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"No-o-o-o Peeking": Preschoolers' Executive Control, Social Competence, and Classroom Adjustment

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Abstract

The goals of this study were to evaluate (1) how specific aspects of executive control, briefly assessed, predict social competence and classroom adjustment during preschool; and (2) differences between two aspects of executive control, according to child's age, socioeconomic risk status, and gender. The facets of executive control were defined as cool executive control (CEC; affectively neutral, slow acting, and late developing) and hot executive control (HEC; more emotional, fast acting, and early developing). Two hundred eighty-seven 3- to 5-year-old children from private child care and Head Start centers were directly assessed during executive control tasks, and preschool teachers provided information on their school success. Aspects of executive control varied with age, socioeconomic risk, and gender. Specifically, older children performed better on CEC tasks across three age levels; for HEC tasks, change was seen only between 3-year-olds and 4-year-olds. Children of mothers with less formal education performed less well on CEC than those whose mothers had more education; girls performed better than boys on HEC tasks. Further, facets of executive control were differentially related to later social competence and classroom adjustment. HEC predicted social competence, whereas CEC uniquely predicted classroom adjustment. Implications for everyday practice and specific curricula formulation are discussed.

Keywords

executive control; social competence; classroom adjustment

Young children's school readiness is defined as mastery of certain basic skills or abilities, including literacy, numeracy, and social skills, which help ensure success in school (Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006). According to kindergarten teachers, executive control is a crucially needed readiness skill (Rimm-Kaufmann, Pianta, & Cox, 2000). Specifically, a growing body of work emphasizes the impact of children's executive control on both social adjustment and academic success, including social competence (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Blair, Granger, & Razza, 2005; Raver et al., 2011), as well as classroom adjustment (e.g., early learning behaviors and attitudes toward learning), mathematics ability, and literacy (Bierman et al., 2008; Blair &

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Razza, 2007; Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Ponitz, McClelland, Matthews & Morrison, 2009; Pritchard & Woodward, 2011; Sesma, Mahone, Levine, Eason, & Cutting, 2009; Welsh, Nix, Blair, Bierman, & Nelson, 2010).

In this study, using a short direct assessment tool, we focus upon the contributions of two aspects of executive control to preschoolers' social competence and classroom adjustment. These outcomes highlight the child's success in the new preschool environment with teachers and peers alike, accompanied by crucial learning-related attitudes and behaviors that allow them to become immersed in the many new tasks put before them. Hence, *social competence* can be defined as skills associated with successful interactions with peers and teachers, such as cooperating, taking into account others' feelings, refraining from either aggression directed at, or withdrawal from, one's peers. *Classroom adjustment* can be defined as young children's behaviors and attitudes associated with learning in the classroom environment, such as positive attitudes about school, the ability to participate cooperatively in classroom activities, and the ability to engage in self-directed activities (Ladd, Birch, & Buhs, 1999).

These two sets of abilities go hand-in-hand—without either, experiences in the early years of schooling are apt to be less positive. The classroom is a very social place, and social competence undergirds classroom adjustment. A socially competent child may be able to pay more attention to academic tasks, plan better, and devote more resources to learning than a less socially competent one, *because* they can benefit more from teachers' instructions, giving and getting academic information from peers, sharing academic resources with peers, and modeling peers' learning skills (Ladd, Buhs, & Seid, 2000). Moreover, children who demonstrate classroom adjustment are more accepted by classmates and teachers, and are given more instruction and positive feedback by teachers (Birch & Ladd, 1997; Ladd et al., 1999; Ladd, Kochenderfer, & Coleman, 1997). Thus, we view both *social competence* and *classroom adjustment* as crucial, and related, outcomes for a successful introduction to schooling.

Definition and Structure of Executive Control

Cognitive and affective/motivational processes that modulate attention, emotion, and behavior to a given situation/stimulus, for the purpose of pursuing a goal and supported by prefrontal and other cortical involvement, are implicated in what is termed *executive control* (as opposed to the broader and often ill- or multiply-defined construct, *self-regulation*) (EC; Calkins & Howse, 2004; Posner & Rothbart, 2007). Such modulation of attention, emotion, and behavior should contribute to successful social competence and classroom adjustment.

