

EMOTION REGULATION IN AT-RISK YOUTH: THE INFLUENCE OF THE FAMILY

CHECK-UP

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The purpose of this study was to advance our understanding of the role of emotion regulation in the growth of conduct problems over time by examining whether increases in positive behavior support brought about by a family-centered intervention focusing on parenting were associated with more adaptive emotion regulation, and whether more adaptive emotion regulation at age 3 in turn mediated the association between improvements in positive behavior support from ages 2-3 and decreases in the growth of conduct problems from ages 2-4. The results indicated that emotion regulation at age 3 was significantly associated with growth in conduct problems from ages 2-4. However, neither the intervention nor positive behavior support was significantly associated with emotion regulation. Results provide support for the notion that emotion regulation plays an important role in the growth of conduct problems in early childhood, but do not support the hypotheses that a family-centered intervention would result in more adaptive child emotion regulation strategies or that such changes in emotion regulation would mediate previously reported intervention effects between parenting and reductions in growth of child conduct problems.

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1.0 INTRODUCTION

Longitudinal research in the area of antisocial behavior consistently has shown that persistent conduct problems (CP) in early childhood present a risk indicator for the development of more serious antisocial behavior in later childhood and adolescence (Campbell, 2002; Moffitt & Caspi, 2001; Broidy et al., 2003; Shaw & Gross, 2008). Given the serious implications of persistent CP, including the potential for adult criminality, the investigation of ways in which to intervene in early childhood to modify problematic behavior merits attention. Beginning in early childhood many investigations have examined factors that contribute to the exacerbation or improvement of child CP. Moreover, interventions designed to modify risk factors have demonstrated promising potential for success (e.g., Olds, 2002; Baydar, Reid, & Webster-Stratton, 2003; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006; Domitrovich, Cortes, & Greenberg, 2007).

Two factors that are associated with the development of CP in early childhood and shown to be modifiable through interventions are emotion regulation (ER) and parenting. Problems with ER, particularly regulating anger and dealing with frustrating situations, are factors that have differentiated typical children from those with early CP (Cole & Zahn-Waxler, 1992). Several dimensions of parenting have also consistently been linked to the emergence of CP in early childhood, including responsiveness and harsh control (Campbell, Pierce, Moore, & Marakovitz, 1996; Pettit, Bates, & Dodge, 1997; Shaw, Keenan, & Vondra, 1994). Because young children are reliant upon caregivers to assist them in the management of their emotions and behavior, it is important to consider how parents affect the development of ER. Specifically, parental responses

that occur immediately after children's expressions of emotion have been shown to have an important influence on how children cope when distressed (Eisenberg, Fabes, & Murphy, 1996; Fabes, Leonard, Kupoanoff, & Martin, 2001; Cole, Teti, & Zahn-Waxler, 2003).

Preventive interventions targeting aspects of ER have shown success in modifying child problem behavior, most notably CP (Izard et al., 2008). While these findings are promising, one significant limitation of the extant literature on ER interventions is limited attention to parenting, which may lead researchers to miss accounting for important dyadic elements of ER for young children. Additionally, omitting parenting may lead to difficulty in translating the skills children learn from a specific intervention setting, such as the school, to the home (Izard et al., 2008).

Similarly, preventive interventions focusing on parenting have been found to be successful in reducing early CP even among samples of high-risk children (Dishion et al., 2008; Shaw, Dishion, et al., 2006). The efficacy of such interventions provides strong support for the notion that improvements in parenting can influence changes in child behavior, but the child mechanisms through which such changes occur remain unclear. Given the associations between ER and child behavior, existing research supports the contention that ER may play an important role in the relationship between parenting interventions and early child CP, especially in light of the transactional nature of ER between parent and child.

The current study seeks to expand upon current intervention literature to examine whether an intervention successful in reducing child CP may be operating through changes in ER. Using a sample of 731 two-year olds, recruited from nutritional supplement centers at urban, rural, and suburban locations in the US on the basis of socioeconomic, family, and child risk factors, the study's central aim is to identify a child mechanism through which changes in parenting have been found to be associated with improvements in later child CP. More

specifically, the study seeks to examine whether a parenting-focused intervention previously found to be linked to improvements in early CP is related to earlier adaptive skills in child ER, and whether improvements in ER mediate later changes in child CP.

2.0 LITERATURE REVIEW

This review will focus on factors that influence ER, particularly parenting, and how ER has been found to be related to CP in both basic and intervention research. The findings from prior basic and intervention research involve two lines of study, which provide a framework for the current study's examination of the possible indirect pathway through which a parenting intervention may influence CP via its effect on ER. The first line examines how ER is related to CP and the second examines how dimensions of parenting have been related to CP.

2.1 EMOTION REGULATION

The adaptive regulation of emotions is an important aspect of development for young children (Kopp, 1989) and can affect diverse areas of their lives, spanning spheres such as social relationships (Spinrad et al., 2006), achievement outcomes, (Thompson, 1991; Eisenberg et al., 1997) and psychological wellbeing (Cole, Michel, & Teti, 1994). Relevant to the study of youth at risk for the development of CP, ER is implicated in multiple forms of psychological maladjustment, including disruptive behavior disorders and mood disorders (Cole, Michel et al., 1994), and therefore is an important element to consider in advancing our understanding of the development, prevention, and treatment of such disorders. Strong associations have been demonstrated between ER and behavior problems (Eisenberg, Cumberland, et al., 2001), and specific regulatory difficulties have been linked to both internalizing and externalizing problem

behaviors. Further, specific to CP, different types of regulatory strategies and emotional expressions have been shown to play a role in the persistence of CP (Cole et al., 2003). Improved understanding of ER has the potential to provide an avenue through which to prevent the development or exacerbation of CP, particularly in early childhood when behavior appears to be more malleable than in later childhood or adolescence (Dishion & Patterson, 1992).

2.1.1 Emotion Regulation Defined

While research in the area of regulation of the self and one's emotions is not new, there still exists a great deal of debate regarding what the term ER refers to and how it should be distinguished from related constructs such as self regulation. Just as emotions are a complex phenomenon, the regulation of emotion is complex and encompasses physiological, cognitive, and behavioral elements (Thompson & Calkins, 1996). One compelling viewpoint of ER, known as the functionalist perspective, conceptualizes ER as a process that is "responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (Thompson, 1994, pp. 27-28). The functionalist perspective does not limit the concept of ER to self-regulation (intrinsic factors) as others have done (Gross, 1998), but rather extends the definition to how the management of one's emotions is affected by other actors (extrinsic factors) (Fox & Calkins, 2003; Cole et al., 2003; Thompson, 1994).

The inclusion of intrinsic and extrinsic factors is particularly compelling for the study of ER in early childhood because the ways in which young children react are often the best observable indication for how a situation may be affecting them (as opposed to the specific emotion underlying or leading up to an action) and because of young children's dependence on

adult caregivers in learning how to deal with and regulate unpleasant emotions. There are certainly limitations to taking a functionalist perspective because of the difficulty of measuring specific emotional experiences and concurrent/subsequent behaviors, which generally necessitates an assumption that a certain emotion has been elicited. However, so long as the situations and stimuli under study have been validated as eliciting emotional responses in individuals in the population of interest, the strategies used in the face of such stressors lend themselves to more straightforward study because they are observable (whereas specific emotions themselves may not be).

