The Pennsylvania State University

The Graduate School

College of Education

EFFECTS OF ENVIRONMENTAL, MATERNAL, AND CHILD FACTORS ON PRESCHOOLERS' EMOTION REGULATION DURING A FRUSTRATING TASK

A Dissertation in

School Psychology

by

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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

December 2013

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ABSTRACT

The experience of multiple risk factors during childhood negatively influences academic, behavioral, and socioemotional development. Executive functioning (EF), specifically in the form of emotion regulation (ER), is an important determinant of childhood outcomes and later functioning across developmental domains. Adaptive ER strategy use during the Transparent Box task was examined for a sample of 108 preschoolers ($n_{maltreatment}$ = 62; $n_{comparison}$ = 46). Based on exploratory factor analysis (EFA) results, an adaptive ER composite was created to include proportion scores for goal-directed and inverse proportion scores for distraction and self-soothing strategies exhibited during the Transparent Box task. When controlling for child gender, age, and gestational age and including group status as an environmental predictor, findings from multiple regression analysis revealed that maternal total years of education, child age, and child IQ served as significant predictors of adaptive ER strategy use for the total sample (N = 96). Based on analysis of variance (ANOVA), the youngest participants demonstrated significantly less time spent using adaptive strategies compared to older participants. Adaptive ER strategy outcomes were not significantly different across group status or gender. Further, higher maternal education was associated with lower adaptive composite scores, though correlation results were not statistically significant. Potential links between ER strategy use and school readiness outcomes and measurement limitations are discussed.

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ACKNOWLEDGMENTS

I would like to thank the participating families from the Families Matter in the Lives of Youth (FaMILY) Study as well as the organizations (e.g., National Institute of Mental Health [NIMH]) that provided funding for the project. I want to thank my adviser, Dr. Barbara Schaefer, for mentoring me and supporting my academic and professional goals throughout my graduate career. I also would like to thank Dr. Elizabeth Skowron for providing me with the opportunity to work for the FaMILY Study and for her generosity in allowing me to use the data for my dissertation.

I want to thank Dr. Shirley Woika and Dr. Robert Hale for their professional guidance and invaluable expertise as my doctoral committee members. I also would like to thank the graduate and undergraduate research assistants who worked for the FaMILY Study, specifically Dr. Elizabeth Cipriano for helping me find the inspiration needed to complete my project. Finally, I am immensely grateful for the unwavering encouragement and love offered by my family and friends, my most dedicated supporters, especially my remarkable cohort members, Emily Perlman and Sarah Wollersheim Shervey, as well as my parents, Sandy and Frank Mintern, and late grandmother, Harriet Friedman.

Chapter 1

Literature Review

The development of self-regulatory processes in early childhood influences later adjustment involving cognition, behavior, socioemotional functioning, and academic achievement. Executive functioning (EF) represents cognitive processes underlying self-regulation and other constructs such as memory and attention (Allan & Lonigan, 2011; Blair, 2002). Also, development of EF during the preschool years is related to numerous parent and child characteristics (Blair). As children begin formal schooling, skills related to attention, planning, and inhibition become increasingly important, and individual differences in these skills may contribute to development in other essential domains such as those related to academic, behavioral, and socioemotional functioning (Clark, Pritchard, & Woodward, 2010). Considering the rapidity with which EF develops, better understanding of how individual factors influence EF as well as what constitutes typical childhood development of EF would be beneficial (Blair, Zelazo, & Greenberg, 2005; Kroesbergen, Van Luit, Van Lieshout, Van Loosbroek, & Van de Rijt, 2009).

One aspect of EF is emotion regulation (ER), and children's ER development serves as an important determinant of later functioning across academic, behavioral, and socioemotional domains. While EF is considered an umbrella term for numerous higher order processes, ER fits within this categorization and specifically relates to cognitive modulation of emotional stimuli (Zelazo & Cunningham, 2007). ER can be conceptualized as a form of self-regulation involving EF processes that contribute to adaptive responses necessary for production, evaluation, maintenance, and modification of emotions (Cole, Michel, & Teti, 1994; Thompson, 1994). More research is needed to determine how ER skills influence childhood development in various domains. The goal of the current study was to evaluate the role of specific environmental, maternal, and child characteristics on preschoolers' ER strategy use during a frustrating laboratory task. Also, comparison between maltreatment and control groups was used to examine the extent to which ER strategy use differed between groups.

Influence of Risk Factors on Childhood Outcomes

The experience of childhood maltreatment is associated with maladaptive development across academic, behavioral, and socioemotional domains. Maltreatment is defined as including four categories of abuse: physical, sexual, emotional, and neglect (Cicchetti & Toth, 2005). Based on Child Protective Services (CPS) records from 2002, 896,000 children in the U.S. were involved in cases concerning child abuse or neglect (Cicchetti & Toth). Estimates are that 12 children in 1,000 ages 0 to 17 are abused, and the rate increases to 16 in 1,000 for children under age 3. However, projections posit that only two-thirds of total cases are reported to authorities, and the financial and logistical limitations of CPS may limit the number of investigations (Cicchetti & Toth). Not only do the effects of childhood maltreatment affect individuals and families, but the societal costs are far-reaching and pervasive.

Various individual and family factors such as socioeconomic status (SES) and childhood maltreatment have been linked to academic, behavioral, and socioemotional outcomes during childhood. Poverty and family stress tend to co-occur, and children from low-income families are more likely to experience frequent and intense stressful life events (Evans, 2004; Flouri, 2008). Risk factors have been shown to have cumulative effects throughout development, and these effects may influence childhood outcomes differentially depending on their timing (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Aylward, 1992). The National Institute of Child Health and Human Development (NICHD) found that poverty duration may be particularly detrimental to childhood development compared to timing of risk factors (NICHD Early Child Care Research Network [ECCRN], 2005a).

Childhood risk factors such as familial poverty, low parental education, and parental psychological maladjustment may increase the likelihood of child maltreatment, thereby influencing long-term negative effects on behavioral, socioemotional, and academic outcomes from childhood throughout adulthood (Gilbert et al., 2008). More specifically, trauma during childhood has been linked to later difficulties with interpersonal relationships, self-efficacy, and emotion understanding (Kaufman & Henrich, 2000). Fishbein et al. (2009) found that exposure to childhood trauma and violence was differentially associated with poorer neurocognitive outcomes related to IQ, emotion attribution, and Attention Deficit Hyperactivity Disorder (ADHD) symptoms (N = 553). However, the authors were not able to measure parent-related factors, and the sample consisted of mostly Latino participants (Fishbein et al.). Nolin and Ethier (2007) also determined that children who had experienced maltreatment scored lower on both IQ- and EF-related outcomes compared to participants in the control group (n = 79 and 53, respectively), though the authors acknowledged their use of a relatively small sample size as well as the difficulty with treating neglect and family environment as unidimensional factors.

SES influences multiple areas of development, including physical, cognitive, academic, and socioemotional outcomes (Bradley & Corwyn, 2002; Dearing, 2008). Children from economically disadvantaged families are more likely to experience complications prior to and during birth (Bradley & Corwyn). Low SES also is associated with health problems later in childhood, reflecting restricted access to healthcare and poor nutrition, and economic disadvantage during childhood is linked to poorer health status in early adulthood after controlling for current SES (Bradley & Corwyn). Additionally, lower SES is related to an increased likelihood of socioemotional and behavior problems, such as psychiatric illness, substance abuse, and overall poor adjustment and well-being (Bradley & Corwyn; Cole, Gyurak, & Levenson, 2010).

Links have been made between SES and school-related outcomes, though findings have been mixed. Howse, Lange, Farran, and Boyles (2003) reported that at-risk children were not necessarily less motivated compared to not-at-risk peers, but nonetheless performed more poorly on achievement measures ($N = 106$). Mistry, Biesanz, Taylor, Burchinal, and Cox (2004) found that SES was directly related to cognition and achievement more than to behavior-related outcomes ($N = 1{,}363$). However, Morgan, Farkas, and Wu (2009) determined that specific groups of children (e.g., those from disadvantaged families) were more likely to exhibit both internalizing and externalizing behavior problems compared to other groups of children, though the authors used teacher ratings only to determine students' emotional and behavioral difficulties ($N = 4{,}674$). More specifically, preschoolers from families with low SES were 10 times more likely to develop severe problem behaviors, compared to children from families with higher SES (Qi & Kaiser, 2003). Clearly, disadvantage during childhood can be associated with poorer outcomes across various developmental domains.

Several authors have investigated the extent to which the experience of multiple risk factors contributes to poor childhood outcomes. Appleyard et al. (2005) found support for the cumulative risk hypothesis, which presumes that greater numbers of risk factors lead to increased likelihood of clinical diagnoses and other negative outcomes. The authors examined child maltreatment, family disruption, maternal life stress, inter-parental violence, and SES as possible predictors of adolescent behavior problems; greater risk factors experienced during early childhood were associated with more behavior problems in adolescence, particularly externalizing problems (*N* = 171). Also, the timing of cumulative risk may be important, in that Appleyard et al. distinguished that exposure to risk factors early in life was indicative of increased problem behaviors in adolescence, whereas middle childhood risk was not a significant predictor of later maladjustment. Appleyard et al.'s findings corroborated earlier work by Atzaba-Poria, Pike, and Deater-Deckard (2004) and Deater-Deckard, Dodge, Bates, and Pettitt (1998), who found that cumulative risk was concurrently associated with greater problem behaviors in middle childhood. Further, Gassman-Pines and Yoshikawa (2006) found that cumulative poverty-related risk was associated with both increased behavior problems and lower academic achievement levels, though the authors indicated the possibility of both methodological and selection biases influencing the results (*N* = 1,169).

