



Research Paper

Combining a kindergarten readiness summer program with a self-regulation intervention improves school readiness[☆]



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ABSTRACT

Self-regulation and academic skills in kindergarten are strong predictors of later achievement. However, many children enter kindergarten without adequate levels of these skills, often because of limited participation in early childhood education. The current study examined a kindergarten readiness summer program (Bridge to Kindergarten; B2K) that served children with no prior preschool experience. The first study goal was to examine the effects of adding a self-regulation intervention to the B2K program on children's self-regulation, math, and literacy. The second study goal was to compare changes in self-regulation, math, and literacy during the kindergarten transition period for children attending the B2K program with the intervention to expected development. Results from a randomized trial indicated that children who participated in the B2K program that included the self-regulation intervention experienced more gains in self-regulation relative to children who participated in the B2K program alone. There were no significant effects on math or literacy at the end of the program. However, when examining change during the kindergarten transition period, participation in the B2K program with the self-regulation intervention was associated with improved growth in self-regulation, math, and literacy into the fall of kindergarten compared to expected development. Collectively, the findings suggest a kindergarten readiness summer program that incorporates a self-regulation intervention leads to improved school readiness in children at higher risk for later school difficulties.

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1. Introduction

The importance of school readiness is widely recognized, as children's early math and literacy skills are strong predictors of subsequent academic success (Duncan et al., 2007). In addition to academic skills, self-regulation has emerged as a critical com-

ponent of school readiness and children's ability to learn in the classroom (Blair & Raver, 2015; McClelland & Cameron, 2012). As such, there has been a surge in interest in early childhood programs and interventions that facilitate the development of self-regulation and academic skills in recent years (e.g., Lonigan et al., 2015; Raver et al., 2011). This interest has intensified when studying populations of children that face higher levels of risk for school difficulties or failure (e.g., children who have no previous preschool experience). The current study examines the effects of a kindergarten readiness summer program (Bridge to Kindergarten; B2K), which is designed to boost school readiness skills prior to kindergarten entry for children who have not had previous preschool experiences. Specifically, the study investigates 1) the impact of adding a self-regulation intervention to the B2K program (referred to as B2K + RLPL) on children's self-regulation, math, and literacy, and 2) how growth in self-regulation, math, and literacy differs between children that participated in the B2K + RLPL program compared to expected development during the kindergarten transition period.

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1.1. School readiness

Despite theory and evidence that school readiness is comprised of both behavioral and cognitive skills, many early childhood programs focus primarily on teaching children early academic skills in order to promote later school success (e.g., Clements & Sarama, 2007; Weiland & Yoshikawa, 2013). These academic skills include understanding numbers and relations between them (e.g., four is more than three), as well as knowing letters and letter sounds. Across nationally representative samples and controlling for potential confounds (e.g., socioeconomic status), these early academic skills (especially math) are strong predictors of children's later achievement (Duncan et al., 2007). However, early math interventions that have shown short-term positive effects have been plagued with fadeout of these effects at follow-up time points, tempering enthusiasm for their potential to offset longer-term achievement gaps through only improving early math skills (Bailey et al., 2016; Clements, Sarama, Wolfe, & Spitler, 2013). Thus, it is also important to consider the potential impact of improving children's behavioral skills (e.g., self-regulation) for school readiness and later achievement.

Self-regulation is foundational for learning and school success (Blair & Diamond, 2008; Blair & Raver, 2015; McClelland & Cameron, 2012) and is conceptualized as the ability to stop, think, and then act in goal-directed ways (McClelland & Tominey, 2015). These skills draw heavily upon the three components of executive function: working memory, attentional shifting, and inhibitory control (Blair, Zelazo, & Greenberg, 2005). Working memory is the ability to manipulate information while holding it in mind, attentional shifting is the ability to shift focus from one characteristic to another, and inhibitory control is the ability to stop a prepotent response with a secondary, more adaptive response (Garon, Bryson, & Smith, 2008). Children use these skills when they pay attention to teachers, remember rules, follow instructions, interact with peers, and persist with learning activities, all of which contribute to children's short- and long-term academic success (Blair & Raver, 2015; Cameron Ponitz, McClelland, Matthews, & Morrison, 2009; McClelland, Acock, Piccinin, Rhea, & Stalling, 2013; McClelland et al., 2014).