Recent advances in both developmental psychobiological theorizing and research, as well as neuroimaging, suggest that two types of EC are distinguishable, both neurally and behaviorally, and that such distinctions can be important both theoretically and practically (Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011; Zelazo & Müller, 2002). Thus, EC may be seen as including cool executive control (CEC; more affectively neutral, slow acting, and late developing) and hot executive control (HEC; more reflexive, fast acting, early developing, and under stimulus control; Willoughby et al., 2011). Although because of its responsibility for higher-order cognitive processes, such as working memory, focusing and shifting attention, and inhibiting prepotent behaviors while activating alternative, subdominant responses, the prefrontal cortex (PFC) plays a central role in both CEC and HEC, there are distinguishing neural structures involving each type of EC (Bernier, Carlson, & Whipple, 2010; Garon, Bryson, & Smith, 2008).

CEC, in which the dorsolateral prefrontal cortex (DL-PFC) plays a special role (Best & Miller, 2010; Garon et al., 2008), encompasses a wide array of increasingly organized, flexible, goal-directed cognitive processes in response to relatively non-affective and novel situations, as well as complex cognitive tasks (Diamond, 2006). School tasks mandate that children use CEC abilities to purposefully shift or focus their attention, and thus flexibly respond to conflicting stimuli (Blair et al., 2005). Hence, CEC skills have been found to predict early literacy skills (McClelland et al., 2007; Willoughby et al., 2011), and mediate the intervention effects of research-based curricula (Bierman et al., 2008). Preschoolers with good CEC may be better adjusted in the classroom; for example, they can pay attention to and remember teachers' instructions and directions, and also restrain themselves when necessary (e.g., sitting still, waiting in line when they would like to move around). In terms of social competence, they may be able to shift attention to others' feelings, and suppress prepotent responses in order to be more cooperative.

Young children also need to demonstrate EC that requires more affective and motivational processes (e.g., not touching a toy that belongs to someone else)—in other words, HEC. Guided by both emotional information from the limbic system and orbitofrontal cortical *braking*, as well as the PFC (Calkins & Marcovitch, 2010; Lewis & Todd, 2007; Willoughby et al., 2011), HEC enables children to, for example, regulate their anger and approach systems and purposefully deploy attention during emotional arousal (Rothbart & Bates, 1998). Preschoolers better able to control their impulses and balance their own self-defined needs with societal norms are ready to be motivated and engaged in schooling (Blair & Razza, 2007; Rothbart & Jones, 1998); for example, in terms of social competence, they can refrain from hitting when they are provoked, or, in terms of classroom adjustment, delay the gratification of biting into their snack until everyone is served. It is important to consider both subtypes of EC because of their somewhat varying source and functions, but much overlap would be expected between them.

EC and Child Characteristics

Moving from definitional issues and relations with social competence and classroom adjustment, it is important to consider individual differences due to age, socioeconomic risk, or gender. Researchers have found age-related differences on EC tasks (e.g., Carlson, 2005; Carlson & Moses, 2001; Diamond, Carlson, & Beck, 2005; Jones, Rothbart, & Posner, 2003; Li-Grining, 2007), probably because so many of the processes involved (e.g., inhibitory control, working memory, and attention) show dramatic development between ages of 3 to 5 years (Jones et al., 2003; Welsh et al., 2010). Knowledge of age differences in EC can have not only important measurement and developmental considerations (e.g., what tasks are appropriate for ages across the preschool range?), but also important applications, such as appropriate expectations for preschoolers' EC.

In terms of SES-related risk, children growing up in poverty may experience stressful life events, low levels of social support, and limited opportunities for scaffolded exploration of their social and physical environments, resulting in potential developmental delays in EC (Bierman et al., 2008). Dilworth-Bart (2012) has further suggested that home disorganization, chaos, housing disruption, noise (i.e., major stressors), and lack of environmental/familial resources from which to benefit, are attributes of lower SES that make development of EC difficult for children. Ponitz et al. (2009) found that children from higher-SES families achieved higher self-regulation scores than children from lower-SES families. Pinpointing differences in the development of age-appropriate EC in children varying in SES can translate into foci for preschool programming; in other words, children living in poverty can benefit from a focus on EC (Raver et al., 2011).