Additionally, length of time spent in poverty has been examined for its role in childhood development. Several investigators have found associations between persistent poverty and increased cognitive, academic, and socioemotional problems (Dearing, McCartney, & Taylor 2006; Macmillan, McMorris, & Kruttschnitt, 2004; McLeod & Shanahan, 1996; McLoyd, 1998). It may be that children who experience more successive or chronic years in poverty and a larger number of risk factors demonstrate greater levels of negative academic, behavioral, and socioemotional outcomes compared to those with transient poverty status.

Maternal education. SES often includes maternal education as well as family income variables (Bradley & Corwyn, 2002). Maternal education is strongly associated with SES (Mistry, Biesanz, Chien, Howes, & Benner, 2008) and serves as a significant predictor of childhood behavior problems (Macmillan et al., 2004). Maternal education also has been linked to learning disability diagnoses in the expected direction (*N* = 159,129; Blair & Scott, 2002).

Support for the use of maternal education as an indicator of SES is highly documented in the extant literature.

Maternal education has associations with cognitive and academic outcomes. Dearing, McCartney, and Taylor (2001) determined that maternal education significantly predicted children's performance on school readiness and language measures, with home environment serving as a mediating variable (N = 1,364). Similarly, Durham, Farkas, Hammer, Tomblin, and Catts (2007) found that the effects of SES on elementary school achievement were mediated by language skill in kindergarten, which was directly influenced by maternal education (N = 502). However, the authors acknowledged their use of a nonrepresentative sample (Durham et al.). Further, SES influences other achievement-related outcomes, such as school attendance and graduation rates (Bradley & Corwyn, 2002). Overall, low SES and its relations to parental stress and family instability appear to negatively influence childhood academic, behavioral, and socioemotional outcomes.

Influence of Maternal and Child Characteristics on Childhood Outcomes

Resilience and protective factors ultimately affect the ways in which children cope with stressors and possible negative outcomes related to poverty, maltreatment, and other risk factors (Luthar, Cicchetti, & Becker, 2000). Resilience refers to positive adaptation in response to exposure to adversity, and protective factors (e.g., familial support, adaptive coping style) contribute to resilience in varying ways (Luthar et al.). Individual differences in cognition, self-regulation, and parent-child attachment have been indicated as possible adaptive characteristics that influence developmental outcomes in various types of environments (Masten & Coatsworth, 1998). Also, childhood resiliency has been linked to better behavioral and attentional control, resulting in improved social outcomes for children over time (N = 407; Spinrad et al., 2006).

Environmental and familial characteristics interact with children's biological propensities and subsequently influence developmental trajectories (Campbell, 1995). More specifically, Cicchetti and Rogosch (2007) found that children who experienced maltreatment exhibited lower levels of resilience based on a variety of measures (e.g., depressive symptoms, peer nominations, behavioral functioning; N = 677).

Child age and gender are factors that influence current functioning and subsequent developmental outcomes. Personality characteristics and emotionality interact with parental and environmental characteristics to influence childhood behavior. Several investigators have found individual characteristics to predict later behavior problems, with boys more likely to display aggression early in life (Rubin, Burgess, Dwyer, & Hastings, 2003; Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997). Additionally, childhood characteristics are associated with academic and socioemotional functioning. Behavior problems during childhood tend to be related to decreased academic competence and performance, subsequently influencing internalizing behavior in adolescence (Masten et al., 2005; Zhou, Main, & Wang, 2010). Also, the presence of both internalizing and externalizing symptoms may lead to decreased likelihood of high school completion (N = 424; McLeod & Kaiser, 2004).

Children's home functioning also plays an important role in influencing children's school performance. Behavior at home and at school may relate to each other in predictable ways. In a high-risk sample of kindergarteners with disruptive behavior, the investigators found that children's behavior at home significantly predicted problem behaviors in the school setting (N = 631; Stormshak, Bierman, & the Conduct Problems Prevention Research Group, 1998). Further, those exhibiting both hyperactivity/inattention and oppositional/aggressive behavior at home displayed the highest risk for teacher-rated behavior problems and peer rejection in the school setting, though additional aspects of home and school environment were not assessed (Stormshak et al.).

Maternal characteristics relate to developmental outcomes in childhood. Several researchers have found links between positive maternal characteristics (e.g., autonomy support, sensitivity, strategy instruction) and adaptive childhood outcomes in academic, socioemotional, and behavioral domains (Joussemet, Koestner, Lekes, & Landry, 2006; Miner & Clarke-Stewart; NICHD ECCRN, 2004, 2008; Supplee, Shaw, Hailstones, & Hartman, 2004). Conversely, results have been found in the opposite direction, with negative maternal characteristics (e.g., depressive symptomology) associated with poorer childhood outcomes across various domains (Kiernan & Huerta, 2008; Mistry et al., 2004; NICHD ECCRN, 2005a; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Maternal depression is particularly detrimental to childhood development, though symptom improvement may relate to increased socioemotional adjustment in children (N = 1,363; Mistry et al.).

Child and maternal characteristics are inextricably linked to adaptive and maladaptive outcomes across domains. Individual differences in resilience influence the ways in which mothers and children cope with adverse circumstances. However, how resilience and other individual factors uniquely contribute to childhood outcomes is less clear, especially considering the ways in which risk and protective factors tend to co-occur.

Influence of Early Experiences on Childhood Outcomes

Both individual and environmental differences contribute to early childhood development. More specifically, preschool experiences are related to school readiness and later academic achievement. The NICHD (2002) investigated the relations between early childcare characteristics; maternal, child, and family factors; and school readiness (N = 1,364). Overall, quality of daycare was associated with increased school readiness, though quantity of daycare was related to more problem behaviors upon school entry. However, quantity also was related to better language and memory skills, indicating that daycare experiences may be associated with both risks and benefits for developmental outcomes (NICHD). Fantuzzo et al. (2005) also found that students who attended formal preschool performed better across academic and social areas measured in kindergarten compared to those who did not attend early childhood programs, though the quality of early childcare experiences was not evaluated ($N = 3{,}969$). Additionally, early childcare experiences significantly predicted later academic performance, with social competence as a mediator of this relation (Downer & Pianta, 2006).

Specific aspects of early childcare and education may relate to later developmental outcomes. Peisner-Feinberg et al. (2001) found that teacher-student relationship quality was associated with later socioemotional skills, and classroom practices related to children's academic skills ($N = 183$). Similar to previously cited studies, preschool quality was found to be a unique predictor of children's later academic skills above and beyond demographic characteristics, teacher-child relationships, and classroom practices (Peisner-Feinberg et al.). In sum, it seems that preschool experiences relate to later childhood outcomes in various domains.

Executive Functioning (EF) Development

EF development has been shown to influence academic skills and school success. Further, EF has been linked to socioemotional factors beyond the contributions of cognitive and academic variables (Monette, Bigras, & Guay, 2011). More specifically, EF may be partitioned into two domains, with "cool" skills reflecting self-regulation connected to academic performance and "hot" skills relating to socioemotional functioning such as ER and interpretation of social situations (Hongwanishkul, Happaney, & Zelazo, 2005; Meltzer, Pollica,

& Barzillai, 2007). The “hot” skill of ER may begin to develop as early as infancy, when child-caregiver dyads determine their regulatory styles and modes of interaction (Calkins, 1994).

“Cool” EF is linked to cognitive ability, whereas “hot” EF relates to socioemotional functioning (Allan & Lonigan, 2011). Additionally, “hot” and “cool” EF skills may differentially relate to aspects of IQ, with “hot” skills most associated with performance-related tasks and “cool” to verbal tasks (*N* = 106; Hongwanishkul et al., 2005). EF consists of multiple components (e.g., memory, inhibition, shifting), with more complex skills involving the use of numerous cognitive processes.

Several gains in cognitive processes (e.g., planning, problem solving) that occur throughout childhood appear to be related to improvement in EF skills (Zelazo & Frye, 1998). Longitudinal results have provided support for large gains in EF skills in preschool and during the early elementary years, with moderate improvements in late childhood, and lesser gains in adolescence (*N* = 2,036; Best, Miller, & Naglieri, 2011). More specifically, frontal lobe growth in the first 5 years of life shows associations with improved attentional control, whereas neurological growth in middle and later childhood may be more correlated with gains in increasingly complex areas of EF (e.g., cognitive flexibility; Anderson, 2002). Support for the involvement of the frontal lobe in EF development has been implicated by studies involving electroencephalography (EEG; Wolfe & Bell, 2007). Individual differences in EEG results may be present as early as infancy and predictive of EF skills in later childhood, though more research is needed (Wolfe & Bell). However, EF, and specifically ER skills, are particularly difficult to assess in preschoolers considering variable development within and across individuals as well as methodological and conceptual inconsistencies (Cole, Martin, & Dennis, 2004; Isquith, Crawford, Espy, & Gioia, 2005).

