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Associations among parental education, home environment quality, effortful control, and preacademic knowledge

Emily C. Merz [a,*], Susan H. Landry [a], Jeffrey M. Williams [a], Marcia A. Barnes [a], Nancy Eisenberg [b], Tracy L. Spinrad [b], Carlos Valiente [b], Michael Assel [a], Heather B. Taylor [a], Christopher J. Lonigan [c], Beth M. Phillips [c], Jeanine Clancy-Menchetti [c], the School Readiness Research Consortium

[a] University of Texas Health Science Center at Houston, United States
[b] Arizona State University, United States
[c] Florida State University, United States

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ABSTRACT

This study used a longitudinal design to examine whether effortful control mediated the associations of parental education and home environment quality with preacademic knowledge in toddlers and young preschoolers. The sample consisted of 226 children (2 to 4 years of age at T1) from socioeconomically disadvantaged backgrounds. Parents provided data on parent education and home environment quality. Children completed effortful control, early literacy, and early math assessments. T2 effortful control partially mediated the associations of T1 parental education and T1 home environment quality with T3 emergent literacy after accounting for child age, gender, race/ethnicity, T1 effortful control, and T2 early literacy. T2 effortful control partially mediated the association between T1 parental education and T3 emergent math after accounting for child age, gender, race/ethnicity, T1 effortful control, and T2 early math. Prior to entry into preschool, parental education and home environment quality may shape effortful control which in turn influences preacademic knowledge.

Successful school performance is important for children's emotional and behavioral health and future occupational status. Preacademic knowledge gained prior to school entry is a core component of school readiness measures and a strong predictor of later academic performance (Cunningham & Stanovich, 1997; Duncan et al., 2007). Specifically, emergent literacy skills, such as print knowledge and phonological awareness, equip the preschooler to learn to read upon school entry (Justice, Bowles, & Skibbe, 2006), and emergent math skills, including counting and knowledge of numbers, quantities, and shapes, prepare children to learn mathematical concepts like addition and subtraction (Geary, Hoard, Byrd-Craven, Nugent, & Numtee, 2007). Thus, it is important that children acquire preacademic knowledge during the preschool years. The period of toddlerhood and transition into preschool provides young children with many opportunities for acquiring informal academic knowledge that serves as a foundation for further learning in the preschool years. A better understanding of the factors that affect this early learning is important in order to find effective ways of supporting children's acquisition of preacademic knowledge prior to or as they enter preschool.

Low socioeconomic status (SES) indicators, such as the level of parental education or family income, and a low quality home environment are significant risk factors for poor acquisition of preacademic knowledge and early school disadvantage (Son & Morrison, 2010). However, few studies have tested specific hypotheses regarding the processes involved in the association of SES and home environment quality with preacademic skills. One process model that could be applied to these associations is a mediation model which specifies that a mediator accounts for the association between a predictor and an outcome (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Specifically, SES and home environment quality may be associated with the development of particular cognitive or social–emotional skills, which in turn are important for facilitating the acquisition of preacademic skills. Effortful control is a likely candidate for a developmental skill that may partly explain the association between contextual factors and preacademic knowledge in young children. Effortful control refers to a set of self-regulatory skills including attention modulation, response inhibition, persistence, and delay of gratification (Rueda, Posner, & Rothbart, 2005). Under supportive conditions, these skills show rapid growth during the toddler and preschool years (Garon, Bryson, & Smith, 2008). However, children exposed to contextual risks, such as

* Corresponding author at: Children's Learning Institute, University of Texas Health Science Center at Houston, 7000 Fannin Street, Suite 2300, Houston, TX 77030, United States. Tel.: +1 713 500 3683.
E-mail address: emilymerz@gmail.com (E.C. Merz).

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low SES or a low quality home environment, show poorer development of effortful control (Lengua, Honorado, & Bush, 2007). Effortful control is linked with children's acquisition of early literacy and math skills perhaps due to the role of attention and self-regulatory skills in supporting on-task behavior during learning activities (Espy et al., 2004). Therefore, family SES and home environment quality may lead to individual differences in young children's effortful control skills which in turn contribute to variation in preacademic knowledge.

The current study examined direct and indirect effects of parental education and home environment quality on preacademic skills in toddlers and young preschoolers from lower SES backgrounds. It was hypothesized that effortful control would mediate associations of parental education and home environment quality with early literacy and math skills.

SES and home environment quality as predictors of children's preacademic knowledge

Testing a mediation model must be based on prior evidence of associations among the putative predictor, outcome, and mediator variables (MacKinnon et al., 2002). Indeed, previous studies have yielded evidence to suggest that children's effortful control may play a mediating role in the associations of SES factors and home environment quality with preacademic knowledge.

SES indicators, such as parental education or family income, represent indices of global environmental resources. An extensive literature has demonstrated socioeconomic disparities in preschool-age children's early development (McLoyd, 1998) as well as their emergent literacy and math skills (Bracken & Fischel, 2008; Cadima, McWilliam, & Leal, 2010; Evans & Shaw, 2008; Justice et al., 2006; Mistry, Benner, Biesanz, Clark, & Howes, 2010). In addition, home environment quality, composed of a range of characteristics including parental sensitive responsiveness, language stimulation, and access to educational materials and activities, has been linked to variability in children's acquisition of preacademic knowledge (Belsky & Fearon, 2002; Britto, Brooks-Gunn, & Griffin, 2006; Connell & Prinz, 2002; Son & Morrison, 2010; Stipek & Ryan, 1997). Some studies have examined these aspects of the home environment individually whereas others have used a composite reflecting the overall quality of the home environment (Anders et al., 2012).