Regarding gender, differences between girls and boys on EC could shed light on the achievement gap between the genders (Matthews, Ponitz, & Morrison, 2009). Gender differences are not always found; in fact, Matthews et al. note that researchers have not often focused on such potential differences. However, when such differences have been tested, results favoring girls have been seen on both CEC tasks (Carlson & Moses, 2001) and HEC tasks (Clark, Sheffield, Wiebe, & Espy, 2013; Eisenberg et al., 2010; Li-Grining, 2007). Ponitz et al. (2009) also found that girls achieved slightly higher behavioral self-regulation scores than boys. These gender differences may emerge on several different measures of EC, as early as 2 ½ years of age (Eisenberg et al., 2010), with this gap remaining wide until the spring of kindergarten (Matthews et al., 2009). Importantly, Matthews et al. also found that this gender difference was particularly true for boys whose initial performance was the lowest. Discerning gender differences could help early childhood educators in targeting programming to those most in need, who are often boys. Finally, as already noted, preschoolers' EC is increasingly being found to relate to various indices of school readiness, including social competence and classroom adjustment.

The Current Study

The Preschool Self-Regulation Assessment (PSRA; Smith-Donald, Raver, Hayes, & Richardson, 2007) is a direct assessment of aspects of EC. This measure has been shortened based on recent research; in Authors (2012b), six PSRA tasks were examined for ceiling effects at 35–65 months. In that research, with four remaining tasks showing no ceiling effects, confirmatory factor analyses showed two components at each of two longitudinal time points—CEC and HEC. Four-year-olds, children of higher socioeconomic status, and girls outperformed 3-year-olds, those at socioeconomic risk, and boys. Children, especially girls, scored higher on HEC. Finally, aspects of EC differentially predicted teacher-reports of school readiness at both times of assessment, with age, socioeconomic risk status, and gender controlled.

The current study's general aims are to corroborate and extend this previous work with a new cohort of preschoolers, and to further refine the PSRA for applied usage by shortening it even further. Two of the PSRA tasks that showed no ceiling effects, one for CEC and one for HEC, were selected and administered across a broader age range than in the previous work, to: (1) evaluate differences in CEC and HEC according to child characteristics (age, socioeconomic risk status, and gender); and (2) describe associations of PSRA components with teachers' reports on children's social competence and classroom adjustment, after holding child characteristics constant. Based on the nature of CEC and HEC, and on earlier work, we expected that CEC would be more highly associated with classroom adjustment than HEC, with the converse true for social competence. We expected that older children, those in higher SES families, and girls would show higher scores on indices of EC. Results commensurate with earlier work but with a shortened measure could have important applications; for example, early childhood educators could make use of these tasks in evaluating young children's EC for ongoing assessment and programming decisions.

Method

Participants

The present study was part of a larger longitudinal study focused on creating a portable assessment battery of preschoolers' social-emotional competence related to school readiness (Authors, 2005). Participants were preschoolers enrolled in Head Start and private child care centers, who varied in terms of race, ethnicity, and income, in the greater Northern Virginia area. The 287 participating children (183 in private child care, 104 attending Head Start) included, at the study's inception, 64 3-year-olds: M = 42.3 mos, SD = 3.2; 138 4-year-olds: M = 54.0 mos, SD = 3.4; and 85 5-year-olds: M = 62.6 mos, SD = 1.8). Approximately 50% of the participants were male, with a majority of children identified by their parent as either Caucasian or African American (of the 92% of parents reporting, 58% self-reported as Caucasian, 32.2% as African-American, 7.6% as multi-racial, 1.1% as Asian, and 1.2% as other). Fifteen percent of parents self-reported as Hispanic/Latino. Approximately half of the mothers had attained high school graduation or less. The ordinal value for level of maternal education was used as a proxy for socioeconomic risk status in regression analyses to follow (Desai & Alva, 1998); for the group comparisons, a dichotomous variable for mothers' education was created in which low equaled high school diploma or less, and high equaled associates' degree or higher).

Procedures

Our research design was a short-term longitudinal, correlational study. Parents reported on demographics in the late fall to early winter. Assessments of EC were conducted from late winter to spring, in quiet areas of centers. Teacher measures were collected at the end of the academic year. For each participating child in their classroom, these teachers were paid $20 in compensation for their time in the completion of the questionnaires. Children received stickers after completion of their task.