Individual characteristics influence the development of EF and ER skills during childhood. Development of EF skills relates to verbal ability (*N* = 602; Carlson, 2005), with individual differences in inhibitory control (IC) and ER particularly linked to both age and verbal ability of preschoolers (Carlson & Wang, 2007; Liebermann, Giesbrecht, & Muller, 2007). More specifically, Kerr and Zelazo (2004) found that development of affective or "hot" skills was significantly different between 3- and 4-year-olds in a small sample (*N* = 24). Also, Korkman, Kemp, and Kirk (2001) found that 5- to 12-year-old children's performance on the Developmental NEuroPSYchological Assessment improved most for younger groups and more moderately for children 9 years and older (*N* = 800). Children either had the greatest gains in EF skills early in childhood or displayed more continuous improvement over time (Korkman et al.). Further, Blandon, Calkins, Keane, and O'Brien (2008) found that children with the greatest improvements in ER over time displayed better ER skills at age 7 (*N* = 269). Overall, the preschool years serve as an important developmental period for cognitive processes related to both EF and ER skills.

Specific EF skills may develop at different rates throughout the course of childhood. Brocki and Bohlin (2004) examined distinctions between development of particular EF skills (e.g., fluency, inhibition, working memory) in 6- to 13-year-olds (*N* = 92). The authors found that skills involved in speed and inhibition matured at earlier ages compared to working memory (WM) and fluency, though results were based on a small sample from a cross-sectional study (Brocki & Bohlin). Also, improvements in EF skills related to classroom behavior have been linked to decreased problem behavior and increased academic competence after the kindergarten transition (*N* = 191; Hughes & Ensor, 2011). Further examination of how specific aspects of EF contribute to academic, socioemotional, and behavioral development in childhood is merited.

Influence of Maternal and Child Characteristics on EF Development

Maternal and child characteristics have been shown to influence the relation between EF skills and subsequent development. Several neonatal and postnatal factors related to infant (e.g., attention) and maternal (e.g., responsiveness, drug use) characteristics have served as predictors of later EF skills (Kochanska, Murray, & Harlan, 2000; Noland et al., 2003). Other factors before infancy, such as preterm birth, also influence EF performance, in that those born preterm appear to be more likely to exhibit difficulties with EF (Aarnoudse-Moens, Duivenvoorden, Weisglas-Kuperas, Goudoever, & Oosterlaan, 2011; Aarnoudse-Moens, Smidts, Oosterlaan, Duivenvoorden, & Weisglas-Kuperas, 2009; Li-Grining, 2007; Luu, Ment, Allan, Schneider, & Vohr, 2011; Sun, Mohay, & O'Callaghan, 2009). Further, preterm status may be predictive of ER difficulties in preschool (N = 205; Clark, Woodward, Horwood, & Moor, 2008) and of attentional and learning problems in later childhood (Sun et al.).

Environmental characteristics in early childhood also have been found to be predictive of EF skills. Across studies, children in at-risk groups performed more poorly on EF tasks compared to those who were not considered at-risk (Razza, Martin, & Brooks-Gunn, 2010; Rhoades, Greenberg, Lanza, & Blair, 2011; Wiebe et al., 2011). Maltreatment has been shown to have particularly detrimental effects on EF skills during childhood. Children who have experienced maltreatment tend to display maladaptive ER and EF skills (Maughan & Cicchetti, 2002; Pollack, Cicchetti, Hornung, & Reed, 2000; Shields & Cicchetti, 1998; Shipman, Edwards, Brown, Swisher, & Jennings, 2005; Shipman & Zeman, 2001; Teisl & Cicchetti, 2008). Additionally, children experiencing the most risk factors displayed the poorest EF skills, and outcomes differed by race/ethnicity, though results were based on a restricted sample (Rhoades et al.). More specifically, risk factors such as exposure to poverty, parenting behaviors, and maternal psychological stress experiences during infancy were found to predict later EF skills in the areas of WM, IC, and attention (*N* = 1,155; Rhoades et al.). Similarly, Maughan and Cicchetti reported that characteristics such as maltreatment experiences, childhood behavior difficulties, and interparental violence were significantly associated with ER patterns in 4- to 6-year olds (*N* = 139). Additionally, exposure to maltreatment may influence the ways in which children distinguish between emotions in other people, thereby affecting how they are able to perceive, understand, and interact with their environments (Teisl & Cicchetti; Pollack et al.). Even in an ecologically valid setting (i.e., summer camp), children who has been abused exhibited greater emotion dysregulation and attentional difficulties compared to non-maltreated children (Shields & Cicchetti). Other studies have been used to investigate how maltreatment and maternal parenting behavior influenced ER skills in older children (Shipman et al., Shipman & Zeman). Overall, low SES, maltreatment, and related risk factors appear influential in determining EF and ER skills during childhood.

EF and ER skills relate to children's behavior difficulties, though the direction of influence is unclear. It may be that children with behavior problems display differential EF development dependent on the nature of their difficulties. Eisenberg et al. (2001) investigated how ER development differed between children with internalizing and externalizing difficulties; those with internalizing behavior problems exhibited low effortful control (inhibition and goal-directed behavior) and less impulsivity, whereas those with externalizing behavior problems displayed more negativity and less task persistence (*N* = 214). However, preschoolers' ER has been found to predict both externalizing problems and cooperation during a frustrating task, and also was related to ER strategy use at age 6, though results may be generalizable to one context and to low-income students only (*N* = 189; Gilliom, Shaw, Beck, Schlonberg, & Lukon, 2002).

Child gender may differentially relate to EF and ER skills, particularly for children with externalizing behavior problems. For girls, poor ER skills were associated with chronic behavioral difficulties, whereas inattention served as a predictor for boys with the chronic profile (Hill, Degnan, Calkins, & Keane, 2006). Further, SES was significantly associated with chronic status for boys, but not for girls. Although the study design was longitudinal, generalizability of results may be limited based on overselection of children with externalizing problems (Hill et al.).

Maternal characteristics have been linked to childhood EF skills. In particular, maternal depression serves as a detriment to childhood development in the area of EF (Blandon et al, 2008). Children of depressed mothers displayed greater emotional dysregulation and behavioral problems and less active ER strategies across studies (Feng et al., 2008; Hoffman, Crnic, & Baker, 2006; Maughan, Cicchetti, & Toth, 2007; Silk, Shaw, Skuban, Oland, & Kovacs, 2006). More depressive symptoms in mothers have been associated with diminished ER development in children (Blandon et al.), and onset of maternal depression earlier in a child's life (i.e., during the first 21 months of life) may be related to greater emotion dysregulation (Maughan et al.). Further, mothers with elevated levels of depressive symptoms may be less adept at providing scaffolding for their children during challenging tasks (Hoffman et al.). Other negative maternal characteristics (e.g., negative emotionality, mutual ER) have been linked to decreased ER skills in preschoolers (Brown & Ackerman, 2011; Cole, Teti, & Zahn-Waxler, 2003). Protective factors such as maternal positivity may serve as buffers against poor ER development (Feng et al.), whereas specific child characteristics have been associated with greater risk for later psychopathology, particularly for girls with ER difficulties (Silk et al.).

Children's ER development also may be influenced by parenting style. Positive parenting practices tend to be associated with better ER skills (Chazan-Cohen et al., 2009; Garner & Spears, 2000; Graziano, Calkins, & Keane, 2011; Graziano, Keane, & Calkins, 2010), and the effects of harsh parenting may include maladaptive ER skills (Chang, Schwartz, Dodge, & McBride-Chang, 2003). Additionally, both child age and parenting style have been found to predict children's ER skills (*N* = 116; Cole, Dennis, Smith-Simon, & Cohen, 2009), and these relations may become stronger over time (Kalpidou, Power, Cherry, & Gottfried, 2004).

Individual differences may serve to protect against the detrimental effects of negative childhood experiences on EF development. Self-regulation and positive parent-child relationships have been found to mediate the relations between low SES, poor EF skills, and subsequent outcomes (Miech, Essex, & Goldsmith, 2001; Schultz, Izard, Ackerman, & Youngstrom, 2001; Vazsonyi & Huang, 2010). More research is needed to determine how maternal and child characteristics influence EF skills and subsequent development across academic, behavioral, and socioemotional domains.

EF and Childhood Outcomes

Behavioral and socioemotional outcomes. EF difficulties exhibited during the preschool years may help predict academic and behavioral problems in the elementary grades (Monette et al., 2011). Also, deficits in particular areas of EF have been linked to specific disorders such as ADHD, Autism Spectrum Disorder (ASD), and Conduct Disorder (Cohen, 2012; Meltzer, 2007). Further, individual- and environmental-level interventions (e.g., Head Start Research-Based Developmentally Informed program; Ursache, Blair, & Raver, 2012) have been shown to be effective for use with students who display EF difficulties (Dawson & Guare, 2010; Diamond & Lee, 2011).

Children with ADHD appear to have particular difficulties with EF- and ER-related tasks (Anastopoulos et al., 2011; Berlin, Bohlin, & Rydell, 2003; Espy, Sheffield, Wiebe, Clark, & Moehr, 2011; Yang et al., 2011). Similarly, those with comorbid disorders such as Oppositional Defiant Disorder and Disruptive Behavior Disorder tend to display poorer EF performance (Raaijmakers et al., 2008; Schoemaker et al., 2012; Thorell & Wahlstedt, 2006). EF deficits have also been found for children with ASD, though the difficulties did not appear primary or specific (Yerys, Hepburn, Pennington, & Rogers, 2007). More longitudinal research is needed to examine the EF difficulties associated with various disabilities.

EF has been linked to adaptive behavior in the classroom. Children with better self-regulation skills in the classroom at the beginning of the year were found to display better cognitive and behavioral functioning in the spring (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). Similarly, Yen, Konold, and McDermott (2004) found that adaptive learning behavior associated with EF was related to better achievement outcomes, even after controlling for cognitive ability (N = 1,304). Overall, it seems that EF skills are highly related to behavioral outcomes in childhood, which subsequently influence academic achievement.

