



Linking preschool language and sustained attention with adolescent achievement through classroom self-reliance[☆]



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ABSTRACT

This study examined self-reliant classroom behaviors during middle childhood as a mechanism through which early language and sustained attention become associated with academic achievement in adolescence. Participants were enrolled in the NICHD Study of Early Child Care and Youth Development ($N = 1364$). Path analyses revealed that preschool language and sustained attention predicted self-reliant classroom behaviors during middle childhood and that self-reliant classroom behaviors predicted changes in math achievement in adolescence. Self-reliant classroom behaviors mediated the relations of preschool sustained attention and linguistic ability with adolescent math achievement, but not reading achievement. These findings extend research highlighting the importance of self-reliant classroom behaviors for children's academic outcomes.

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Despite consistent evidence regarding the importance of early language and sustained attention for children's long term academic success (e.g., Dickinson, Golinkoff, & Hirsh-Pasek, 2010; Duncan et al., 2007; NICHD Early Child Care Research Network, 2003, 2005; Spira, Bracken, & Fischel, 2005; Spira & Fischel, 2005), we know little about the mechanisms through which these factors are associated with children's success in school throughout childhood and adolescence. Language in early childhood has been linked with academic achievement in adolescence, such that early problems with language are associated with lower achievement in adolescence, suggesting that early language problems put children at risk for poor long-term academic outcomes (e.g., Aram, 1984; Catts, Bridges, Little, & Tomblin, 2008; Duncan et al., 2007; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998; Young et al., 2002). Similarly, sustained attention in early childhood has been associated with academic outcomes in adolescence, such that young children who have more difficulties sustaining attention score lower on measures of academic achievement as adolescents (e.g., Breslau et al., 2009; Duncan et al., 2007; Fischer, Barkley, Edelbrock, & Smallish, 1990).

Understanding the mechanisms underlying connections between language and sustained attention in the early years and adolescent achievement may inform intervention efforts to prevent academic failure.

One potential mechanism through which early language and sustained attention may be associated with long-term academic outcomes is children's self-reliance in the classroom. Self-reliance refers to the extent to which children use self-directed behaviors to orient toward learning tasks or activities while meeting the academic and social demands of the classroom (Downer, Booren, Lima, Luckner, & Pianta, 2010). Self-reliance has been described as the degree to which children display "personal initiative, behavioral self-regulation, persistence, and engagement in the classroom" (NICHD Early Child Care Research Network, 2008, p. 895–896). As such, self-reliant behaviors are critical for children to function with autonomy in the classroom and take advantage of classroom learning opportunities (NICHD Early Child Care Research Network, 2008). Less is known, however, about how children's language and sustained attention at school entry are associated with children's displays of self-reliance in the classroom during middle childhood and, in turn, with later academic achievement.

Conceptual framework

The bioecological model of human development (Bronfenbrenner & Morris, 2006) provides a conceptual framework for understanding the developmental mechanisms that are likely to underlie the connections between language and sustained attention in preschool, classroom self-reliant behaviors in middle childhood and academic achievement

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in adolescence. The model posits that the primary mechanism through which development occurs is through proximal processes, or complex reciprocal interactions over time between the individual and people, objects or symbols in his or her environment. These proximal processes vary by the characteristics of the developing individual and the relevant context and time periods. In this way, children's characteristics such as their skills in language and sustaining attention may play a role in the proximal processes they experience, and thus become associated with their academic outcomes as they proceed through different developmental transitions.

During the transition to formal schooling, there is a qualitative shift in the interactions children experience as goals, demands and the nature of the classroom environment differ from those experienced in preschool or at home (Rimm-Kaufman & Pianta, 2000). As the transition to formal school begins before children enter school, the early skills that children develop during the preschool period become important for creating a foundation for later competence in meeting the demands of formal schooling (Masten & Coatsworth, 1998). Thus, the early school transition period is a sensitive period for later school success (Rimm-Kaufman & Pianta, 2000). Early skills in language and sustained attention may contribute to how well prepared children are for the transition to formal schooling, as difficulties with language and attention may be associated with problematic or difficult functioning within the classroom environment (Rimm-Kaufman, Pianta, & Cox, 2000).

As children proceed through elementary school, they experience increased freedom along with greater expectations for controlling their behavior, exercising good work habits, and complying with rules (Eccles, 1999). Having strong language and sustained attention skills may benefit children's school adjustment during middle childhood as these skills may be associated with how well children are able to function with self-reliance in the classroom setting. Being able to function with self-reliance in the classroom may provide children with the opportunity to make the most of learning activities and successfully meet the increasing demands of school.