Measures

EC: PSRA (Smith-Donald et al., 2007)—Two PSRA tasks (Pencil Tap and Toy Peek) were used to capture strengths and weaknesses in preschoolers' EC. Authors (2012a, 2012b) showed concurrent and predictive validity for four to seven of the original PSRA tasks; to further this inquiry and in keeping with study goals, two tasks from Authors (2012b) were chosen due to lack of ceiling effects and high standardized factor loadings in confirmatory factor analyses. The Pencil Tap task was included as a measure of CEC, and the Toy Peek task was included as a measure of HEC. The tasks were administered by trained and certified research assistants who live-coded performance levels or latencies, as appropriate, for each task. For the Pencil Tap task, the child was asked to tap an unsharpened pencil, once after the assessor tapped twice, and twice after the assessor tapped once; scores equaled the percentage of correct trials over a total of 16 trials. For the Toy Peek task, the child was asked not to peek for one minute while the assessor wrapped a toy in tissue paper and a gift bag; scores equaled latency in seconds to the first peek up to the maximum of 60 seconds.

Inter-assessor reliability via intra-class correlations equaled .95 for Pencil Tap, and .79 for Toy Peek, *p*s < .001. As for internal consistency of scales for each task, Cronbach's alpha across 16 trials for Pencil Tap was .79; for Toy Peek, across scores for presence of peeking, number of peeks, and time to peeking, Cronbach's alpha equaled .96. Scores used in analyses were the percentage of correct pencil taps across trials, and latency to peeking (up to 60 sec allotted time).

Social Competence: Social Competence and Behavior Evaluation (SCBE-30; LaFreniere & Dumas, 1996)—Social competence can be defined as skills associated with successful interactions with peers and teachers—cooperating, taking into account others' feelings, refraining from either aggression directed at, or withdrawal from, one's peers. The SCBE-30 taps these dimensions of children's behavior; teachers rated children's social competence and behavior on 30 items using a 1 – 5 point scale. Ten-item scales included Angry/Aggressive (e.g., "easily frustrated"), Sensitive/Cooperative (e.g., "comforts or assists children in difficulty"), and Anxious/Withdrawn (e.g., "avoids new situations"). Internal consistency was good for the scales in our data (α = .91, .82, and .81, respectively). Validity has been previously shown with normative, clinical, and cross-cultural samples (Denham et al., 2003; LaFreniere & Dumas, 1996). For this study, scales were correlated (mean r (281) = .39, $p < .001$); an aggregate of z-scores for each scale (with Angry/Aggressive and Anxious/Withdrawn reversed) was created, α = .66.

Classroom Adjustment: Preschool Learning Behaviors Scale (PLBS; McDermott, Leigh, & Perry, 2002)—*Classroom adjustment* can be defined as young children's behaviors and attitudes associated with learning in the classroom environment, such as positive attitudes about school, the ability to participate cooperatively in classroom activities, and the ability to engage in self-directed activities (Ladd et al., 1999). The PLBS is a 29-item measure that taps aspects of classroom adjustment; teachers rate children's approaches to learning (Fantuzzo, Perry, & McDermott, 2004; McDermott et al., 2002). Internal consistency reliability for the three subscales was good in these data: Competence Motivation (11 items, e.g., reluctant to tackle a new activity; α = .87), Attention/Persistence (nine items, e.g., tries hard, but concentration soon fades and performance deteriorates; α = .88), and Attitudes Toward Learning (seven items, e.g., does not achieve anything constructive when in a sulky mood; α = .78). Multi-method, multi-source analyses have validated the PLBS for use with this study's population (Fantuzzo et al., 2004).

Classroom Adjustment: Teacher Rating Scale of School Adjustment (TRSSA; Ladd et al., 1997)—Classroom adjustment was assessed using the TRSSA. The TRSSA includes 52-items rated on a 3-point scale, across four scales: School Liking, Cooperative

Participation, Self-Directiveness, and Comfort with Teacher. Adequate reliability was found in this study for School Liking (five items, e.g., “likes going to school”; $\alpha = .75$), Cooperative Participation (eight items, e.g., “follows teacher’s directions”; $\alpha = .91$), Self-Directiveness (nine items, e.g., “works independently”; $\alpha = .87$), and Comfort with Teacher (five items, e.g., “initiates conversations with the teacher”; $\alpha = .70$). The TRSSA has been found to be valid across social economic status and ethnicity (Ladd et al., 1997). For this study’s classroom adjustment score, a summed aggregate of *z*-scores for each PLBS and TRSSA scale was created, $\alpha = .88$; average r (279) = .52, $p < .001$.