Academic outcomes. The relations between EF and academic achievement are complex considering the wide variety of EF-related tasks needed to succeed in school. Based on results from longitudinal studies, it seems that the association is unidirectional, in that EF influences academic achievement but not vice versa (Best et al., 2011; Bull, Espy, & Wiebe, 2008). More specifically, EF has been linked to both math and reading achievement, and IC and WM tend to contribute more to academic achievement than do other types of EF (N = 2,036; Best et al.). Also, EF skills in preschool may be related to academic achievement in elementary school, particularly in reading and math (Bull et al.). Further, students with and without learning disabilities tend to exhibit EF differently in that children with learning disorders may have difficulties with particular areas of EF compared to typical students (Best at el.).

Much support has been found for the relation between EF skills and academic achievement in reading, math, and writing (Altemeier, Abbott, & Berninger, 2008; Blair & Razza, 2007; Bull et al., 2008; Bull & Scerif, 2001; Clark et al., 2010; Espy et al., 2004; Kroesbergen et al., 2009; Monette et al., 2011; Passolungi, Mammarella, & Altoe, 2008; Sesma, Mahone, Levine, Eason, & Cutting, 2009; Toll, Van der Van, Kroesbergen, & Van Luit, 2011). However, findings related to EF and academic achievement have been mixed in terms of the exact nature of the relation and the specific skills involved in academic success. Based on the results of several studies, it seems that a unidimensional view of EF best accounts for its role in academic and related outcomes, particularly for preschoolers (Garon, Bryson, & Smith, 2008; Wiebe & Espy, 2008; Wiebe et al., 2011, Willoughby, Blair, Wirth, Greenberg, & the Family Life Project Investigators, 2012). More specifically, young children who displayed better general self-regulation in the classroom tended to have higher performance across academic areas and showed the most gains after controlling for sociodemographic variables (Matthews, Ponitz, & Morrison, 2009; Ponitz, McClelland, Matthews, & Morrison, 2009). Similar associations between EF in preschool and emergent math and literacy skills in kindergarten have been found for children from low SES environments participating in Head Start (N = 164; Welsh, Nix, Blair, Bierman, & Nelson, 2010).

Although much research has established relations between ER, interpersonal skills, and mental health, information regarding associations between ER and academic achievement is sparse (Calkins & Marcovitch, 2010). ER skills have been found to be significantly related to both academic and socioemotional development (Leerkes, Paradise, O’Brien, Calkins, & Lange, 2008; Trentacosta & Izard, 2007). Children who display more adaptive socioemotional functioning are likely to be more successful in the school setting compared to students with ER difficulties.

Measurement of EF and Emotion Regulation (ER)

EF and ER skills can be measured via direct observation in natural settings, behavior rating scales, standardized neuropsychological assessments, or during laboratory tasks. The Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1993) is a widely used method for evaluating preschoolers' temperament characteristics. Considering the various structured tasks that are involved in Lab-TAB, it is considered a comprehensive and objective way to reliably and validly assess children's emotionality traits in a more narrow way than is typically provided by rating scale and observational results (Gagne, Van Hulle, Aksan, Essex, & Goldsmith, 2011).

The Transparent Box task is one part of Lab-TAB that can be used to examine preschoolers' responses during an emotion-eliciting task. Several investigators have used the Transparent Box task to assess the links between individual differences in various areas (e.g., temperament, behavioral self-regulation, academic achievement, externalizing disorders, parental psychopathology) and preschoolers' ER during a frustrating task (Cole et al., 2009; Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Hayden, Klein, & Durbin, 2005; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003; Jahromi & Stifter, 2008). Overall, results of Lab-TAB may have stronger associations with observational findings compared to correlations between observational and rating scale results (Gagne et al., 2011). Therefore, lab-based assessments are considered an adequate method for measuring children's emotional responses and strategy use related to ER.

Purpose and Research Questions

The purpose of the current study was to examine how specific environmental, maternal, and child factors influenced preschoolers' use of ER strategies during the Transparent Box task (Goldsmith & Rothbart, 1996). Further, a comparison was made between maltreatment and comparison groups to determine whether preschoolers' ER strategy use differed by group status. The study addressed three research questions: (a) How do environmental (i.e., SES, number of stressful events, and number of children in the home), maternal (i.e., IQ and psychological symptoms), and child (i.e., gender, age, gestational age, IQ, and preschool status) factors contribute to preschoolers' ER strategy use during the Transparent Box task, (b) Do these specific environmental, maternal, and child factors differentially influence ER strategy use for preschoolers from maltreatment and comparison groups, and (c) How do preschoolers' ER skills compare across maltreatment and control groups?

Based on previous research, environmental, maternal, and child factors were hypothesized to have both cumulative and unique effects on preschoolers' ER strategy use. More specifically, risk factors related to family environment (i.e., low SES, greater number of stressful events, greater number of children in the home) and maternal (i.e., low IQ and presence of psychological symptoms) characteristics were expected to negatively influence preschoolers' use of ER strategies (i.e., contribute to decreased use of adaptive strategies). Further, child factors (i.e., gender, age, gestational age, IQ, and preschool status) would differentially influence ER outcomes, in that girls, those born full-term, and older children would use more adaptive ER skills, subsequently exhibiting more time spent using adaptive ER skills than boys and younger participants. Also, children who attended preschool were anticipated to spend more time engaged in adaptive ER skills compared to those who did not attend preschool.

Second, influences of specific predictors on ER strategy use were expected to differ between maltreatment and comparison groups. Further, ER outcomes of children in the maltreatment group were predicted to be more influenced by specific environmental, maternal, and child risk factors compared to those from the control group. Last, children from the maltreatment group were expected to display less time engaged in adaptive ER strategies compared to the control group.

Chapter 2

Method

Participants

One hundred and eight mother-child dyads ($n_{maltreatment}$ = 62; $n_{comparison}$ = 46) were recruited for the Families Matter in the Lives of Youth (FaMILY) Study, funded by the National Institute of Mental Health (NIMH) via Dr. Elizabeth Skowron's 2007-2013 project entitled, *Parent-Child Processes: Negative Self-Regulatory and Behavioral Outcomes*. Dyads considered for the maltreatment group were recruited using Children and Youth Services referrals involving maternal physical abuse or neglect. Mothers in the maltreatment group were required to be 18 years or older, fluent English speakers, and primary caregivers living with the target child (Cipriano, 2010). Additionally, referred dyads were excluded from the FaMILY Study if they did not have at least one case codable by the Maltreatment Classification System (Barnett, Manly, & Cicchetti, 1993), a standardized format for defining severity and type of abuse; mothers with codable cases were considered perpetrators of child maltreatment in the areas of physical abuse or neglect. The Pennsylvania State University's Families Interested in Research Studies database was used to recruit comparison group dyads that were matched with maltreatment dyads based on SES, maternal marital status, and ethnicity. Comparison dyads were excluded from the study if maternal Child Abuse Potential Inventory scores exceeded the clinical cut-off of 215 (Milner, 1986).

As shown in Tables 1 and 2, mother-child dyads were identified as predominantly White. Maternal age ranged from 20 to 45 years, and preschoolers were ages 3 through 5. Fifty-seven child participants were male and 51 were female. Additional demographic information is available upon request.

Table 1

Maternal Demographic Characteristic Means, Standard Deviations, Distribution Frequencies, and Percentages for Maltreatment and Comparison Groups

Characteristic	Maltreatment (n = 62)		Comparison (n = 46)	
Age	29.63	(6.84)	30.35	(5.53)
Years of education	12.50**	(1.92)	14.80**	(2.42)
WASI FSIQ-2 score	97.09**	(15.24)	108.07**	(13.05)
BSI GSI *T* score	55.55	(10.94)	52.11	(10.46)
Total negative events	2.57*	(2.65)	3.58*	(2.49)
Ethnicity				
White	55	(88.71)	44	(95.65)
Black	2	(3.23)	1	(2.17)
Hispanic/Latino	1	(1.61)	0	
Mixed	4	(6.45)	1	(2.17)
Relationship status				
Single, never been married	13	(20.97)	8	(17.39)
Single, in committed relationship	13	(20.97)	9	(19.57)
Separated	6	(9.68)	1	(2.17)
Divorced	10	(16.13)	4	(8.70)
Married	19	(30.65)	24	(52.17)
Widowed	1	(1.61)	0	
Employment status				
Works outside the home	30	(48.38)	31	(67.39)
Maternal education				
Left high school early	13**	(20.97)	0**	
High school degree	40**	(64.52)	19**	(41.30)
Associate's degree	3**	(4.84)	6**	(13.04)
Bachelor's degree	5**	(8.06)	16**	(34.78)
Master's degree	1**	(1.61)	5**	(10.87)
Household income				
$10,000 or less	24**	(38.71)	4**	(8.70)
$10,001-$30,000	28**	(45.16)	17**	(36.96)
$30,001-$50,000	5**	(8.06)	10**	(21.74)
$50,001 and higher	4**	(6.45)	15**	(32.61)
People in home				
Adults	1.82	(.96)	1.87	(1.11)
Children	2.49	(1.18)	2.09	(1.05)
Total	4.33	(1.70)	3.98	(1.73)

Note. Total N = 108. WASI FSIQ-2 = Wechsler Abbreviated Scale of Intelligence two-subtest form. BSI GSI = Behavioral Symptom Inventory General Severity Index. Total negative events = Life Experiences Survey total number of negative events reported for 12-month period. Parenthetical information is the standard deviation for interval level variables or the percentage by subgroup for categorical variables. Statistical significance derived from *t*-test results for interval level variables or from chi-square results for categorical variables.
*p < .05. **p < .01.