Taking a skills beget skills theory of human capital (Heckman, 2000), children who are the most prepared for school are the most likely to be successful academically. Moreover, the early skills needed to beget academic learning are likely both self-regulation and early academic competence (Blair & Diamond, 2008; Duncan et al., 2007). Children that enter school ready to learn are able to develop academic skills at faster rates than their peers, with cumulative advantages building over time. Therefore, boosting skills prior to kindergarten entry may be critical for addressing achievement gaps that largely persist throughout the schooling years (Duncan & Magnuson, 2011).

1.1.1. Risk factors for poor school readiness

Gaps in school readiness skills are associated with both demographic factors and children's preschool experiences. In the current study, having no preschool experience is considered a risk factor for poor school readiness. Previous research has found that a year in preschool is estimated to contribute roughly one-third of a year, on average, of additional learning in emergent literacy and mathematics (Yoshikawa et al., 2013), with the highest quality programs adding roughly one full year of additional learning (e.g., Weiland & Yoshikawa, 2013). Furthermore, access to high quality prekindergarten may be particularly important for improving early learning for children who are from low-income families and who are dual language learners (Phillips et al., 2017, chap. 2). One of the key aspects of high quality programs is using effective curricula that promote stimulating and supportive interactions between children

and their teachers (Yoshikawa et al., 2013). In a population of children at increased risk for school difficulties (i.e., no prior preschool experience), the current study examines if a kindergarten readiness program combined with a self-regulation intervention boosts children's self-regulation and academic skills. Additionally, the study examines these changes conditional on key demographic factors shown to potentially moderate early program effects (e.g., family income, English language learner status).

1.2. Self-regulation intervention

Evidence suggests that self-regulation is a malleable and teachable set of skills (Blair & Raver, 2015). Recent efforts have focused on developing and evaluating a variety of approaches for improving self-regulation prior to kindergarten entry (e.g., Diamond, Barnett, Thomas, & Munro, 2007; Raver et al., 2011), including the Red Light, Purple Light (RLPL) circle time games intervention (Schmitt, McClelland, Tominey, & Acock, 2015; Tominey & McClelland, 2011). The RLPL intervention is a classroom-based, early childhood intervention that consists of circle time games implemented in 16, 20–30 min sessions. The circle time games explicitly focus on the three components of executive function (i.e., working memory, attentional shifting, and inhibitory control) and allow children to practice self-regulation in a group setting (i.e., children play the games in a group). For more information see Tominey and McClelland (2011) and Schmitt et al. (2015).

The RLPL intervention includes traditional children's games that have been modified to increase in cognitive complexity. An example of one game included in this intervention is called Red Light, Purple Light, which is a variation of the traditional childhood game *Red Light, Green Light*. In this game, a researcher acted as a stoplight and held up different-colored construction paper circles to represent stop and go. Children responded to specific color cues (e.g., orange means clap hands, purple means stop) and then, to make the game more complex, opposite cues with a variety of actions would be introduced over time (e.g., purple is clap, red is stomp, and orange is stop). During this game, children were required to listen to and remember instructions (i.e., working memory), successfully switch from one rule to another (i.e., attentional flexibility), and resist the natural inclination to engage in one action in favor of the correct response (i.e., inhibitory control). As the intervention progressed, activities were repeated and additional rules were introduced to the games increasing their cognitive complexity.

This intervention has been evaluated in two randomized controlled trials (RCTs) as delivered by researchers in preschool classrooms. In the pilot study, participation in the intervention was associated with gains in self-regulation for children with the lowest initial levels of these skills and gains in literacy for the full sample (Tominey & McClelland, 2011). Results from a larger efficacy study with children from low-income families suggested that participation in the intervention was related to gains in self-regulation for the full sample and gains in math for English language learners (Schmitt et al., 2015). In the present study, we examined the effectiveness of the intervention when delivered by teachers as part of an existing kindergarten readiness summer program (i.e., B2K). If researcher-developed interventions are going to be successful at scale, teachers need to be able to successfully implement them in real-world settings. The current study addresses whether adding the self-regulation intervention to a pre-existing kindergarten readiness program has meaningful impacts on children's school readiness.

1.3. Bridge to Kindergarten (B2K)

The B2K program is a free kindergarten readiness summer program run by a school district that targets entering kindergarteners

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