2.1.2 Factors Affecting Emotion Regulation

Research on ER has identified several influential intrinsic and extrinsic factors related to a child's ability to regulate emotions (Fox & Calkins, 2003). Among the intrinsic factors, some important examples include child temperament (Fox, 1998), effortful control (Kochanska, Murray, & Harlan, 2000), language abilities (Greenberg, Kusche, & Speltz, 1991; Domitrovich et al., 2007), and physiological factors such as vagal tone (Santucci et al., 2008). Researchers have hypothesized that ER develops from a very reliant process in early development to one that becomes more independently directed (Kopp, 1989; Cole et al., 2003), making proximal extrinsic factors related to the development of ER especially important to consider during very early childhood. Although relationships with siblings and peers (Thompson & Meyer, 2007) and day care providers and teachers (Greenberg, Kusche, Cook, & Quamma, 1995) become increasingly important as children become older and spend more time in settings outside of the home, young children are most reliant on primary caregivers, and thus parents are typically the most influential extrinsic factor affecting how young children learn to manage emotions.

While much theoretically oriented research has highlighted the important influence that parents have on the development of ER in children (e.g., Thompson, 1994; Fox & Calkins, 2003), the number of empirical studies examining the effects of parenting on ER in high-risk preschool-age samples has been somewhat limited (Cole et al., 2003). Among school age children, Eisenberg, Fabes, and Murphy's (1996) study examining the effects of parental reactions on children's ER found that mothers' problem-focused reactions were related to positive social functioning whereas minimizing reactions were related to lower social competence and less adaptive emotional coping. Research on younger samples of preschool children has suggested that for children who experience deficits in their regulatory strategies, the ways in which parents interact with them, whether supportive and warm versus harsh and controlling, affects how these children are able to cope with stressors (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). For example, mothers who neglect young children's expressions of sadness and fear may increase risks for dysregulation when children experience these emotions (Shaw, Sherill, et al., 2006). In addition to the focus on parental responses, the tone of responding to children's expressions of emotion has been related to how young children cope when distressed. Fabes et al. (2001) found that parents' harsh responses to preschool children's expressions of negative affect were associated with more intense child emotional reactions and poorer social competence.

Anticipatory positive parenting might also be instrumental in preventing children from becoming easily upset. For example, Thompson (1994) hypothesizes that parents can extrinsically manage children's emotional experiences by helping to control the types of arousing situations to which they are exposed. Additionally, parents may teach (via modeling) proactive ways of handling situations likely to elicit negative emotions, by serving as models to their

children about appropriate ways to respond to stressors through their own responses to emotionally stimulating events (Cole, Michel, et al., 1994). The way that parents talk about feelings can also help children learn to better manage emotions, as work on emotion coaching has demonstrated (Katz & Windecker-Nelson, 2006).

Specific to the study of CP, maternal emotional reactions to children's emotions have been shown to play a role in whether CP persists or improves, with positive emotion linked to improved behavior and negative emotion (specifically anger) associated with worsening and persisting CP (Cole et al., 2003). A study by Katz and Windecker-Nelson (2004) found that mothers of children with CP used less emotion coaching with their children than mothers of children without CP. Parents therefore not only may influence how a child may respond or behave immediately after an exchange but also longer-term patterns of interaction and behavior trajectories, suggesting that intervening to modify maladaptive dyadic elements of ER, both in parental responding and through modeling, could be one means through which to prevent persistent CP.

2.1.3 Emotion Regulation and Conduct Problems

Across age groups and time, research has shown a consistent relationship between ER and risks for CP, including during early childhood (e.g., Cole, Zahn-Waxler, Fox, Usher, & Welsh., 1996; Eisenberg, Cumberland, et al., 2001; Gilliom et al., 2002; Hill, Degnan, Calkins, & Keane, 2006; Stansbury & Zimmerman, 1999). Studies of school-age children have shown that children with externalizing problems are more likely to express anger, and this unregulated anger may lead to CP (Eisenberg, Cumberland, et al., 2001). As early as the toddler and preschool years, ER has been associated with concurrent problematic behavior (e.g., Calkins & Dedmon, 2000).

However, there are few longitudinal or experimental studies that examine the pathways through which early ER may be associated with later CP (Keenan, 2000). In one study of preschoolers with CP, children who had difficulty with ER, specifically negative emotional expression or lack of expression, had more CP both concurrently and at a follow-up in first grade (Cole et al., 1996). Similarly, a study examining persistent CP found that girls (but not boys) who had had poorer regulatory skills at age 2 had more chronic CP concurrently and at ages 4 and 5 (Hill et al., 2006). Finally, in a longitudinal study examining ER in the infant to toddler period, as assessed by the regulation of frustration, low levels of regulation measured at 5, 10, and 18 months were related to noncompliant behaviors at 30 months (Stifter, Spinrad, & Braungart-Rieker, 1999). Although findings from these studies suggest that early problems with ER are associated with later CP, there is a lack of experimental data examining this relationship, an issue that is addressed in the current study.

Specific types of ER strategies have been shown to be differentially related to child behavioral outcomes. Grolnik, Bridges, and Connell (1996) describe the following common strategies utilized by preschool age children that are employed in regulating emotion, which have been used extensively in research in this area: shifting attention from a distressing stimulus; comforting behaviors such as seeking physical comfort from a caregiver or self-soothing; or focusing on a distressing stimulus. A consistent finding in the ER literature is that one's ability to actively distract oneself from a distressing stimuli or situation can serve a beneficial function in reducing distress (e.g., Grolnik et al., 1996; Gilliom et al., 2002), whereas passive strategies or those that concentrate attention on the stimuli are less beneficial (Silk, Shaw, Skuban, Oland, & Kovacs, 2006; Supplee, Skuban, Shaw, & Prout, 2009). In a longitudinal study of at-risk youth, Trentacosta and Shaw (2008) found that less use of active distraction during a waiting task when

children were 3.5 years of age, the same procedure used to assess ER in the current study at age 3, was related to peer rejection at ages 10-12, which in turn was related to increased antisocial behavior in adolescence. This finding and others from researchers using observational procedures that elicit individual differences in ER (e.g., Gilliom et al., 2002; Cole, Zahn-Waxler, & Smith, 1994) suggest that strategies used by young children have important implications for CP.

2.1.4 Emotion Regulation Interventions

Further demonstrating the association between ER and child problem behavior, preventive interventions designed to improve aspects of ER have shown success in preventing the emergence and/or attenuating levels of child CP (Domitrovich et al., 2007; Izard et al., 2008). For example, the PATHS (Promoting Alternative Thinking Strategies) program, a teacher led social-emotional curriculum designed to improve social competence and ER and reduce problem behavior, has been found to be associated with improvements in preschool and school-age children's adaptive ER and social skills (Domitrovich et al., 2007). A similar program designed to address the ER skills among preschool children attending Head Start was found to increase children's emotion knowledge and ER and decrease negative emotion expressions and aggression (Izard et al., 2008). One significant limitation of the extant literature on ER interventions is limited involvement of parents, which may lead researchers to overlook the ways in which parents influence ER and lead to difficulty in children applying the lessons learned at school to different settings (e.g., home, after-school care) (Izard et al., 2008).

