development but also executive function abilities and academic readiness for school (Raver et al., 2009; Raver et al., 2011). Another early childhood program, Project REDI, combined a focus on emotional development with enhanced early language and literacy instruction. Results from the RCT evaluation of REDI, also with Head Start classrooms, indicated moderate to large effects on children's early literacy development as well as aspects of emotional awareness and social behavior (Bierman, Domitrovich et al., 2008; Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Many of these effects were sustained or increased from kindergarten through the third grade (Bierman & Torres, 2016; Nix et al., 2016). Further, there is evidence that efforts to increase academic ability in preschool can enhance social-emotional outcomes. A quasi-experimental evaluation of an innovative preschool program combining an enhanced literacy focus with a comprehensive mathematics curriculum indicated moderate to large gains across the preschool year in math and literacy indicators as well as moderate to small gains in measures of social-emotional and self-regulation abilities (Weiland & Yoshikawa, 2013).

2. Kindergarten as a context for innovation

Much of the attention in early childhood has focused on the social-emotional and academic benefits of high-quality programming in prekindergarten. Kindergarten, however, also represents a potentially opportune yet relatively under-researched context in

which to foster children's early social-emotional skill development. For one, kindergarteners exhibit a greater capacity for complex thinking and for self-regulation than do preschoolers. For another, teachers in kindergarten are members of the established teaching profession with many teachers having many years of experience. In one of the longitudinal studies referenced previously (Jones et al., 2015), prosocial competence ratings by teachers in kindergarten were found to relate to young adult outcomes over and above other child, family and neighborhood characteristics measured contemporaneously. Although that study does not necessarily indicate the unique value of kindergarten, as prosocial ratings in later grades were not included in analyses of outcomes, findings are consistent with other studies demonstrating a unique effect of experience in kindergarten on outcomes in later childhood and early adulthood. Notably, analysis of data from the class size experiment in Tennessee known as Project Star indicated that students randomly assigned to kindergarten through grade 3 classrooms with fewer students had higher academic achievement in grades 4, 6, and 8 (Nye, Hedges, & Konstantopoulos, 1999). Analyses of those data also indicated that initial assignment to a higher quality kindergarten classroom was associated with higher rates of college attendance and higher earnings in adulthood (Chetty et al., 2011). Notably, the effect of kindergarten class quality on later earnings was distinct from the effect of class quality on later achievement and was primarily attributable to social-emotional aspects of student behavior assessed by teacher ratings at fourth grade.

We are not aware of any prior RCT evaluations of innovative social-emotional programs for kindergarten specifically, although certainly other social-emotional learning programs (e.g., 4Rs; Jones, Brown, & Aber, 2011) have been effectively implemented in the early elementary grades. Notably, many of these programs are supplemental or additions to a primary curriculum. This is in contrast to Tools of the Mind, which is a comprehensive program, meaning that its principles and approach are interwoven throughout all classroom activities. We recently reported, the results of a large-scale cluster randomized controlled trial of Tools of the Mind kindergarten program on children's academic and cognitive ability outcomes (Blair & Raver, 2014). That analysis indicated small effects of the program on measures of math and reading ability as well as measures of executive function abilities in the sample as a whole. Effects were substantially larger on these outcomes, as well as on measures of reasoning, vocabulary and the control of attention, for children in high-poverty schools as indicated by the percent of students eligible for free- or reduced-price lunch. Follow-up into the first grade indicated sustained effects on math and reading ability in the sample as a whole that were not moderated by school poverty status.

3. The tools of the mind program

Here we follow our prior analysis and examine the effect of the Tools of the Mind program on children's social-emotional competence at program end in the spring of the kindergarten year and in the fall of the first grade. Our expectations for effects of the program on social-emotional aspects of children's development are based on the nature of the classroom activities that characterize Tools of the Mind. Although Tools of the Mind focuses most directly on cognitive development in young children, specifically executive function (EF), it does so primarily through the mechanism of social interaction. The program is based on classic Vygotskian theory with the expectation that a comprehensive set of primarily group-based activities for children can promote EF and higher-order thinking skills. In Tools, techniques for supporting, or scaffolding the development of EF are embedded in large and small group classroom activities that are designed primarily to promote the learning of

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