Furthermore, these predictors are found to be linked such that children in lower SES families experience a poorer quality home environment, including fewer educational materials and resources, fewer enrichment opportunities, and more stressors, than children in higher SES families (Bradley & Corwyn, 2002; Bradley, Corwyn, Burchinal, McAdoo, & García Coll, 2001). Differences in home environment quality may partially explain associations between SES and cognitive development (Dilworth-Bart, Khurshid, & Vandell, 2007; Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005; Hoff, 2003; Sarsour et al., 2011).

SES and home environment quality as predictors of children's effortful control

Self-regulatory skills facilitate voluntary, purposeful, or goal-directed behavior. Effortful control is a multidimensional framework for examining self-regulation and is considered to reflect the regulatory domain of temperament. Effortful control encompasses the abilities to focus and shift attention, inhibit a dominant response to perform a subdominant response, monitor conflict, detect errors, and persist in challenging tasks (Rothbart & Bates, 2006; Rothbart, Sheese, & Posner, 2007). Effortful control also includes the ability to delay gratification or inhibit the urge to approach motivationally or emotionally salient stimuli, such as desirable rewards (Kochanska, Murray, & Harlan, 2000; Raver et al., 2011). Effortful control is often assessed using experimental tasks that provide a direct measure of the child's self-regulatory skills (Rothbart & Bates, 2006).

Another framework for examining self-regulation is executive function, which refers to a similar set of skills, including inhibitory control, working memory, and attentional set-shifting (Hughes, 2011). Whereas there are numerous similarities between these constructs, there can be some differences in their component skills. For instance, executive function composites usually include measures of working memory. Although working memory may be needed to accomplish many effortful control tasks, it is not considered to be a core component of effortful control (Zhou, Chen, & Main, 2011).

Effortful control emerges during the first year of life and develops rapidly during early childhood (Rueda et al., 2005) suggesting that early childhood may constitute a period of heightened susceptibility to environmental influences. In fact, SES is associated with effortful control in preschool-age children (Evans & English, 2002; Li-Grining, 2007; Mezzacappa, 2004; Noble, Norman, & Farah, 2005; Rhoades, Greenberg, Lanza, & Blair, 2011). For example, poverty, single parenthood, and living in an unsafe neighborhood were associated with poorer performance on delay of gratification and inhibition tasks (Li-Grining, 2007). Parenting and home environment quality are also associated with effortful control development (Bernier, Carlson, & Whipple, 2010; Kochanska et al., 2000; Lengua et al., 2007). For instance, parental limit-setting and scaffolding predicted changes in preschool-age children's effortful control over a 6-month period (Lengua et al., 2007).

The association between effortful control and preacademic knowledge

Effortful control is found to be related to the acquisition of early literacy and math skills (Blair & Razza, 2007; Espy et al., 2004; McClelland et al., 2007; Welsh, Nix, Blair, Bierman, & Nelson, 2010; Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011). For example, inhibitory control was positively associated with math knowledge after accounting for child IQ, age, and maternal education in a preschool-age sample (Espy et al., 2004). In addition, a classroom-based intervention targeting preschoolers' self-regulation led to improved school readiness outcomes (Raver et al., 2011). Effortful control may relate to preacademic competence because skills such as focusing and shifting attention and inhibiting impulsive behavioral responses may influence children's engagement with teachers and approaches to learning (Li-Grining, Votruba-Drzal, Maldonado-Carreño, & Haas, 2010). That is, children high in effortful control are likely to demonstrate adaptive behavioral regulation, planning, persistence, attention, flexibility, and organization during learning activities. In addition, effortful control may support the regulation of emotional reactivity (e.g., frustration, fearfulness) such that children experiencing these emotions may persist in challenging activities and engage with teachers. Effortful control skills may be particularly important early in development as children must rely on them to encode the correct foundational literacy and math knowledge into long-term memory to be retrieved automatically in future learning tasks (Wass, Scerif, & Johnson, 2012).

Several studies have examined self-regulatory skills as mediators of the associations of SES and home environment quality with preacademic skills. Broadly speaking, these studies generally found support for mediation by self-regulatory skills (Dilworth-Bart, 2012; NICHD ECCRN, 2003; Razza, Martin, & Brooks-Gunn, 2010; Swanson, Valiente, & Lemery-Chalfant, 2012). For example, preschoolers' concurrent and kindergarten self-regulation mediated the relation between preschoolers' home risks and first grade academic achievement (Sektnan, McClelland, Acock, & Morrison, 2010).

Despite their similarity to the current study, these prior studies differ from this study in several important ways. First, these studies all focused on older preschoolers, kindergarteners, or school-aged children (e.g., Swanson et al., 2012). Second, previous research was conducted in higher SES or nationally representative samples (e.g., NICHD ECCRN, 2003; Sektnan et al., 2010) and therefore generalizability to lower SES populations is questionable, especially given differences in these