2.2 IMPORTANCE OF PARENTING AND PARENTING INTERVENTIONS

As mentioned previously, basic research indicates strong associations between several dimensions of parenting and CP (Campbell, Shaw, & Gilliom, 2000; Shaw et al., 2004), with rejection (Trentacosta & Shaw, 2008), harshness (Pettit et al., 1997), and unresponsiveness (McLeod & Shanahan, 1993; Loeber and Stouthamer-Loeber 1986) implicated. More recently, positive parenting skills, including warmth (Pettit et al., 1997), scaffolding (Dishion & McMahon, 1998), anticipating problematic situations (Gardner, Sonuga-Barke, & Sayal, 1999), providing contingent reinforcement for child prosocial behavior (Patterson & Stouthamer-Loeber, 1984), and responsiveness (Martin, 1981; Shaw et al., 1994) have all been found to play a protective role against CP. Related to parental responsiveness is the construct of mutual responsivity between parent and child, which measured during infancy and the toddler period has been linked to the development of conscience and has been found to mediate the relationship between child responsiveness and later disruptive behavior (Kochanska, Barry, Askan, et al., 2008). It seems likely that maternal responsiveness to children in general and particularly in times of child distress could set the tone for children's responses and how they learn to regulate their emotions.

Similarly, results from experimental preventive interventions have linked improvements in parenting with decreases in CP and other forms of problem behavior from early childhood through adolescence (e.g., Olds, 2002; Gardner, Burton & Klimes, 2006; Gardner, Shaw, Dishion, Supplee, & Burton, 2007; Connell et al., 2008; Dishion et al., 2008). Research on a long-standing nurse home visiting program initiated during pregnancy and sustained until children are age 2 has demonstrated that improvements in parental care (e.g., reductions in child abuse and neglect) and major parental lifestyle changes (e.g., increases in work force

participation) brought about by the intervention were associated with long-term reductions in adolescent antisocial behavior and substance use (Olds, 2002). More specific to the modification of CP during early childhood and the early school-age years, the Incredible Years Program (Webster-Stratton, 2005), a parenting intervention that focuses on praising, motivating children through reinforcement, limit setting, and handling misbehavior (Webster-Stratton, Reid, & Hammond, 2002), has been shown in numerous studies to reduce child CP (Webster-Stratton, Reid & Hammond, 2001; Baydar et al., 2003). The Incredible Years program is one of the few parenting-oriented programs that has also attempted to modify facets of children's behavior and ER skills through a classroom-based application involving training teachers to promote children's ER through being persistent, problem-solving, and emotion coaching and training children on such ER skills as emotion literacy and anger management (Webster-Stratton, Reid, & Stoolmiller, 2008). Although this work demonstrated significant findings for reducing child CP and improving some measures of ER (problem solving and identifying feelings), parental involvement was limited to increasing involvement in the classroom, helping with homework, and receiving weekly letters (Webster-Stratton et al., 2008). Additionally, when the effects of each component of the intervention have been evaluated, the parenting component appears to be the most effective in isolation with little incremental changes added by inclusion of child and/or teacher training (Webster-Stratton et al., 2002), suggesting that modifying parenting may be the most effective intervention for reducing CP (Webster-Stratton & Reid, 2002).

Finally, the Family Check-Up (FCU) is a preventive intervention that combines aspects of motivational interviewing with parent training for at-risk youth spanning from early childhood to adolescence that has demonstrated promising outcomes in reducing CP and other types of problem behavior (e.g., substance use for adolescents; Connell et al., 2007) (Dishion et al., 2008;

Shaw, Dishion, et al., 2006, 2009). Mediation models have demonstrated that changes in parenting, specifically positive behavior support, which includes parent involvement, positive reinforcement, engaged parent-child interaction, and proactive parenting, mediated the effect of the intervention on child CP at a two-year follow-up (Dishion et al., 2008).

The effectiveness of such interventions provides strong support for the notion that improvements in parenting, particularly positive behavior support, are associated with changes in CP. However, the child mechanisms through which such changes may occur remain unclear. Given the associations between parenting and CP, between ER and CP, and the transactional nature of ER between parent and child, it seems likely that parenting interventions that have shown success in modifying child behavior may be operating through changes in child ER. A few lines of research have proposed the parenting to ER to CP link. Perhaps the closest approximation of a pathway similar to that examined in the current study comes from work on a broader regulatory construct, effortful control, which has been conceptualized as a feature of temperament that influences ER (Eisenberg et al., 2005). Eisenberg et al. (2005) found that children's effortful control mediated the relationship between positive parenting and externalizing problems in a school-age sample. Looking more specifically at ER, a study on emotion coaching (teaching children to regulate emotions and talking about feelings) found that high levels of coaching were related to less CP in homes with domestic violence. The authors suggested that improvements in CP were due to better ER, although this was not directly tested (Katz & Windecker-Nelson, 2006). Another example is a study investigating the association between maternal emotional expressivity and CP in children ages 4.5 to 6.5 screened on the basis of risk for behavior problems. The results indicated that child regulation (defined by persistence on a task, attention focusing/shifting, and inhibitory control) mediated the relationship between

maternal emotional expressivity and CP, providing evidence that regulatory abilities play a crucial role in how parenting is associated with child behavior (Eisenberg, Gershoff, et al., 2001). Findings on mutuality of responsiveness also suggest that parental responsiveness is strongly associated with child responsiveness, which has implications for later expressions of disruptive behavior (Kochanska et al., 2008) and indicates that parental responsiveness (and in turn, children's responses) could play a particularly important role also in distressing situations.

3.0 STATEMENT OF PURPOSE

Based on the serious implications of the expression of CP in early childhood, the examination of ways in which to prevent long-term trajectories of CP for at-risk youth merits considerable attention and may serve to inform research and policy regarding the most important targets for interventions. Despite a wealth of research on parenting interventions that have led to changes in CP and other types of problem behavior (Olds, 2002; Gardner et al., 2007; Connell et al., 2008; Dishion et al., 2008; Webster-Stratton, 2005), few studies have examined the specific child mechanisms through which changes in parenting may translate into changes in child behavior. Interventions that target ER (Domitrovich et al., 2007; Izard et al., 2008) provide support for the notion that ER may serve as an important child mechanism underlying the development of later CP. Clarification of whether ER is a child mechanism that mediates the link between improvements in positive behavior support and reductions in CP (Dishion et al., 2008) could advance our understanding about the specific pathways that lead to the most effective behavioral change.

Based on the extant literature, the current study aims to increase our understanding of how improvements in positive behavior support may be associated with more adaptive ER, and whether ER plays a mediating role in the relationship between improvements in positive behavior support and decreases in child CP. Strengths of the current study include a prospective, longitudinal *and* experimental design, the use of multiple informants and methods including different measurement techniques for each of the variables of interest, and the utilization of a

high-risk sample recruited on the basis of multiple risk factors for CP. Additionally, the current study is unique in its test of a double mediation mechanism and its examination of a child mechanism potentially involved in a parenting intervention.

Specifically, the following hypotheses were tested.

Hypothesis 1: It was hypothesized that across the entire sample early adaptive ER skills measured at age 3 would be negatively associated with CP measured at age 4.