Table 2

Child Demographic Characteristic Means, Standard Deviations, Distribution Frequencies, and Percentages for Maltreatment and Comparison Groups

Characteristic	Maltreatment (n = 62)		Comparison (n = 46)	
Age	3.68	(.72)	3.70	(.76)
SB-5 ABIQ score	97.15**	(12.63)	104.71**	(12.20)
Gestational age				
Full-term	49	(79.03)	38	(82.61)
Pre-term	13	(20.97)	8	(17.39)
Gender				
Male	31	(50.00)	20	(43.48)
Female	31	(50.00)	26	(56.52)
Ethnicity				
White	48	(77.42)	38	(82.61)
Black	2	(3.23)	1	(2.17)
Mixed	12	(19.35)	7	(15.22)
Preschool status				
Attended preschool	44	(70.97)	31	(67.39)
Months in preschool	13.02	(9.41)	13.25	(9.89)
Adaptive composite	2.27	(.55)	2.27	(.60)

Note. Total N = 108. SB-5 ABIQ = Stanford-Binet–Fifth edition Abbreviated IQ. Parenthetical information is the standard deviation for interval level variables or the percentage by subgroup for categorical variables. Statistical significance derived from t-test results for interval level variables.
**$p < .01$.

Procedure

The FaMILY Study was designed to examine the role of child maltreatment and family stressors on the development of mother-child relationships, and maternal and child self-regulation (Cipriano, 2010). Data were collected during two home visits and a laboratory session. Informed consent procedures were explained to the adult participants prior to beginning the first home visit, and mothers were reminded of these procedures before each subsequent session. Examiners administered demographic surveys, the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), and various psychosocial questionnaires to mothers in the home setting. Children completed the Stanford-Binet–Fifth edition: Abbreviated Battery (SB-5:

AB; Roid, 2003) during the first home visit. All information was gathered by trained undergraduate and graduate interviewers using a counterbalanced administration procedure based on day of the week.

Mother-child dyads participated in several laboratory tasks during the third session. Before beginning the tasks, mothers were provided with a brief overview of the laboratory activities. Interviewers placed electrodes on the dyads to monitor physiological activity. Mothers and preschoolers then participated in a baseline activity before completing joint tasks for the assessment of parent-child interactions. Children also engaged in independent, frustration-inducing activities as measures of emotion and ER strategies. During child-only tasks, mothers completed various psychosocial measures with trained examiners.

Transparent Box task. In the Transparent Box task (Goldsmith & Rothbart, 1996), the experimenter gives the child participant keys to open a box visibly containing a desirable toy (i.e., trains or dolls). First, the child was instructed to choose a toy before the interviewer locked the clear box. Then the experimenter demonstrated how to use the key to unlock the box, but gave the child a second key ring with the wrong keys. The child did not know that the key ring provided was missing the correct key. The interviewer asked the child to attempt to unlock the box for 3 minutes while the interviewer waited outside of the room. Next, the experimenter reentered, offered apologies for having mistakenly provided the wrong keys, and provided the child the correct keys. The child was allowed to unlock the box to play with the toys for a brief period before proceeding to the next task.

Measures

Environmental variables. Demographic surveys were utilized to collect information regarding maternal and child age and ethnicity; child gender; family income; and maternal education, employment, and relationship status. Number of children in the home and SES were evaluated as possible environmental predictors of adaptive ER strategy outcomes. For ease of interpretation, total number of years of maternal education and income were used as indicators of SES.

Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978). The 50-item LES determined maternal perceptions of both positive and negative life events experienced within the year. Ratings on a 7-point Likert scale range from -3 (*extremely negative*) to 3 (*extremely positive*), with 0 representing "no impact." For the purposes of the study, only Section 1, consisting of items relating to most individuals rather than to students exclusively, was used. Maternal reports of total number of negative events occurring in the past 12 months were included in the current analyses.

According to Sarason et al. (1978), test-retest reliability coefficients obtained from two studies (N = 34 and 58, respectively) were .19 and .53 for positive change scores, .56 and .88 for negative change scores, and .63 and .64 for total change scores. In terms of studies related to validity, Sarason et al. found that total and negative change scores were significantly and positively related to trait and state anxiety as measured by the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) using a sample of 100 college students. Also, for a sample of 75 college students, the authors indicated that LES scores were related to results from the Psychological Screening Inventory (Lanyon, 1973), a scale used to measure stress and maladjustment, in the expected directions. Additionally, negative change scores on the LES were associated with results on the Beck Depression Inventory (BDI; Beck, 1967) and the Internal-External Locus of Control Scale (Rotter, 1966) for a sample of 64 college students.

Students receiving counseling treatment were found to have higher negative change scores compared to a control group (*N* = 36; Sarason et al.).

Olinger, Kuiper, and Shaw (1987) sought to examine how attitudes combined with stressful life experiences contributed to depressive symptomology (*N* = 120). Overall, both LES negative change scores and scores on the Dysfunctional Attitudes Scale (Weissman & Beck, 1978) predicted BDI results. Further, high BDI scores were associated with increased perceived stress levels, further supporting the interactive relations between negative life experiences and vulnerability to depression (Olinger et al.). However, studies from both Olinger et al. and Sarason et al. (1978) utilized small, college-aged samples only, and most results were based on correlational, cross-sectional data.

Kotch, Browne, Dufort, Winsor, and Catellier (1999) evaluated how various neonatal risk factors contribute to child maltreatment in the first 4 years of life (*N* = 708). The authors found that maternal stressful life events as measured by the LES and social well-being produced an interaction effect in predicting child maltreatment. Characteristics such as maternal education, depression, and psychosomatic symptoms significantly predicted child maltreatment (Kotch et al.). Overall, results suggested that maternal experiences associated with negative life events contributed to childhood development in conjunction with other risk factors. However, the sample utilized consisted of mostly low-SES families, and maltreatment reports were not legally substantiated (Kotch et al.).

Maternal measures. Mothers completed psychological and cognitive measures within the home setting. Scores related to maternal psychological symptoms and IQ were examined as potential predictors of adaptive ER strategy use in preschoolers.

Brief Symptom Inventory (BSI; Derogatis, 1993). The BSI assessed maternal psychological symptoms related to internalizing disorders. The scale consists of 53 items rated on a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*), representing the severity of symptoms. Three Global Indices of Distress are produced, the General Severity Index (GSI), the Positive Symptom Distress Index, and the Positive Symptom Total. Further, scores can be interpreted via nine primary symptom dimensions related to different disorders (Derogatis). For the purposes of the current analyses, only GSI *T* scores were included. *T* scores of 63 or above are considered indicative of clinically significant psychological symptoms (Derogatis).

Findings regarding the psychometric characteristics of BSI scores have been mixed. Derogatis and Melisaratos (1983) provided technical properties of BSI scores based on older norm samples ($n_{outpatient}$ = 1,002; $n_{nonpatient}$ = 719; $n_{inpatient}$ = 313). According to information from the technical manual, more recent norm construction was based on four samples: adult nonpatient (*n* = 974), adult psychiatric outpatient (*n* = 1,002), adult psychiatric inpatient (*n* = 423), and adolescent nonpatient (*n* = 2,408; Derogatis, 1993). Across samples, internal consistency coefficients ranged from .71 to .85 for the nine dimensions: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism. Additionally, test-rest reliability coefficients ranged from .68 to .91 across dimensions and from .87 to .90 across global indices. Derogatis also included evidence for structural validity of BSI scores as well as for high convergent validity with Symptom Checklist-90 (Derogatis, 1983) and Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1983) scores.

In terms of validity, BSI scores have served as markers of symptom improvement due to treatment effectiveness (*N* = 217; Piersma, Reaume, & Boes, 1994). However, generalizability of results may be limited based on the composition of the sample (Piersma et al.). Overall, factor analytic results from various studies have supported the interpretation of global scores only (Clark Johnson, Murphy, & Dimond, 1996; Khalil, Hall, Moser, Lennie, & Frazier, 2011; Morlan & Tan, 1998). Findings also provided psychometric evidence for use with individuals with mild intellectual disabilities (Kellett, Beail, Newman, & Hawes, 2004; Wieland, Wardenaar, Fontein, & Zitman, 2012) and those from international samples (Daoud & Abojedi, 2008; Daoud & Abojedi, 2010; Loutsiou-Ladd, Panayiotou, & Kokkinos, 2008).

Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). The WASI is a norm-referenced, abbreviated intelligence test designed for use with children, adolescents, and adults ages 6 through 89 years. WASI scores were standardized using a nationally representative, stratified sample of 2,245 English-speaking individuals from the U.S. (Wechsler). The WASI consists of four subtests: (a) Vocabulary, (b) Block Design, (c) Similarities, and (d) Matrix Reasoning. IQ scores can be derived from both four-subtest and two-subtest forms, which require 30 minutes and 15 minutes for completion, respectively (Wechsler). For the purposes of the study, only Vocabulary and Matrix Reasoning were used to determine maternal IQ scores.

WASI subtest scores are converted from raw form into *T* scores, which are used to determine standard scores for both subscale (Verbal and Performance) and Full Scale IQ (FSIQ) scores. Subtest *T* scores may be translated into scaled scores. WASI standard scores also include percentile ranks, confidence intervals, and test-age equivalents.