As children transition to adolescence, earlier patterns of development can operate to affect children's academic achievement. As adolescents face school environments that are characterized by increased competition, social comparison and self-assessment compared to elementary school, they experience a mismatch between what the environment affords and their developmental needs for choice and decision-making autonomy, a mismatch that often results in disengagement from school (Eccles et al., 1993). How adolescents meet the challenges of this period has implications for their academic outcomes (Blackwell, Trzesniewski, & Dweck, 2007). Developing classroom self-reliant behaviors during middle childhood may continue to benefit children's academic achievement into adolescence when schoolwork becomes less intrinsically motivating and adolescents' expectations for success in school decline (Eccles, 1999). To be academically successful during adolescence, students need to be able to manage their own learning and exercise skills in persisting through difficulties, stressors and competing distractions (Bandura, 2006). Children who have acquired these self-reliant skills before adolescence may be better equipped to meet the academic demands that arise during adolescence.

Classroom self-reliance

The concept of self-reliance has theoretical connections to motivational constructs of autonomy and self-regulated learning. Scholars consider autonomy, or "self-rule," as essential for optimal development and enhanced intrinsic motivation (Ryan & Deci, 2000). Having a sense of autonomy encourages an internalized self-regulatory style, where individuals direct their own behaviors (Ryan & Deci, 2000; Ryan & Powelson, 1991). The extent to which children are self-regulated in their approaches to learning in school reflects the degree to which they display personal initiative, perseverance, and adaptive skills (Zimmerman, 2008). When children are more self-regulated or

autonomous in their learning, they are more likely to engage in behaviors that reflect academic involvement, classroom participation, and task persistence (Miserandino, 1996). These behaviors, as well as other behaviors such as working independently, seeking challenges, and complying with teacher instructions, have been described as learning-related behaviors (e.g., Stipek, Newton, & Chudgar, 2010), learning-related skills (e.g., McClelland, Acock, & Morrison, 2006), work-related skills (e.g., McClelland, Morrison, & Holmes, 2000), approaches to learning (e.g., Li-Grining, Votruba-Drzal, Maldonado-Carreño, & Haas, 2010), adaptive classroom behaviors (e.g., Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009), school engagement (e.g., Archambault, Janosz, Fallu, & Pagani, 2009), and student engagement (e.g., Reschly & Christenson, 2012). Despite differences in terminology, these phrases all refer to a constellation of behaviors that reflect the focus, independence, and engagement that are thought to lay the foundation for academic success or failure (Pagani, Fitzpatrick, & Parent, 2012). While there is conceptual overlap between these behavioral constructs and the construct of self-reliance, self-reliance differs from these constructs in that it is a component of task orientation that demonstrates children's ability to take learning into their own hands through initiative, independence, and persistence (Downer et al., 2010). As such, children's ability to function with self-reliance in the classroom is a critical construct to consider when examining changes in academic achievement over time, as evident from research that finds that children's self-reliance is an important mediator of academic achievement (NICHD Early Child Care Research Network, 2008).

Classroom self-reliance and academic achievement

Children's self-reliant behaviors in the classroom have been positively associated with reading and math achievement (e.g., Bulotsky-Shearer & Fantuzzo, 2011; Dobbs-Oates, Kaderavek, Guo, & Justice, 2011; McClelland et al., 2007; NICHD Early Child Care Research Network, 2008; Raver et al., 2011; Wentzel, 1993). For example, Onatsu-Arivilommi and Nurmi (2000) found that young children who engage in off-task behaviors and who showed helpless responses and a lack of persistence at the beginning of their first year in school had poorer reading skills at the end of the school year. In another study, children who were rated by teachers as being engaged in positive learning-related behaviors, such as working independently and seeking academic challenges, were more likely to experience gains in reading achievement from kindergarten to fifth grade (Stipek et al., 2010). These associations are also relevant for math achievement. Kenney-Benson, Pomerantz, Ryan, and Patrick (2006) found that fifth graders who approached their learning with planning, monitoring, regulation, and persistence had higher math scores two years later. Similar results have been found with younger children, such that kindergarteners who engaged in positive classroom behaviors, such as working autonomously, following rules and instructions, and completing work on time, scored higher on a math achievement test three years later (Fitzpatrick & Pagani, 2013). These studies provide evidence of an association between self-reliant classroom behaviors and academic achievement (Stipek et al., 2010).

A few studies have examined the long-term links between self-reliance in the classroom and children's achievement (e.g., DiPrete & Jennings, 2012; Galindo & Fuller, 2010; Li-Grining et al., 2010; NICHD Early Child Care Research Network, 2008; Stipek et al., 2010). Previous analyses of the NICHD Study of Early Child Care and Youth Development, for example, showed that higher levels of self-reliant behaviors in the classroom in Grades 1 and 3 predicted gains in math and reading achievement from preschool to Grade 3 (NICHD Early Child Care Research Network, 2008). Another study by McClelland et al. (2006) showed that the extent to which kindergarteners displayed self-reliant behaviors in the classroom predicted math and reading scores between kindergarten and sixth grade. These longitudinal studies suggest that self-reliance may be associated with learning habits

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