Hypothesis 2: It was hypothesized that the intervention group, who received the Family Check-Up (FCU) administered initially at child age 2, would show higher levels of adaptive ER skills at age 3 compared to ER skills for children in the control group.

Hypothesis 3: It was hypothesized that the effect of the FCU on ER measured at age 3 would be mediated by improvements in positive behavior support from ages 2 to 3. Specifically, compared to the control group, the intervention group was expected to show greater improvement in positive behavior support after receiving the FCU from age 2 to 3, which, in turn, would be related to higher levels of ER at age 3.

Hypothesis 4: It was hypothesized that differences in ER between children in the intervention and control group measured at age 3 would mediate the effects of improvements in positive behavior support from ages 2 to 3 on CP measured at ages 2, 3, and 4. Specifically, compared to the control group, the intervention group was expected to show greater improvement in positive behavior support after receiving the FCU from age 2 to 3, which, in turn, would be related to higher levels of ER at age 3, which, in turn, would be related to less growth in CP from ages 2, 3, and 4.

4.0 METHOD

4.1 PARTICIPANTS

The study involved participants from the Early Steps Multisite (ESM) project, a large ongoing study that was designed to examine the effectiveness of a tailored, family-based intervention for children identified as at risk for externalizing behavior problems on the basis of child, family, and sociodemographic factors (described in more detail in Dishion et al., 2008). Participants included 731 mother-child dyads recruited from Women, Infants, and Children (WIC) Nutritional Centers between 2002 and 2003. Families with children age 2 years 0 months to 2 years 11 months were asked to participate and screened to ensure that they met risk criteria defined as 1 standard deviation or more above normative averages on at least two of the following three domains: (a) child behavior (conduct problems, high conflict relationships with adults), (b) family problems (maternal depression, daily parenting challenges, substance use problems, teen parent status), and (c) socio-demographic risk (low educational achievement and low family income using WIC criteria). Participants were from urban (37% from Pittsburgh, PA), rural (26% from Charlottesville, VA), and suburban (37% from Eugene, OR) locations and self reports of primary caregivers' ethnicity was as follows: 28% African American (AA), 50% European American (EA), 13% biracial, and 9% other groups. Thirteen percent self-reported as Hispanic American. Over two-thirds of families had an annual income of less than \$20,000 at the time of recruitment (in 2002-3). Fifty-eight percent of primary caregivers had a live-in partner.

See Table 1 for these and other initial sociodemographic characteristics and study variables by site.

The families were previously assessed annually between ages 2 and 7.5, with annual assessments currently being carried out between ages 8.5 and 10.5. The current study utilized data collected from the age 2, 3, and 4 assessments. After the initial age 2 assessment, subjects were randomly assigned to the intervention or control group, with 367 in the intervention and 364 in the control group. Of the 731 families who initially participated, 659 (90%) participated at the one-year age 3 follow up, and 619 (85%) participated at the two-year age 4 follow-up. At ages 3 and 4, selective attrition analyses revealed no significant differences by site, race, ethnicity, sex, or parent-reported children's externalizing behavior. In addition, randomization appeared to be successful as there were no differences at age 2 prior to group assignment between the intervention and control groups on measures of parent-reported children's externalizing behavior or observations of maternal positive behavior support. Furthermore, no differences were found in the number of participants who were not retained in the control versus intervention groups at ages 3 ($n = 40, 32$) and 4 ($n = 58, 53$, respectively).

Table 1: Recruitment Descriptives by Project Site

	Project site			
	Pittsburgh	Eugene	Charlottesville	Total sample
Recruitment (n)				
Screened	596	565	505	1,666
Qualified	309	323	247	879
Participated	272	271	188	731
Participant demographics (%)				
Race				
African American	50.4	1.5	33.5	27.9
European American	38.1	70.0	39.4	50.1
Biracial	10.0	23.5	15.4	13.0
Other race	1.5	5.0	11.7	8.9
Ethnicity				
Hispanic	1.8	20.0	20.7	13.4
Target child age, $M (SD)$	28.3 (3.49)	28.5 (2.91)	27.7 (3.43)	28.2 (3.28)
	49.6%	49.8%	48.9%	49.5%
Target child gender	female	female	female	female
Annual family income < \$20,000 (%)	70.5	62.4	66.0	66.3
Family members per household, $M (SD)$	4.4 (1.55)	4.5 (1.67)	4.6 (1.66)	4.5 (1.63)
Education (%)				
High school diploma	42.5	39.5	40.0	41.0
1-2 years post-high school	35.7	34.7	25.5	32.7
Treatment participation (%)				
Age 2 feedback received	76.5	78.7	78.9	77.9
Age 3 feedback received	66.6	70.4	56.3	65.4
Age 4 feedback received	66.6	71.9	53.2	65.3

4.2 ASSESSMENT PROTOCOL

Procedures and protocol for the current study are explained in more detail elsewhere (Dishion et al., 2008; Lunkenheimer et al., 2008). Parents (i.e., mothers and, if available, alternative caregivers such as fathers or grandmothers) who agreed to participate in the study and went through informed consent procedures were scheduled for annual home visits at child ages 2-4. Assessment visits were identical for control and intervention group participants and involved structured and unstructured play activities for the target child with primary and alternative caregivers and siblings. Parenting and child observational data derived from the current study included the following sequence of tasks administered at ages 2, 3, and 4 with only minor deviations in task selection in accord with the child's developmental status: a 15 minute free play session, a 5 minute clean-up session, a 5 minute delay of gratification task (described in greater detail below), four 3 minute teaching tasks, a second free play session for 4 minutes, a second 4 minute clean-up task, 2 minutes each of 2 inhibition-inducing toys, and a 20 minute meal preparation task. Families received \$100 for participating in the age 2 assessment, \$120 for the age 3 assessment, and \$140 for the age 4 assessment, each of which lasted 2.5-3 hours.

4.3 INTERVENTION PROTOCOL: THE FAMILY CHECK-UP

A more complete description of the FCU can be found in Dishion et al. (2008) and Lunkenheimer et al. (2008). The FCU is a brief intervention generally consisting of three sessions, and it is based on motivational interviewing techniques and modeled after the Drinker's Check-Up (Miller & Rollnick, 2002). Families who were randomly assigned to the intervention condition were scheduled to meet with a parent consultant for two or more sessions, depending

on the family's preference. The three meetings in which families were typically involved included an initial contact meeting, an assessment meeting, and a feedback session (Dishion & Kavanaugh, 2003). To optimize the internal validity of the study by preventing differential dropout rates in the intervention and control groups, the age 2 assessments (visits described previously) were completed before random assignment results were known to either the research staff or the family. For research purposes, the sequence of contacts was assessment, randomization, initial interview, and feedback session with the option for follow-up sessions. Families in the feedback session received a \$25 gift certificate for completing the FCU and feedback session.

After the first meeting (the assessment described previously), the second visit called the "get to know you" (GTKY) meeting consisted of the parent consultant meeting with the parent or parents and discussing their concerns with a focus on current family issues that were most critical to their child's and family's functioning. For the third meeting, the feedback session, parent consultants utilized motivational interviewing to summarize the results of the assessment and highlight areas of strength and areas in need of attention. One objective of the feedback session was to assess the parent's willingness to change problematic parenting practices, to support existing parenting strengths, and to identify services appropriate to the family's needs. The parent was given the choice to participate in additional follow-up sessions that were focused on parenting practices as well as other family management and contextual issues (e.g., co-parenting, child care resources, or housing). Parent consultants were also able to recommend community service organizations that may be of assistance to the family. Parents in the intervention group received the FCU after each year's assessment.