The Vocabulary subtest consists of 42 items, 4 pictures and 38 words, designed to assess an individual's verbal knowledge and expressive vocabulary (i.e., crystallized intelligence). The Matrix Reasoning subtest is comprised of 35 items with two samples used to examine nonverbal reasoning (i.e., fluid intelligence). Both subtests provide an adequate measure of general intellectual ability (*g*), a construct related to both verbal and nonverbal ability (Wechsler, 1999).

Internal consistency coefficients were calculated using scores from both child and adult samples from two pilot studies (*N* = 242 and 316, respectively) and a national tryout study (*N* = 978). Internal consistency coefficients derived using the adult sample ranged from .90 to .98 for Vocabulary and from .88 to .96 for Matrix Reasoning. Reliability coefficients for the two-subtest form (FSIQ-2) ranged from .93 to .98 (Wechsler, 1999).

Test-retest stability was determined using scores from a nationally representative sample of 222 participants, with eight to 14 participants from each age group. Average coefficients for the scores from the adult sample ranged from .79 to .90 for subtest scores. Test-retest coefficients for the FSIQ-2 had an average of .88 for scores from the adult samples (Wechsler, 1999).

Developers of the WASI also examined interrater reliability amongst four trained scorers, two experts and two graduate students. Interrater reliability coefficients ranged from .98 to .99 for both verbal subtest scores. The test developers concluded that despite the possible subjectivity involved in scoring verbal subtests, both Similarities and Vocabulary items can be scored using adequate reliability (Wechsler, 1999).

The structural validity of WASI scores is supported by evidence for interrelations between scores as well as results from factor analyses. FSIQ-2 and four-subtest form (FSIQ-4) scores displayed average correlations ranging from .93 to .95 for scores from child and adult samples, respectively. Further, Verbal and Performance scores were adequately correlated with FSIQ-2 and FSIQ-4 scores, with average coefficients ranging from .84 to .91 for the total sample (Wechsler, 1999).

Factor structure analysis of scores from the standardization sample was used to examine the consistency of verbal and nonverbal (performance) constructs, though the authors indicated that the data may have been insufficient due to number of WASI subtests (Wechsler, 1999). The test developers instead used data from the correlation studies (*N* = 176 and 248, respectively) involving both the Wechsler Intelligence Scale for Children–Third edition (WISC-III; Wechsler, 1991) and the Wechsler Adult Intelligence Scale–Third edition (WAIS-III; Wechsler, 1997) in order to include more subtests in the analysis. Exploratory factor analysis (EFA) results indicated support for a two-factor solution including verbal and nonverbal constructs; however, support was also found for a four-factor solution using the WASI/WAIS-III sample. Then, confirmatory factor analysis was used with the standardization sample to examine both one- and two-factor models. Overall, the two-factor model was determined to be the best fit across scores from child, adult, and the total sample (Wechsler, 1999).

In order to provide evidence for content validity of test scores, WASI items were created using content from both the WISC-III and WAIS-III. Also, a panel of experts compared items between the WASI, WISC-III, and WAIS-III to examine similarities between test batteries (Wechsler, 1999). WASI scores were adequately correlated with WISC-III scores (*N* = 176), with coefficients ranging from .69 to .74 for subtest scores and from .81 to 87 for FSIQ-2 and the four-subtest form (FSIQ-4), respectively. Additionally, WASI scores were adequately correlated with WAIS-III scores (*N* = 248), with coefficients ranging from .66 to .88 for subtest scores and from .87 to .92 for FSIQ-2 and FSIQ-4, respectively. Last, WASI scores displayed adequate correlations with academic achievement scores from the Wechsler Individual Achievement Test (WIAT; Wechsler, 1992), with coefficients ranging from .53 to .72 for WIAT composite scores (Wechsler, 1999).

The test developers also examined clinical validity using samples of individuals diagnosed with mental retardation, giftedness, ADHD, learning disabilities, and traumatic brain injury; however, the authors acknowledged several limitations of the clinical studies such as use of small samples that were not statistically representative. Overall, the WASI was determined to be a good measure of general intelligence across groups, though specific information about memory and processing speed were not obtained (Wechsler, 1999).

Child measures. Preschoolers were administered an abbreviated IQ test in the home setting. Information regarding child preschool status, gestational age, age, and gender was collected via demographic surveys.

Stanford-Binet–Fifth edition: Abbreviated Battery (SB-5: AB; Roid, 2003). The SB-5: AB is an abbreviated, norm-referenced, standardized intelligence test for use with individuals ages 2 through 85+. SB-5: AB norms were developed using a nationally representative, stratified sample of 4,800 children and adults (Roid). Full Scale Intelligence Quotient (FSIQ) scores are based on 10 subtest scores, five verbal and five nonverbal; however, the Abbreviated Battery was determined to be more appropriate for the purposes of the study. The Abbreviated IQ (ABIQ) is based on two routing subtests, Object Series/Matrices (nonverbal; NV FR) and Vocabulary (verbal; V KN). The full test can be completed in 45 to 75 minutes, whereas the Abbreviated Battery takes only 15 to 20 minutes for administration (Roid).

For the SB-5: AB, raw scores are converted into scaled scores, which may be used to derive IQ scores. Percentile ranks, confidence intervals, and change-sensitive and age equivalent scores are available to aid in interpretation. The NV FR subtest consists of 36 items and is used to assess nonverbal fluid reasoning, whereas the V KN subtest is composed of 44 items and considered a of measure vocabulary knowledge (Roid, 2003).

Based on the norm sample, the average internal consistency coefficient for ABIQ scores across age groups was .91. As expected, average reliability coefficients for V KN and NV FR subtests were slightly lower (*r* = .89 and .86, respectively). Further, internal consistency coefficients specific to 3- to 5-year-old's scores ranged from .89 to .92 for the ABIQ, .84 to .88 for V KN, and .82 to .91 for NV FR (Roid, 2003).

Additionally, the author provided test-retest coefficients for ages 2 through 5. The test-retest reliability coefficient was .87 for ABIQ scores. V KN and NV FR scores produced test-retest reliability coefficients of .91 and .76, respectively. Interrater reliability coefficients were derived for subtest scores involving items scored polychotomously using stratified random sampling of the norm sample. Overall, V KN scores indicated interrater reliability coefficients ranging from .95 to .98 across three examiners (Roid, 2003).

Indicators of content validity of ABIQ scores were based on expert judgment and item analysis. The correlation between FSIQ and ABIQ scores was .81 for 2- to 5-year-olds, slightly lower than the relation for ages 6 and above (*r* = .87). Also, concurrent validity evidence has been found regarding ABIQ relations to scores on the WISC-III and WAIS-III, with coefficients ranging from .69 to .81, respectively (Roid, 2003).

In terms of clinical utility, studies conducted with specific groups of individuals (e.g., those with intellectual disabilities) have produced adequate support for sensitivity and specificity of ABIQ scores. However, the author did not recommend interpreting SB-5 results as a sole measure of group status, but rather to use scores to inform hypotheses and contribute to comprehensive assessments (Roid, 2003). Overall, the SB-5: ABIQ is considered an acceptable measure of general cognitive ability for preschool participants.

Other child variables. Mothers indicated whether child participants attended preschool, the number of months of enrollment, and the specific month of enrollment. For the purposes of the study, only preschool attendance status was included in the analysis. Child gestational age, age, and gender also were examined as possible predictors of ER strategy use.

ER strategy outcomes. Children's use of ER strategies was coded at 5-second intervals by trained observers during the Transparent Box task. Based on previous research related to children's coping behaviors during frustrating tasks (Calkins & Johnson, 1998; Cipriano, 2010; Gilliom et al. 2002), seven behaviors were included in the coding scheme: distraction, giving up, goal-directed behavior, negative self-speech, physical venting, positive/neutral self-speech, and self-soothing. Children could display multiple behaviors during a single interval. Seven ER strategy proportion scores were created based on the frequency a specific behavior was observed divided by the total number of intervals during the task to reflect the amount of time a participant engaged in each strategy (Cipriano). Creation of adaptive and maladaptive composites were explored for the proposed analyses.

Chapter 3

Results

Descriptive Statistics and Preliminary Analyses

Results from the FaMILY Study were based on a quasi-experimental, static group comparison design. The Statistical Package for the Social Sciences Version 16.0 (SPSS V.16.0, 2007) was used to conduct the analyses. Data were screened for missing input and outliers. Based on the standard of 10 to 15 cases per predictor (Field, 2009; Tabachnick & Fidell, 2007), the sample size was considered appropriate for multivariate analyses, and all cases were included based on evaluation of Mahalanobis distance values (N = 108).

Number of children in the home ranged from 1 to 6 across maltreatment and comparison groups (M = 2.32; SD = 1.14). Maternal years of education ranged from 9 to 20 years (M = 13.48; SD = 2.42). Information about income groupings is included in Table 1. Total number of negative events ranged from 0 to 14 events (M = 3.15; SD = 2.60). GSI scores ranged from 33 to 72 (M = 54.08; SD = 10.83). WASI scores from the maternal sample ranged from 55 to 130 (M = 102; SD = 15.26). SB-5 ABIQ scores from the child sample ranged from 76 to 133 (M = 100.46; SD = 12.94). Preschoolers were ages 3 through 5 (M = 3.67; SD = .72).

Means and standard deviations of relevant variables differentiated by group status are reported in Tables 1 and 2. Maltreatment and comparison groups were relatively similar across variables with the exception of statistically significant differences for maternal education, WASI FSIQ-2, family income, LES scores, and SB-5 ABIQ. Correlations between predictor and outcome variables are included in Table 3. Variables with skew less than two and kurtosis less than seven were considered acceptable for the normality assumption (West, Finch, & Curran, 1995). Histograms and scatter plots of predictors and outcome variables were examined for evidence of normality and linearity. Predictor residuals were visually evaluated for homoscedasticity (Field, 2009).