Results

The first goal of this study was to examine differences in both CEC and HEC due to age (measured cross-sectionally), socioeconomic risk status, and gender. To meet this goal, a 3 (Age: 3-year-old, 4-year-old, 5-year-old) × 2 (SES: low maternal education versus high maternal education) × 2 (Gender: boy, girl) MANOVA was run using CEC and HEC as dependent variables. Results of this analysis can be seen in Table 1. Older children showed more EC; follow-up one-way ANOVAs showed that age differences were significant for both CEC and HEC, *F*s (2, 273) = 48.26 and 20.638, respectively, *p*s < .001. Bonferroni multiple comparisons for age differences in CEC showed a linear progression, with groups scoring higher as age increased. Similar comparisons for age differences in HEC showed only differences between 3-year-olds and both other age groups. SES differences favoring children less at risk were found only for CEC, F (1, 273) = 18.90, *p*s < .001, and gender differences favoring girls were significant only for HEC, F (1, 273) = 7.63.

The second goal of the study was to assess CEC’s and HEC’s contributions to variance in later indicators of teacher-rated social competence and classroom adjustment. Regression analyses were used to address this goal, with age, maternal education, and gender entered in the first block of each equation, and CEC and HEC entered in the second block. As can be seen in Table 2, after controlling for significant contributions of age, maternal education, and gender, HEC contributed to a significant increment in variance explained for social competence. For classroom adjustment, after controlling for significant contributions of age and gender, CEC marginally contributed, and HEC significantly contributed, to increments in variance explained.

To consider whether EC explained a significant increment of variance in classroom adjustment over and above social competence, a third regression equation was calculated, with social competence entered in the first block along with the child characteristic variables. Given the significant contribution of social competence to classroom adjustment (r (285) = .62, $\beta = .576$, $p < .001$), the β for HEC became nonsignificant, and that for CEC became significant, $\beta = .129$, $p < .05$.

Discussion

The study’s first goal was to evaluate differences in CEC and HEC according to child characteristics (i.e., age, socioeconomic risk status, and gender), for 3- to 5-year-old children in Head Start and private child care centers. Next, contributions that both CEC and HEC made to social competence and classroom adjustment were examined, after holding child characteristics constant. Findings corroborated and extended our earlier work (Authors, 2012b) with a new cohort of preschoolers, and a much-shortened PSRA (two subtests instead of the original six).

Child Characteristics and EC

Age—Age differences in both CEC and HEC were found, as would be expected given earlier findings, including our own (Authors, 2012b). In that earlier research, however, only 3- and 4-year-olds were included, and age differences were found for both CEC and HEC. For this cohort, which included 5-year-olds, the age change was continuous between each age level for CEC; in contrast, change was seen only between 3-year-olds and 4-year-olds for HEC.

These differing results suggest that motivational/emotional aspects of EC, which predominate in HEC, may mature before the more exclusively frontally involved CEC abilities. Although others have also shown age change across this span for CEC-type tasks (Carlson, 2005; Jones et al., 2003; Welsh et al., 2010), checking others' findings on the trajectory of HEC age change is difficult, because studies less often include this aspect of EC. When HEC tasks are included, often only 3- and 4-year-olds are tested, or it is difficult to tease apart relative CEC/HEC age differences on a multiplicity of tasks (e.g., Espy, Kaufmann, Glisky, & McDiarmid, 2001). However, current results do stand in contrast to those of Carlson (2005), who found increases in HEC, using the same task, through age 5. Future research targeting the difference found here could be useful, especially because our age data are cross-sectional. Given that many child care and preschool programs still separate children into age-graded groups, knowing what to expect of these groups is necessary in applied settings. For example, it would be useful to know that 3-year-olds would probably not be as successful at waiting during transitions as their older counterparts; teachers could modify practice accordingly, employing supportive methods to assist 3-year-olds to respond to such demands.