Parent consultants were a combination of doctoral- and master's-level service workers, all with previous experience in carrying out family-based interventions. Training in the FCU occurred over a period of 2.5–3 months. Additional information on certification can be found in Dishion et al. (2008). Of the families assigned to the intervention condition, 77.9% participated in the GTKY and feedback sessions at child age 2, and 65.4% participated at child age 3. At the baseline assessment, there were no significant differences between families in the intervention condition who engaged in the FCU (77.9%) and families who did not (22.1%) on sociodemographic covariates of interest (child age, gender, ethnicity, geographical location, baseline level of child distress, parental education, and family income).

4.4 MEASURES

4.4.1 Demographics Questionnaire

A demographics questionnaire was administered to the mothers during the child ages 2, 3, and 4 visits. This measure included questions about family structure, parental education and income, parental criminal history, and areas of familial stress.

4.4.2 Early Childhood Conduct Problems

A construct similar to that described in Dishion et al. (2008) was utilized to measure child CP in the current study. The Child Behavior Checklist (CBCL) for ages 1.5 – 5 (Achenbach & Rescorla, 2001) is a 99-item questionnaire that assesses behavioral problems in young children, which was administered to mothers at ages 2, 3, and 4. Data from the age 2-4 assessments was used for the current study. The CBCL includes one broadband factor that assesses externalizing

symptoms, Externalizing, which was used as the primary outcome measure in the study ($\alpha = .86$, $.89$, and $.86$ for ages 2, 3, and 4 in current sample, respectively).

At child ages 2, 3, and 4 assessments, another popular measure of child problem behavior was also administered to mothers, the Eyberg Child Behavior Inventory (ECBI, Robinson, Eyberg, & Ross, 1980). The ECBI consists of 36 items and again, data from the age 2-4 assessments was used for the current study. The Eyberg includes two factors that focus on the perceived intensity of a behavior and degree to which the behavior is a problem for caregivers. Because the Intensity factor is similar in content and structure to the CBCL Externalizing factor, only the Problem factor was utilized, which asks caregivers to rate, yes or no, whether the behavior is a problem for the parent ($\alpha = .84$, $.90$, and $.94$ for ages 2, 3, and 4 in current sample, respectively).

4.4.3 Parental Positive Behavior Support

Parental positive behavior support (PBS) encompasses both the anticipation of children's needs and active involvement in their welfare. This construct was assessed from home visitor's ratings (see description below) and from coding videotaped interactions between caregivers and children in the home setting from the age 2 (pre-intervention) and 3 (post-intervention) assessments using a composite variable as described in Dishion et al. (2008) and Lunkenheimer et al. (2008). A team of undergraduates coded the videotaped family interaction tasks at ages 2 and 3 using the Relationship Process Code (RPC) (Jabson, Dishion, Gardner, & Burton, 2004) (average team RPC percent agreement = $.87$, kappa = $.86$; Dishion et al., 2008). The RPC is a third-generation code derived from the Family Process Code (Dishion, Gardner, Patterson, Reid, & Thibodeaux,

1983) used extensively in previous research. After coding each family interaction, coders completed an impressions inventory regarding proactive and positive parenting practices.

The following items were entered into the parental positive behavior support scores: 1) Parent Involvement. This measure is based on the home visitor's rating of the parents' involvement using the following items from the Home Observation for Measurement of the Environment inventory (Bradley, Corwyn, McAdoo, & Garcia-Coll, 2001): "Parent keeps child in visual range, looks at often"; "Parent talks to child while doing household work"; "Parent structures child's play periods." 2) Positive Reinforcement. This measure is based on caregivers prompting and reinforcing young children's positive behavior from videotape coding as described in the following RPC codes: positive reinforcement (verbal and physical), prompts and suggestions of positive activities, and positive structure (e.g., providing choices in a request for behavior change). 3) Engaged Parent-Child Interaction Time. This score reflects the average length of parent-child sequences involving talking or physical interactions such as turn taking or playing a game. The average duration of episodes that included consecutive parent-child exchanges involving RPC codes such as Talk and Neutral Physical Contact were used to define these episodes. 4) Proactive Parenting. Videotape coders rated each parent on his or her tendency to anticipate potential problems and to provide prompts or other structural changes to avoid young children becoming upset and/or involved in problem behavior on the following six items: parent gives child choices for behavior change whenever possible; parent communicates to the child in calm, simple, and clear terms; parent gives understandable, age-appropriate reasons for behavior change; parent adjusts/defines the situation to ensure the child's interest, success, and comfort; parent redirects the child to more appropriate behavior if the child is off task or misbehaves; parent uses verbal structuring to make the task manageable ($\alpha = .84$). Previous

research using this sample has supported combining these four variables as indicators of PBS (Dishion et al., 2008). Separate scores were created for age 2 and age 3.

4.4.4 Age 2 Disruptive Behavior

Disruptive behavior was measured observationally from the parent busy task (5 minutes) conducted at the home visit at child age 2, which required children to wait for their parent to complete questionnaires while they had nothing to do. Similar to the coding of positive behavior support, disruptive behavior was coded using the RPC based on the presence of negativity, which was defined as being verbally or physically negative or giving a negative demand.

4.4.5 Emotion Regulation

Emotion regulation was measured from the age 3 delay of gratification task, which required children to wait for a cookie while their mother completed several questionnaires. Similar tasks have been noted to be extremely difficult for children (Kopp, 1991; Gilliom et al., 2002). The coding system is based on work by Grolnik and colleagues (1996) and adapted by Gilliom and colleagues (2002) and was utilized by Trentacosta and Shaw (2008) for a similar delay of gratification task with children of the same age. To elicit negative emotion, children were told that they would be given a cookie but had to wait to receive it until their mother was finished completing a series of questionnaires. The task is intended to model situations in which children must wait for their caregivers to receive a desired outcome, which happens frequently in daily life (Gilliom et al., 2002). Caregivers were instructed to place the cookie where the child could see it but could not reach it and to tell their child that they would receive the cookie after the questionnaires were completed. The toys that were used in other tasks during the visit were also

in the room in a covered bin, and the caregiver was instructed not to allow the child to play with these toys so that there was little of interest for the child in the immediate environment (Gilliom et al., 2002; Trentacosta & Shaw, 2008).