Table 3

Intercorrelations for Environmental Variables, Maternal and Child Measures, and Adaptive Emotion Regulation (ER) Outcome (N = 94)

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Adaptive	-						
2. Education	-.14	-					
3. Child age	.35	.21	-				
4. Total children	-.05	-.03	-.08	-			
5. LES	-.15	-.02	.03	-.02	-		
6. GSI	-.03	-.25	.08	.06	.42	-	
7. WASI	-.01	.62	.12	-.12	-.01	-.32	-
8. SB-5	.18	.18	-.06	-.27	-.02	-.08	.27

Note. Adaptive = adaptive composite of goal-directed, inverse distraction, and inverse self-soothing summed proportion scores. Education = maternal total number of years of education. Total children = total number of children in home. WASI = Wechsler Abbreviated Scale of Intelligence two-subtest form. GSI = Behavioral Symptom Inventory General Severity Index. LES = Life Experiences Survey total number of negative events reported for 12-month period. SB-5 = Stanford-Binet–Fifth edition Abbreviated IQ.

Exploratory Factor Analysis (EFA)

Factorability. ER strategy use outcomes were analyzed via EFA to determine whether differentiation into maladaptive and adaptive composite scores was plausible. To examine the appropriateness of the data for EFA, singularity or multicollinearity between variables (r > .90; Tabachnick & Fidell, 2007) was screened. Correlations between ER strategy proportion scores are presented in Table 4. The value of the determinant was examined and determined to be .08, with a determinant greater than .0001 deemed factorable (Tabachnick & Fidell). The Kaiser-Meyer-Olkin (KMO; Kaiser, 1974) test of sampling adequacy value was .55, with a value greater than or equal to .50 deemed acceptable. Additionally, Bartlett's test of sphericity ($\chi^2 = 262.52$, $df = 21$, $p < .001$; Bartlett, 1950) indicated factorability of the data (Field, 2009).

Table 4

Summary of Intercorrelations, Ranges, Means, and Standard Deviations for Emotion Regulation (ER) Strategies Proportion Scores During the Transparent Box Task (N = 108)

Measure	*1*	*2*	*3*	*4*	*5*	*6*	*M*	*SD*	Range	Skew	Kurtosis
1. GD	-						.64	.28	1.00	-.63	-.57
2. GU	.00	-					.01	.02	.17	5.52	35.49
3. PNSS	-.13	-.05	-				.13	.14	.62	1.22	.94
4. NSS	.01	.25**	.24	-			.04	.07	.38	2.52	6.97
5. PV	-.13	.17	.04	.35**	-		.01	.04	.30	5.19	29.52
6. SS	-.33**	.21*	-.14	-.10	-.06	-	.02	.07	.45	4.20	18.43
7. D	-.93**	-.01	.12	-.03	.12	.38**	.35	.27	1.00	.54	-.59

Note. GD = goal-directed; GU = giving up; PNSS = positive/neutral self-speech; NSS = negative self-speech; PV = physical venting; SS = self-soothing; D = distraction. Range = range of proportion scores for each ER strategy.
*$p < .05$. **$p < .01$

Extraction and rotation methods. For the purpose of the analysis, principal axis factoring was considered preferable to principal components analysis (Pedhazur & Schmelkin, 1991). Results related to percentage of variance explained by the factor solution, scree test, parallel analysis, and Kaiser's (1960) eigenvalue greater than one rule were considered for determining factor retention (Zwick & Velicer, 1986). Oblique (promax; $k = 4$) rotation was interpreted due to correlations between factors (Tabachnick

& Fidell, 2007). Factor retention was considered based upon a minimum number of three variables per factor, salient pattern/structure coefficients (≥ .35; Comrey & Lee, 1992), and at least .20 coefficient differences for variables across a factor structure (Hair, Anderson, Tatham, & Black, 1998). Further, variable crossover was expected to be minimal.

Factor Solution Comparison

Both parallel analysis (Watkins, 2006) and scree plot results indicated that three factors should be retained. However, violations of factor retention criteria indicated that the three-factor solution was not interpretable. Pattern coefficients revealed that not all proportion scores displayed a difference of .20 across factors to ensure minimal variable crossover. Therefore, a two-factor solution was explored. Results indicated that the two-factor solution was most interpretable and displayed the simplest structure.

Two-Factor Solution

As shown in Table 5, only five of seven proportion scores displayed salient pattern coefficients across factors (Range = -.93-.99), and communalities ranged from .06 to 1.00. Proportion scores for goal-directed, distraction, and self-soothing behavior loaded saliently on the first factor, whereas physical venting and negative self-speech scores displayed salient pattern coefficients for the second factor. The two-factor solution accounted for 31.17% of total variance, which is comparable to the percentage of total variance accounted for by the three-factor solution. Therefore, the two-factor solution was determined to be the best solution.

Table 5

Pattern Coefficients, Eigenvalues, and Communalities for ER Strategy Proportion Scores (N =108)

	Pattern Coefficients		
Strategy	1	2	h^2
GD	**-.93**	-.07	.87
GU	.01	.25	.06
PNSS	.07	.22	.06
NSS	-.11	**.93**	.86
PV	.08	**.39**	.16
SS	**.37**	-.08	.14
D	**.99**	.05	1.00
Eigenvalue	2.18	1.56	
% Variance	31.17	22.29	

Note. Coefficients ≥ .35 are in bold. GD = goal-directed; GU = giving up; PNSS = positive/neutral self-speech; NSS = negative self-speech; PV = physical venting; SS = self-soothing; D = distraction; h^2 = communality.

Adaptive ER Strategy Composite

Based upon the criterion of three salient loadings per factor, only the first factor was considered interpretable. Proportion scores for goal-directed and inverse proportion scores for distraction and self-soothing strategies were summed to create an adaptive ER strategy composite (*M* = 2.27; *SD* = .57). The adaptive composite score was used for subsequent analyses related to how environmental, maternal, and child characteristics predicted ER outcomes during the Transparent Box task.

Multiple Regression Analysis

Multiple regression analysis was used to assess how environmental (i.e., SES, number of stressful events, and number of children in the home), maternal (i.e., IQ and psychological symptoms), and child variables (i.e., gender, age, gestational age, IQ, and preschool status) predicted ER outcomes during the Transparent Box task. Predictor variables were entered sequentially based on groupings of variables (i.e., environmental, maternal, and child).

Additionally, group status was entered as an environmental predictor. Controlling for child gender, age, and gestational age, only child age, SB-5 ABIQ scores, and maternal total years of education emerged as statistically significant predictors of adaptive ER strategy use for the total sample using the full model (*N* = 94). Given sample size considerations and previous research findings, several variables (i.e., number of children in the home, LES scores, and preschool status) were removed, allowing for improved interpretability and parsimony of the model (*N* = 96). As shown in Tables 6 and 7, child age, ABIQ scores, and maternal education statistically significantly contributed to preschoolers' adaptive ER composite outcomes, though practical significance was considered small to moderate based on β and ΔR^2 values.

Although child age and IQ displayed significant associations with adaptive behavior outcomes in the expected directions, higher maternal education was negatively related to preschoolers' time spent engaged in adaptive ER strategy use. When means of adaptive outcomes were examined by maternal education level, it seemed that the relations may have been influenced by the variability in adaptive ER outcomes across subgroups. More specifically, adaptive outcome means did not consistently increase from 9 years (*M* = 2.24) of maternal education through 20 years (*M* = 2.71). Further, the group of preschoolers who had mothers with 18 years of education (*n* = 8) displayed the least amount of time using adaptive ER strategies (*M* = 1.65), and the group who had mothers with 14 years of education (*n* = 11) demonstrated the next lowest level of adaptive ER outcomes (*M* = 2.05).

Table 6

Hierarchical Regression Analysis Summary for Environmental Variables and Maternal and Child Measures Predicting Adaptive ER (N = 94)

Predictor	*B*	*SE B*	β	T	*p*-value	Δ R^2	R^2	R^2_{adj}
Block 1								
Child gender	.10	.11	.09	.93	.36	.14	.14	.11
Child age	.33	.08	.42	4.06	.00**			
Gestational age	.17	.15	.12	1.14	.26			
Block 2						.09	.23	.16
Education	-.09	.03	-.36	-2.74	.01**			
Income	-.03	.07	-.06	-.45	.65			
Total children	.03	.06	.06	.57	.57			
LES	-.02	.02	-.10	-.89	.37			
Group status	.15	.14	.13	1.08	.28			
Block 3						.01	.24	.15
BSI GSI	-.00	.01	-.09	-.74	.46			
WASI FSIQ-2	.00	.01	.03	.25	.80			
Block 4						.05	.29	.19
SB-5 ABIQ	.01	.01	.26	2.48	.02*			
Preschool status	.01	.13	.00	.04	.97			

Note. Education = maternal total number of years of education. Total children = total number of children in home. WASI FSIQ-2 = Wechsler Abbreviated Scale of Intelligence two-subtest form. BSI GSI = Behavioral Symptom Inventory General Severity Index. LES = Life Experiences Survey total number of negative events reported for 12-month period. SB-5 ABIQ = Stanford-Binet–Fifth edition Abbreviated IQ.
*$p < .05$. **$p \leq .01$.