Socioeconomic Risk—Children of mothers with less formal education performed less well on the CEC task in this study. Similar correlational results were found by Blair et al. (2011) and others previously reviewed (e.g., Bierman et al., 2008; Dilworth-Bart, 2012). As part of a latent variable for risk, maternal education marginally predicted CEC even when cortisol, parenting, and IQ were included in the structural model (Blair et al., 2011). It is clear that children at risk for living in poverty are likely to need support in developing CEC; living in chaos and stress is likely to limit aspects of brain development that underlies the emergence of EC. This need should be acknowledged in practice and policy; for example, programming like that reported on by Raver et al. (2011), including use of clear rules, rewards for positive behavior, and redirection of negative behavior, should be implemented to support the development of EC among children from low-income households.

Gender—Earlier research (e.g., Carlson & Moses, 2001; Clark et al., 2013; Eisenberg et al., 2010; Li-Grining, 2007) has found gender differences on both CEC and HEC, but a number of other reports have not (e.g., some, such as Wiebe, Espy, & Charak, 2008, have examined only CEC), and differences only on HEC were found here. These findings bear replication, but it could be that girls are socialized such that they have more practice, via socializers' expectations, in the motivational-emotional aspects of HEC (e.g., adults may communicate expectations to girls that they can and should be able to wait and delay gratification; Raffaelli, Crockett, & Shen, 2005). Furthermore, these differences could also be impacted by differential maturation and temperamental reactivity. Regardless of the etiology, it appears that boys could benefit from experiences that allow them to develop these skills. For example, increases in HEC might result in lessened aggression and negativity, which are typically seen more often in boys (Raffaelli et al., 2005).

Predicting Social Competence and Classroom Adjustment

The next goal of the study was to see whether CEC and HEC predicted preschoolers' social competence and classroom adjustment. HEC predicted social competence, which may not be surprising given the myriad ways in which being able to delay gratification could bolster one's abilities to get along with others—cooperating, taking into account others' feelings, and refraining from either aggression directed at, or withdrawal from, one's peers. Waiting for a turn and choosing a nonaggressive solution to a problem, for example, require such skill.

As already noted, classroom adjustment works together with social competence. Analyses parsing the influence of EC on social competence and classroom adjustment were attempted here. We found that although classroom adjustment was predicted by both HEC and CEC (marginally) in initial analyses, subsequent analyses that included social competence in the prediction of classroom adjustment showed that CEC, rather than HEC, was the unique predictor of "social competence-free" classroom adjustment. This study joins many others in demonstrating that CEC predicts aspects of school success; in contrast with earlier work (e.g., Ponitz et al., 2009), however, criterion measures here were *softer*, but equally important, indicators of school success.

Conclusions and Implications for Early Childhood Education

In summary, this study uncovered important findings on aspects of preschoolers' EC using a much-shortened version of the PSRA, which could be potentially useful for early childhood educators as part of an assessment battery measuring aspects of preschoolers' social-emotional school readiness. Aspects of EC varied with age, socioeconomic risk, and gender. Moreover, they were differentially related to later social competence and classroom adjustment.

Thus, the current emphasis on EC as a precursor to such success is warranted in research, policy, and practice, and should be informed by the important within- and between-child characteristics emphasized here. These conclusions must be fleshed out in a number of ways.

First, if EC (i.e., cognitive flexibility in divided and sustained attention, working memory, inhibition of behaviors when required, and emotion regulation) is such an important contributor to early school success, effective general frameworks for classroom practice are required. Regarding such frameworks for practice, clear expectations and limit-setting, paired with allowance of autonomy and supportiveness from adults, promote the emergence of EC. A classroom where there is warm support and a predictable order to the day provides a sturdy foundation for the development of EC (Bierman et al., 2008; Diamond & Lee, 2011). Children are more likely to advance in environments where they are aided by caring adults in both following rules and doing things for themselves.

The scaffolding involved in such developmentally appropriate practices supports children's use of their focused attention and careful behavioral responding. For example, imagine a classroom where children are shown how to put on their own coats, given opportunities to try, fail, keep trying, and work out the correct techniques to get dressed appropriately for outdoor winter play. These children are utilizing focused attention, controlling competing responses and emotional meltdowns, and gaining EC.

Further, encouraging children to verbally label the means of EC appears helpful (Kray & Ferdinand, 2013). For example, repeating a rule to a game using self-talk can help a child focus on and remember it. Teachers' verbal redirection techniques (e.g., "talk like a butterfly" when quiet voices are desired) are also useful, as are physical props like holding a ball when it is your turn to speak (i.e., when you do not have the ball, it is not your turn).