Behaviors from the videotapes of the age 3 waiting task were coded for their presence or absence during each of the 10-second intervals during the 3-minute task. For every interval, children were coded as having been engaged in at least one of the codes and could employ more than one strategy in an interval. Codes include: 1) *physical comfort seeking* - touching mother, reclining on mother's lap, requesting to be held; 2) *self soothing* - sucking on a thumb, bottle or sippy cup, twirling hair, reaching for a comfort object such as a blanket; 3) *distraction* - behaviors in which the focus of attention is not on the delay object or the task; the child may be utilizing solitary distraction, including dancing around the room, singing, or engaging in imaginary play or interactive distraction, which includes all behavior in which the child is distracting him/herself by engaging with another person; 4) *passive waiting* - non-goal oriented behavior, not actively looking at anything or exploring the environment; 5) *focus on delay object* - includes the child touching the delay object, crying, tantruming, attempting to break into the forbidden box of toys, leaving the room, or repeatedly breaking a rule that is set by the primary caregiver if the primary caregiver continues to enforce the rule. These codes were intended to be exhaustive, such that coders were required to select at least one code for each interval (see Gilliom et al., 2002 for more detail about the codes). Interrater reliability calculated from a sample of 15% of the tapes indicated adequate reliability for all codes with a mean kappa of .68 and a range from .60 (passive waiting) to .88 (physical comfort seeking). To increase the generalizability of our ER construct, we also included one item tapping ER from coder impressions, which were completed by examiners at the end of the age 3 assessment based on the

child's behavior during the entire visit. On a 9-point likert scale, examiners rated children on the following question: "Does child seem dysregulated and difficult to manage?"

An exploratory factor analysis for ER data was analyzed using SPSS 16.0 with an oblique rotation (oblimin). Two factors emerged with an eigenvalue greater than 1 and accounted for 54.1% of the variance. Factor 1 demonstrated high loadings on distraction (-.821), focus on delay object (.887), and the coder impression of regulation (.610) and factor 2 demonstrated high loadings on passive waiting (.823) and self-soothing (.645). These results informed the next step during which it was decided to create a latent factor of ER using distraction, focus, and the coder impression item as indicators (reflecting factor 1), which will be described in more detail in the results. The passive factor was not utilized in the current study.

4.5 DATA ANALYTIC PLAN

The primary goal of the proposed research was to investigate how improvements in positive parenting associated with random assignment to the Family Check-Up might lead to more adaptive ER, which in turn was hypothesized to mediate improvements in children's CP. An intent-to treat design was used for all analyses, such that those who were assigned to the intervention group and chose not to take part in the FCU were included. As a first step, bivariate correlations were computed to examine the associations between the variables within a univariate framework. Next, structural equation modeling (SEM) was utilized using maximum likelihood estimation with robust standard errors (MLR) in Mplus 5.21 (Muthén & Muthén, 2009) to examine hypotheses from a multivariate perspective, including covariates. MLR is a type of maximum likelihood estimation that is robust to non-normality. The method accounts for

missing data by estimating parameters of all available data for the estimation of a specific parameter (Muthén & Muthén, 2009). Hypotheses were tested sequentially in steps in the process of model building. Because child conduct problems were assessed by two different measures (CBCL and Eyberg), separate models were computed for the CBCL Externalizing factor and the Eyberg Problem factor.

5.0 RESULTS

5.1 DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATIONS

Descriptive statistics including means, standard deviations, and ranges are included for primary study variables in Tables 2 and 3 (also, see Table 1 for recruitment descriptives by project site). For ease of interpretation, *t* scores are presented for CP measures, although raw scores were used for the models to avoid potential age and gender corrections. Not surprisingly, because children were screened based on CP, the age 2 measures of CBCL Externalizing and age 2 Eyberg Problem behavior factors had mean scores approximately 1 *SD* above normative scores. Using the borderline clinical cutoff for the CBCL (i.e., $\geq 84^{\text{th}}$ percentile), 48.6% of children were reported to have clinically elevated scores on the Externalizing factor at age 2, compared to rates of 34.6% at age 3 and 28.5% at age 4. Using the clinical cutoff for the Eyberg Problem factor (i.e., $\geq 84^{\text{th}}$ percentile), 44.3% were reported to have clinically elevated scores at age 2, compared to 50.1% at age 3 and 49% at age 4. A first step to ensure that randomization was effective was to examine whether the intervention and control groups differed on the age 2 observed code of child disruptive behavior. The *t*-test examining this difference was not significant ($t = .31, ns$), indicating that randomization was effective. Before testing the models associated with each hypothesis in an SEM framework, bivariate correlations were computed to examine some of the hypotheses within a univariate framework and are displayed for all study variables in Table 4.

Bivariate correlations addressing the hypothesis that age 3 measures of ER would be related to age 4 indices of conduct problems indicated significant, albeit modest correlations, with r s ranging from .10 to .23, p s < .05 to <.01 in the expected direction between all three indicators of ER (coder impression of regulation, focus, low active distraction) and the age 4 CBCL Externalizing factor. In relation to the age 4 Eyberg problem factor, two of the indicators of ER (coder impression of regulation, and focus) were also significant in the expected direction, with r s for significant findings ranging from .13 to .19, p <.01 and with a nonsignificant trend between the Eyberg problem factor and low levels of active distraction (p < .10).

Bivariate correlations examining associations between intervention group status and indicators of age 3 ER were not supportive of Hypothesis 2, as intervention group status was unexpectedly positively, albeit modestly, associated with *higher* levels of focus on the delay object ($r = .08$, $p < .05$), and nonsignificant associations were found between intervention group status and coder impressions of child ER and use of active distraction.

Additional correlational results provide a reference for associations between key study variables. Four out of 24 possible bivariate correlations involving indicators of PBS at both ages 2 and 3 and indicators of ER were significant with two others indicating a trend, and one significant association in an unexpected direction (i.e., age 2 parental positive reinforcement and the coder impression of regulation). Additionally, 14 of 18 possible correlations involving CBCL measures at ages 2, 3, and 4 and Eyberg problem measures at ages 2, 3, and 4 were significantly associated with indicators of ER in the expected direction with another nonsignificant trend also demonstrated in the expected direction.

Table 2: Descriptive Statistics for CP

	M	SD	Range	Total N	N (%) in clinical range
CBCL Externalizing Behavior (<i>t</i> score), age 2	59.49	8.20	32-95	730	48.6% (355)
CBCL Externalizing Behavior (<i>t</i> score), age 3	56.00	9.38	28-86	657	34.6% (227)
CBCL Externalizing Behavior (<i>t</i> score), age 4	53.65	10.49	28-89	627	28.5% (179)
Eyberg Problem Behavior (<i>t</i> score), age 2	59.18	8.46	41-84	729	44.3% (323)
Eyberg Problem Behavior (<i>t</i> score), age 3	59.43	10.20	41-88	651	50.1% (326)
Eyberg Problem Behavior (<i>t</i> score), age 4	59.64	11.00	41-86	624	49% (306)

Table 3: Descriptive Statistics for ER and Parenting

	M	SD	Range	Total N
Coder Impression of child ER	3.26	2.13	1-9	570
Ratio of intervals focus to total intervals	.138	0.21	0-1	553
Ratio of intervals distraction to total intervals (reverse scored)	.095	0.16	0-.94	553
HOME Parent Involvement age 2	2.21	0.89	0-3	730
HOME Parent Involvement age 3	2.12	0.97	0-3	642
RPC Positive Reinforcement age 2	.123	0.10	0-.83	574
RPC Positive Reinforcement age 3	.118	0.10	0-.82	574
RPC Parent Engagement age 2	.303	0.12	.05-1.05	574
RPC Parent Engagement age 3	.287	0.11	.00-.94	574
COIMP Proactive Parenting age 2	5.90	1.44	1.83-9	458
COIMP Proactive Parenting age 3	6.23	1.50	1.50-9	444