Table 7

Hierarchical Regression Analysis Summary for Environmental Variables and Maternal and Child Measures Predicting Adaptive ER (N = 96)

Predictor	*B*	*SE B*	β	T	*p*-value	Δ R^2	R^2	R^2_{adj}
Block 1								
Child gender	.08	.11	.07	.75	.46	.15	.15	.12
Child age	.35	.08	.44	4.51	.00**			
Gestational age	.22	.14	.15	1.62	.11			
Block 2						.06	.21	.16
Education	-.08	.03	-.35	-2.76	.01**			
Income	-.01	.06	-.01	-.12	.91			
Group status	.14	.13	.12	1.05	.30			
Block 3						.02	.23	.16
BSI GSI	-.01	.01	-.13	-1.25	.22			
WASI FSIQ-2	.00	.01	.00	.01	1.00			
Block 4						.06	.29	.22
SB-5 ABIQ	.01	.00	.27	2.78	.01**			

Note. Education = maternal total number of years of education. WASI FSIQ-2 = Wechsler Abbreviated Scale of Intelligence two-subtest form. BSI GSI = Behavioral Symptom Inventory General Severity Index. SB-5 ABIQ = Stanford-Binet–Fifth edition Abbreviated IQ.
** $p \leq .01$

Post-Hoc Analyses

Analysis of variance (ANOVA) was used to examine adaptive ER strategy usage differences based on child age. Equality of variance was confirmed using Levene’s test. Results across the three age groups indicated significant differences in the adaptive ER outcome, $F(2, 105) = 7.19$, $p = .00$. Post-hoc comparisons using a Bonferroni adjustment revealed that 3-year-olds displayed significantly less time using adaptive strategies ($M = 2.06$; $p = .00$) compared to 4- and 5-year-olds ($M = 2.46$ and 2.44, respectively);

the difference between the two older groups was not statistically significant.

T-tests were used to assess group differences in adaptive ER strategy usage for gender and group status. Equality of variances was evaluated using Levene's test. Effects for both gender, $t(106) = -.71$, $p = .48$, and group status, $t(106) = -.06$, $p = .95$, were nonsignificant. Whereas no differences in adaptive ER strategy usage during the Transparent Box task were found for group status and gender, the youngest participants demonstrated significantly less time spent using adaptive strategies compared to older preschoolers. Further, the correlation between adaptive ER outcome and maternal education ($r = -.08$) was not statistically significant ($N = 108$). Considering the hierarchical regression results related to maternal education, it may be that the variability of the data influenced the results.

Chapter 4

Discussion

The purpose of this study was to examine how specific environmental, maternal, and child characteristics influenced preschoolers' use of ER strategies during the Transparent Box task. Further, ER strategy outcomes were compared across maltreatment and control groups ($n_{maltreatment}$ = 62; $n_{comparison}$ = 46). Based on factor analytic findings, an adaptive ER composite was created by summing the proportion scores for goal-directed and inverse proportion scores for distraction and self-soothing strategies. Overall, three predictors (i.e., child age, SB-5 ABIQ scores, and maternal total years of education) displayed statistically significant coefficients for the total sample when examining the adaptive ER outcome (N = 96). Although maternal education was determined to be a significant predictor of adaptive ER strategy use, it may be that the nature of the relations was not practically meaningful. Child age and IQ were related to adaptive ER outcomes in the expected directions. When adaptive ER composite means were compared across group status and gender, the results were not statistically significant; however, post-hoc analysis revealed that 3-year-old participants spent significantly less time using adaptive ER strategies compared to older preschoolers.

Based on these results, the proposed hypotheses regarding the influence of environmental, maternal, and child factors on adaptive ER strategy use were not fully supported. Consistent with previous findings regarding important influences on childhood outcomes across various domains, child age, SB-5 ABIQ scores, and maternal education emerged as significant predictors of adaptive ER strategy use during the Transparent Box task. However, preschoolers across maltreatment and comparison groups as well as boys and girls displayed relatively similar adaptive ER strategy use. Additionally, age differences were significant only for the youngest participants in terms of adaptive ER strategy use.

Based on results from previous studies, it is not surprising that maternal education level and child age and IQ (Durham et al., 2007) emerged as significant predictors of preschoolers' adaptive ER strategy use. Much support has been found for links between maternal education, child age, and child IQ and childhood outcomes related to EF and ER (Dearing et al., 2001; Durham et al.; Feng et al., 2008, Hoffman, Crnic, & Baker, 2006; Maughan et al., 2007; Silk et al., 2006). However, it is interesting that other predictors such as group status (Maughan & Cicchetti, 2002; Shipman et al., 2005; Shipman & Zeman, 2001; Teisl & Cicchetti, 2008), income level (Bradley & Corwyn, 2002; Dearing et al., 2006; Howse, Lange, Farran, et al., 2003), maternal psychological symptoms (Blandon et al., 2008; Essex et al., 2006; Linver, Brooks-Gunn, & Kohen, 2002), and child gender (Hill et al., 2006; Miner & Clark-Stewart, 2008) did not significantly predict adaptive ER outcomes. Individual factors (e.g., childhood resilience, preschooler behavior difficulties, maternal sensitivity, maternal ER) may have influenced the results. It may be that children in the sample displayed adequately developed ER skills despite exposure to risk factors such as maltreatment and low SES environments (Garner & Spears, 2000; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004).

Additionally, the direction of prediction between maternal education and ER strategy use was unexpected. Detailed examination of adaptive composite means by maternal education level indicated an inconsistent relation between the variables. One explanation is that the way in which maternal education and ER were measured differed from previous studies with significant findings (e.g., Hoglund & Leadbeater, 2004). Also, maternal education may have associations with other variables that were not included in the current study (e.g., parenting style, maternal stress).

Limitations

Several limitations may have affected the generalizability of preschoolers' adaptive ER strategy use. Results were based on a cross-sectional study utilizing a small, restricted sample from central Pennsylvania. Further, there are inherent difficulties with the reliability and validity of assessment results of children 5 years and younger, and both maternal and child IQ scores were abbreviated, indicating somewhat less reliability and validity of results compared to FSIQs. Despite the adequate psychometric properties of SB-5 ABIQ results for preschoolers, developmental characteristics such as activity level and inconsistent performance could have affected test performance (Ford & Dahinten, 2005). Last, much of the data collected were based on maternal report only.

Notably, findings were based on preschoolers' performance during one laboratory task. It is possible that children's interpretations of the frustration-inducing task influenced the results (Dennis, Cole, Wiggins, Cohen, & Zalewski, 2009). Additionally, the Transparent Box task is used to elicit a limited range of contexts and responses (Gagne et al., 2011).

Other limitations of the current study may have been due to measurement and data difficulties. Several of the variables displayed questionable skew and kurtosis values (e.g., self-soothing proportion scores), and results of the EFA were difficult to interpret for the purpose of the study. The seven strategies measured by the ER coding system may have targeted overlapping constructs. When goal-directed behavior and inverse-coded distraction were examined as single adaptive ER outcomes, similar multiple regression results emerged compared to the current findings; however, child age, maternal education, and maternal psychological symptoms were significant predictors for inverse-coded self-soothing as a single outcome. Additionally, regression with maladaptive ER strategies as outcomes displayed various other predictors. More specifically, gender appeared to be a significant predictor of use of the physical venting strategy, and group status was a significant predictor of giving up strategy use. Therefore, measurement of complex constructs may influence the ways in which the results are interpreted (Dennis et al., 2009).

Implications

Considering that the amount of variance accounted for by child age, IQ, and maternal education level was small to moderate, it may be that alternative predictors were not measured or that the adaptive ER composite was not entirely reflective of the intended measurement. Variables such as family instability (Mistry et al., 2004) and duration and timing of poverty (NICHD, 2005a) were not included in the current study. Further, the measurement of ER poses both theoretical and methodological difficulties that subsequently affect consistency across studies and generalizability of results (Cole et al., 2004).

Future Directions

Additional variables that may be related to ER development during early childhood include parenting style, child home functioning, quality of preschool environment, teacher perceptions of child behavior, and school readiness skills. EF and ER skills (e.g., attention, behavioral regulation) at school entry have been linked to preacademic performance (NICHD ECCRN, 2005b), and school readiness is associated with academic achievement in later childhood (Pagani, Fitzpatrick, Archambault, & Janosz, 2010). Overall, difficulties with regulation and engagement in the classroom have been shown to negatively influence subsequent academic outcomes (Fantuzzo et al., 2007; Howse, Calkins, Anastopoulos, et al., 2003).

Developing further understanding about how ER contributes to school readiness across developmental domains is essential. Moreover, it may be important to use multiple measures of ER, particularly when assessing young children. Further examination of environmental, maternal, and child influences on ER development in preschoolers necessitates longitudinal research with larger, more representative samples.

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VITA

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The Pennsylvania State University	PhD; 2013
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Cornell University	BS; 2006

II. PROFESSIONAL CERTIFICATIONS

2013-present *Pupil Personnel Services License*, VA
2012-present *School Psychologist Certificate*, PA

III. EMPLOYMENT EXPERIENCES

2013-present *School Psychologist*, Alexandria City Public Schools
2012-2013 *School Psychology Intern*, Alexandria City Public Schools
2011-2012 *Mobile Clinician*, Bald Eagle Area School District
2009-2011 *Research Assistant*, The Family Systems Laboratory

IV. PROFESSIONAL PRESENTATIONS

Mintern, B. E., & Schaefer, B. A. (2011, August). *Factor structure of the Universal Nonverbal Intelligence Test (UNIT) for Nepali youth.* Poster session presented at annual conference of the American Psychological Association, Washington, DC.