Next, practicing tasks requiring EC, with progressive increases in difficulty, is important (Diamond & Lee, 2011; Kray & Ferdinand, 2013). For example, children can take turns holding a real egg when enacting the story of Humpty Dumpty, play games like "Simon Says," or solve increasingly difficult puzzles. Repeating activities that require one or more elements of EC allow children to move through successive approximations of more and more mature levels of EC.

Second, intervention programming can allow classroom teachers to promote EC in a more intentional, organized fashion. Diamond and Lee (2011) discussed attributes of successful interventions to promote EC, and noted that diverse activities have proven useful. Working with computer games has shown significant but somewhat circumscribed effects so far (Thorell, Lindqvist, Bergman Nutley, Bohlin, & Klingberg, 2009). In terms of noncomputerized games, Röthlisberger, Neuenschwander, Cimeli, Michel, and Roebers (2012) demonstrated gains in elements of preschoolers' and kindergartners' EC via the use of a game-centered curriculum involving mostly small groups of children, playing games such as assembling puzzles using shapes to match a picture, scanning pictures for missing objects, and dimensional card sorting. In addition, exercise programs, especially cognitively engaging ones (i.e., those that require children to create, monitor, and modify a cognitive plan to meet task demands) also show promise (Best, 2010). Even introducing early childhood versions of yoga and mindfulness are theoretically appealing (Zelazo & Lyons, 2012). However, Diamond and Lee (2011) point out that it may be as useful or even *more* useful, in tandem with helpful classroom practices and use of verbal and other scaffolding, to focus less narrowly on activities of EC than on broader emotional and social development (as did Bierman et al., 2008), or on physical development.

Third, it should be reiterated that the current results enjoin early childhood teachers to keep several child characteristics in mind when considering their support of ongoing executive control development. First, expectations should be tailored to the child's age; for both CEC and HEC, younger children are less capable, as are boys and children from lower SES households. These children, in particular, and any who are less capable at CEC and HEC, deserve particular attention. Children with worse executive functions may benefit most from the practices and activities listed here (Matthews et al., 2009); thus, early training may help to avert later difficulties.

Fourth and finally, along with the suggestions already put forward, teachers could use the simple PSRA tasks utilized here in ongoing assessment of children's performance to understand the children's current functioning and forecast its impact on broader classroom adjustment. In summary, although continued effectiveness and efficacy research needs to be performed, EC deserves continued attention in classrooms, in terms of everyday practice, general and specific curricula, individual child characteristics, and assessment.

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Table 1

Age, Gender, and Maternal Education Comparisons for HEC and CEC

	Gender		Age			Maternal Education	
	F (2, 272) = 4.08** **Partial η^2 = .029**		**F (4, 544) = 22.70***** **Partial η^2 = .143**			**F (2, 272) = 10.24***** **Partial η^2 = .070**	
	Boys	**Girls**	**3-yr**	**4-yr**	**5-yr**	**High School or Less**	**Associate Degree or More**
CEC	52.41 (2.57)	57.83 (2.64)	28.14 (3.73)	61.32 (2.49)	75.90 (3.23)	47.12 (2.69)	63.13 (2.51)
HEC	38.64 (1.83)	45.98 (1.88)	29.50 (2.66)	46.08 (1.77)	51.36 (2.30)	42.08 (1.92)	42.54 (1.79)

Notes: *Fs* evaluated by Pillai's Trace. Standard errors in parentheses.

* $p \leq .05$,

** $p \leq .01$,

*** $p \leq .001$.

Table 2

Prediction of Social Competence and Classroom Adjustment, Given Age, Maternal Education, and Gender

	Social Competence				Classroom Adjustment			
	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Block 1				$.162^{***}$				$.122^{***}$
Age	.021	.005	$.217^{***}$		.012	.004	$.173^{**}$	
Maternal Education	−.095	.033	$-.157^{**}$		−.033	.025	−.076	
Gender	.420	. 082	$.280^{***}$		.312	.061	$.285^{***}$	
Block 2				$.019^{*}$				$.036^{**}$
CEC	.000	.002	−.019		.002	.001	$.118^{+}$	
HEC	.005	.002	$.156^{*}$		.004	.002	$.149^{**}$	

$^{+}p < .10$.

$^{*}p < .05$.

$^{**}p < .01$.

$^{***}p < .001$.