Table 4: Correlations Between All Observed Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Group	1																
2. Proactivity Age 2	.01	1															
3. Proactivity age 3	.12**	.49**	1														
4. Reinforcement age 2	.00	.28**	.22**	1													
5. Reinforcement age 3	.09*	.22**	.26**	.24**	1												
6. Engagement age 2	-.06	.40**	.30**	.31**	.24**	1											
7. Engagement age 3	.09*	.25**	.33**	.26**	.24**	.46**	1										
8. Involvement age 2	-.05	.28**	.22**	.10*	.12**	.31**	.24**	1									
9. Involvement age 3	.02	.27**	.29**	.16**	.25**	.26**	.34**	.23**	1								
10. CBCL Externalizing age 2	.02	-.20**	-.10*	-.04	-.05	-.08*	-.04	-.03	-.07*	1							
11. CBCL Externalizing age 3	-.01	-.16**	-.16**	-.05	-.12**	-.07 [†]	-.07	-.05	-.13**	.61**	1						
12. CBCL Externalizing age 4	-.09*	-.18**	-.16**	-.09*	-.09**	-.07	-.05	-.08 [†]	-.12**	.49**	.69**	1					
13. Eyberg Problem age 2	-.00	-.07	-.02	.04	.03	-.04	.04	-.08*	-.09*	.38**	.28**	.23**	1				
14. Eyberg problem age 3	-.05	-.09*	-.10*	.02	-.09*	-.03	-.02	-.03	-.04	.43**	.66**	.49**	.42**	1			
15. Eyberg problem age 4	-.09*	-.10*	-.13**	-.07	-.15**	-.06	-.02	-.07 [†]	-.10*	.36**	.52**	.69**	.35**	.64**	1		
16. Focus on delay object	.08*	-.08 [†]	-.11*	.02	-.05	-.04	.04	-.05	-.07	.11**	.19**	.17**	.10*	.19**	.19**	1	
17. Reverse active distraction	.04	-.07	-.12**	.02	-.03	-.04	.01	.00	-.06	.05	.12**	.10*	.05	.11*	.08 [†]	.74**	1
18. Impression of regulation	.00	-.12*	-.25**	.10*	.03	.01	.07	-.07 [†]	-.06	.10*	.24**	.23**	.06	.16**	.13**	.38**	.28**

** p ≤ .01; * p ≤ .05; † p ≤ .10

5.2 MODELS TESTING CENTRAL HYPOTHESES

The central analyses were conducted in a structural equation modeling (SEM) framework using MLR estimation in Mplus 5.21, with the models for Hypothesis 4 involving latent growth curve modeling (Muthén & Muthén, 2009). Specifically, SEM was used to test the hypotheses that :1) ER measured at age 3 would be positively associated with CP measured at age 4; 2) children in the intervention group would demonstrate more adaptive ER at age 3 compared to the control group; 3) the effect of the FCU on ER at age 3 would be mediated by improvements in positive behavior support from ages 2 to 3; and 4) ER measured at age 3 would mediate the effects of improvements in PBS from ages 2 to 3 on CP measured at ages 2, 3, and 4 as measured using the CBCL Externalizing and Eyberg Problem factors. The current analysis modeled pathways between all measures of ER and CP and the covariates of child gender, child race/ethnicity, and family income, in addition to the pathways between these covariates and the PBS measures that were found to be significant in previous analyses (e.g., Dishion et al., 2008). Because of the relatively low numbers of racial/ethnic minorities outside of African American families, minority status was examined as a dichotomous variable.

5.2.1 Hypothesis 1: Emotion Regulation and Conduct Problems

To test hypothesis 1, the measurement model for the ER construct was first examined using the latent factor of ER, which included the following indicators: 1) coder impression of ER, with higher scores indicating lower regulation, 2) ratio of the number of intervals a child focused on the delay object to the total number of intervals, and 3) the reverse score of the ratio of the number of intervals a child utilized active distraction to the total number of intervals. Distraction

was reverse scored so that all variables would load in the same direction (i.e., higher scores indicate lower levels of ER). The initial results indicated that the unique variance of the focus indicator was not significantly different than zero, suggesting little variability on this measure. To enhance the model's interpretability, the unique variance of this indicator was set to zero. Both the focus indicator and the distraction indicator demonstrated a skewed distribution, so the data were transformed using a linear transformation in SPSS 16.0 and MLR estimation was utilized in Mplus 5.21 as it is robust to non-normality (Muthén & Muthén, 2009). The measurement model provides a good fit to the data, $\chi^2 (df=1) = 0.02, p = .90; CFI = 1.00; TLI = 1.01; RMSEA = .00; SRMR = .00$, providing support for the construction of the emotion regulation latent factor.

The next model includes the path from ER at age 3 to conduct problems at age 4 measured by the CBCL and provides a reasonable fit to the data, $\chi^2 (df=3) = 18.65, p = .00; CFI = .96; TLI = .92; RMSEA = .09; SRMR = .05$ with a significant path between ER and CP indicating that poorer ER at age 3 is associated with greater CP at age 4. When covariates were added to this model (Figure 1), a similar fit was demonstrated, $\chi^2 (df=9) = 43.56, p = .00; CFI = .93; TLI = .87; RMSEA = .07; SRMR = .04$, and a significant association was found between ER at age 3 and gender, with females demonstrating better ER than males at the $p < .01$ level. Path models examining the relationship between each indicator of ER independently and the CBCL Externalizing factor at age 4 demonstrated similar results, with all path coefficients significant at the $p < .05$ level.

