

Touch your toes! Developing a direct measure of behavioral regulation in early childhood

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Abstract

Behavioral aspects of self-regulation, including controlling and directing actions, paying attention, and remembering instructions, are critical for successful functioning in preschool and elementary school. In recent years, several direct assessments of these skills have appeared, but few studies provide complete psychometric data and many are not easy to administer. We developed a direct measure of children's behavioral regulation, the Head-to-Toes Task, and report performance of participants aged 36–78 months, including a group of Spanish-speaking children, from two different sites ($N = 353$; $N = 92$). We examined construct validity, examiner reliability, sources of variation, and associations between task scores and background characteristics. Results showed that the task was valid, reliable, and demonstrated variability in children's scores. A cross-classified hierarchical growth curve analysis indicated that girls, participants assessed in English, and higher-socioeconomic status (SES) children achieved slightly higher average scores than did boys, Spanish-speaking and lower-SES children, but effect sizes were small. Older participants achieved higher scores than did younger children, and there were no effects for site. Results suggest that the Head-to-Toes Task is an informative and easy-to-administer direct assessment of children's behavioral regulation. We discuss implications for its use in early childhood settings.

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Young children's academic and social success depends on a variety of skills, including emergent literacy and basic knowledge of math and vocabulary (Miller, Kelly, Zhou, & Campbell, 2005; Whitehurst & Lonigan, 2001). Beyond early academic competence, the ability to regulate behavior also signifies whether or not children will prosper in school. *Self-regulation* describes a broad construct representing the skills involved in controlling, directing, and planning emotions, cognitions, and behavior, and is important for functioning in varied contexts, including classrooms (Baumeister & Vohs, 2004; Shonkoff & Phillips, 2000).

In early educational settings, strong self-regulation has been linked with effective classroom behavior and high achievement, whereas poor self-regulation forecasts future problems in school (Blair, 2002; Bronson, 2000; Fabes,

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Martin, Hanish, Anders, & Madden-Derdich, 2003b; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003a; Shonkoff & Phillips, 2000). Furthermore, teachers report that many children enter formal schooling without adequate levels of these vital skills. Reports reveal substantial numbers of young students, ranging from 15 to 50% in two different studies, have trouble paying attention to and remembering instructions, converting automatic behaviors into controlled responses (such as raising their hand before participating and taking turns), completing tasks independently, and transitioning between tasks (McClelland, Morrison, & Holmes, 2000; Rimm-Kaufman, Pianta, & Cox, 2000). These basic competencies lay a foundation for individual learning and also contribute to overall classroom functioning, because one or two children with poor regulation can derail a teacher's plans for the entire class.

In recent years, a variety of conceptualizations of self-regulation have been established in a steadily emerging area of inquiry, including executive function, executive control, learning-related skills, emotion regulation, and behavioral regulation (Eisenberg & Spinrad, 2004; Howse et al., 2003a; McClelland & Morrison, 2003; Pintrich, 2000; Rueda et al., 2004). Research on self-regulation during early childhood shows that neurological, linguistic, and motor functions develop to enable independent and deliberate actions (Epsy, Kaufmann, Glisky, & McDiarmid, 2001; Shonkoff & Phillips, 2000). In this study, we focus on “cool” or cognitively mediated *behavioral regulation* skills, which are refined during early childhood and contrast with “hot” or affectively mediated regulation skills (i.e., delay of gratification, controlling aggression). Emotion regulation skills also play a role in children's early school success but are not presently highlighted (Hongwanishkul, Happaney, Lee, & Zelazo, 2005; Mischel, Shoda, & Rodriguez, 1989; Zelazo, Müller, & Goswami, 2002).

Behavioral regulation includes inhibitory control, attention, and working memory. Together and separately, these three skills predict achievement and broader measures of functioning in early learning environments (McClelland, Cameron, Wanless, & Murray, 2007). They are also primarily implicated in executive function and relate to success in school settings (Blair, 2002; Bronson, 2000). *Attention* includes focusing, sustaining, and shifting attention (Barkley, 1994; Rueda, Posner, & Rothbart, 2005). In one study, children who could exercise sustained attention had higher academic achievement than their peers (Howse, Lange, Farran, & Boyles, 2003b). *Working memory*, or holding information in mind while processing new information, is also important for academic success (Adams, Bourke, & Willis, 1999). In addition, there is evidence that *inhibitory control*, or deliberately stopping an automatic response to exhibit another behavior, is the main regulatory deficit in Attention Deficit Hyperactivity Disorder (ADHD; Thorell & Wahlstedt, 2006). Lack of inhibition often impairs social and academic efficacy (Barkley, 2004; Blair, 2003).

Reliable and valid assessments of behavioral regulation are vital for early childhood researchers and the practitioners who work to ensure the well-being of every child as they transition to formal school settings, which pose ever increasing attentional and behavioral demands (Entwisle & Alexander, 1998; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). The aim of this study was to create an easy-to-administer behavioral regulation task, which assessed behaviors similar to those required in classroom settings. We developed the Head-to-Toes Task, a direct measure adapted from the “Head and Feet” task described by McCabe, Cunningham, and Brooks-Gunn (2004a). The Head-to-Toes Task taps behavioral regulation, which includes inhibitory control, attention, and working memory, and contributes to children's ability to control and change their own behavior. We examined task reliability and validity, as well as longitudinal data, background correlates, and teacher reports of behavior for 445 children (30% ethnic minority) from two sites, including a group of Spanish-speaking children assessed in Spanish.

1. Direct measures of behavioral regulation

Traditional assessments of behavioral regulation have often utilized caregiver reports (Howse et al., 2003a; McClelland et al., 2000; Schultz, Izard, Ackerman, & Youngstrom, 2001). Increasingly common are direct observational measures, which demonstrate construct validity and predict social and academic outcomes without the potential for observer bias (Diamond, Kirkham, & Amso, 2002; Gathercole & Pickering, 2000; Hongwanishkul et al., 2005; Kochanska, Coy, & Murray, 2001; Manly et al., 2001; McCabe, Hernandez, Lara, & Brooks-Gunn, 2000; McCabe, Rebello-Britto, Hernandez, & Brooks-Gunn, 2004b; Pickering & Gathercole, 2004; Welsh, Pennington, & Groisser, 1991). Nevertheless, a review of existing observational instruments revealed a number of shortcomings because many tasks were designed for use in the laboratory or with clinical populations (Fahie & Symons, 2003; Pickering & Gathercole, 2004).

Table 1 displays thirteen commonly used direct assessments of aspects of behavioral regulation (see also Carlson, 2005, for a discussion of additional measures). All measures except Luria's Handgame require specialized materials

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