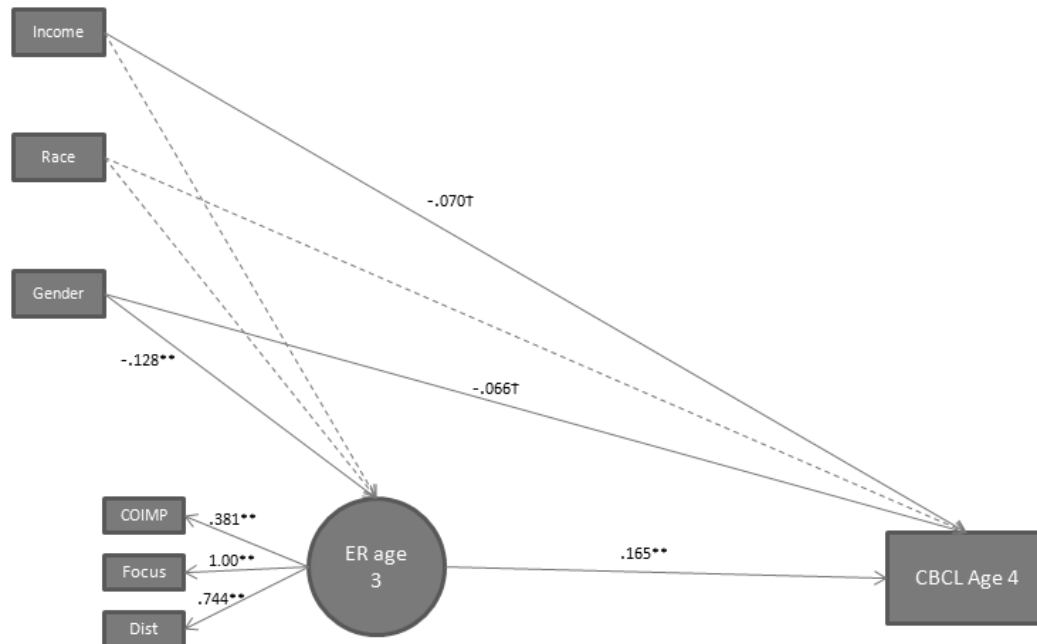


Figure 1: Hypothesis 1 with Age 4 CBCL Externalizing Factor

** $p < .01$, [†] $p < .10$

The next model includes the path from ER at age 3 to conduct problems at age 4 measured by the Eyberg problem factor and also provides a reasonable fit to the data, $\chi^2 (df=3) = 6.93, p = .07$; $CFI = .99$; $TLI = .98$; $RMSEA = .04$; $SRMR = .02$, with a significant path between ER and CP indicating that poorer ER at age 3 is associated with greater CP at age 4. When covariates were added to this model (Figure 2), a similar fit was demonstrated, $\chi^2 (df=9) = 32.70, p = .00$; $CFI = .95$; $TLI = .91$; $RMSEA = .06$; $SRMR = .04$, and a significant association ($p < .05$) was found between income and CP, with children of families with less income demonstrating greater CP. Path models examining the relationship between each indicator of ER independently and the Eyberg Problem factor demonstrated similar results, with the path coefficients in the models

involving the coder impression and focus on the delay object significant at the $p < .01$ level and a nonsignificant trend for the path model involving distraction.

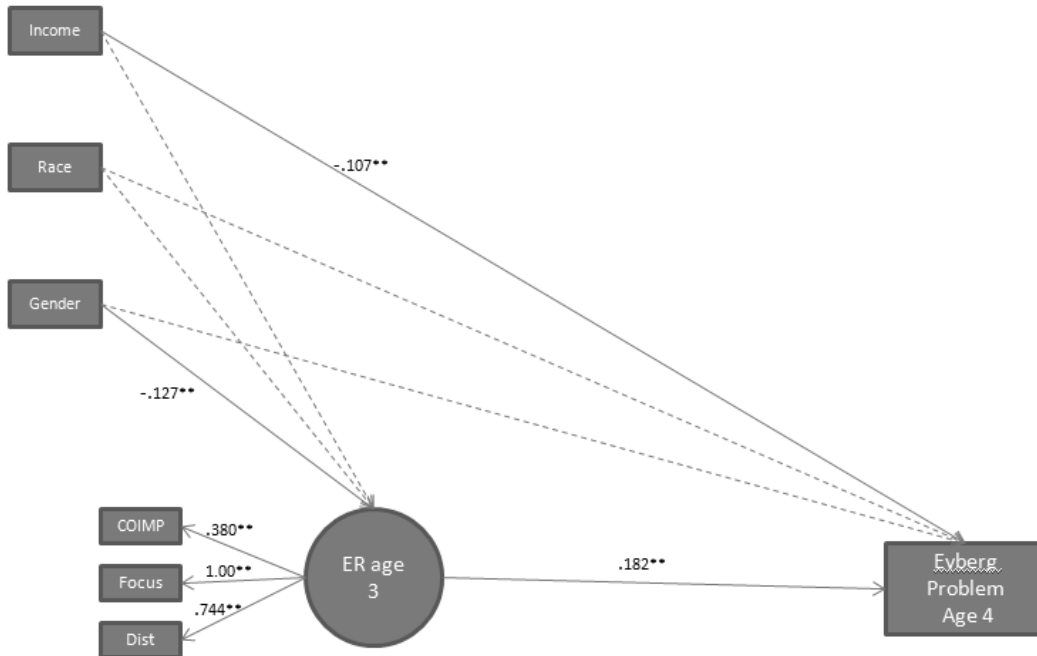


Figure 2: Hypothesis 1 with Age 4 Eyberg Problem Factor

** $p < .01$

5.2.2 Hypothesis 2: Family Check-Up and Emotion Regulation

To test hypothesis 2, a model including the path from the FCU to the latent factor of emotion regulation was tested. This model provides a reasonable fit to the data, $\chi^2 (df = 3) = 1.142$, $p = .77$; $CFI = 1.00$; $TLI = 1.01$; $RMSEA = .00$; $SRMR = .01$. The model with covariates added (Figure 3) demonstrated similar fit to the data, $\chi^2 (df = 9) = 26.92$, $p = .00$; $CFI = .96$; $TLI = .94$; $RMSEA = .05$; $SRMR = .03$, and a nonsignificant trend (in the unexpected direction) between

intervention status and ER at age 3 from the previous model became significant at the $p < .05$ level, such that contrary to the hypothesis, assignment to the intervention group was unexpectedly positively associated with *higher* levels on the ER latent variable indicating poorer ER. Path models examining the relationship between the FCU and each indicator of ER independently were nonsignificant, although there was a trend between the FCU and focus ($p = .053$).

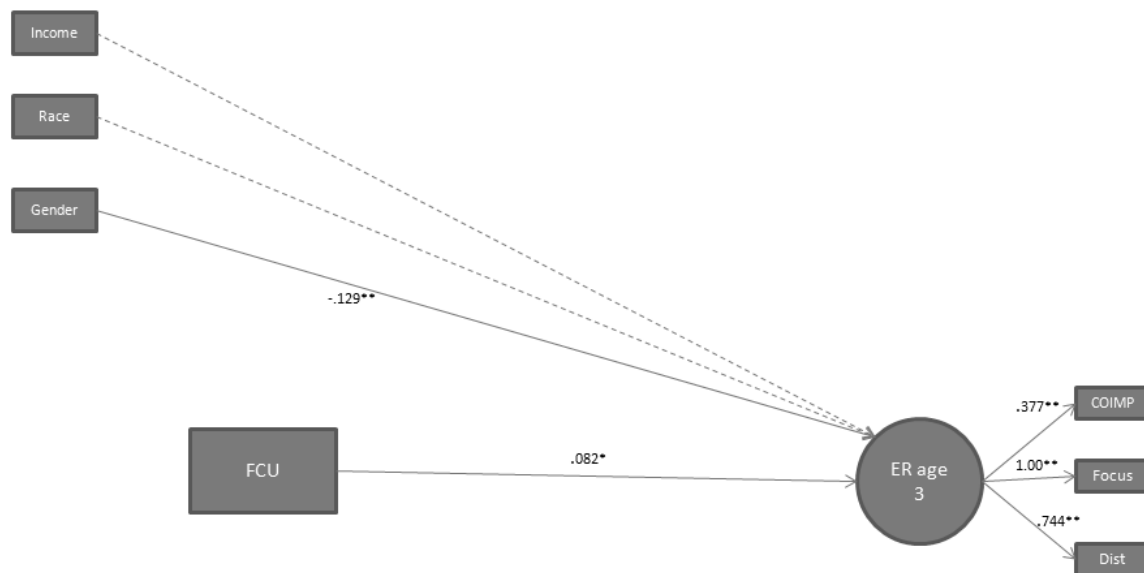


Figure 3: Hypothesis 2

** $p < .01$, * $p < .05$

5.2.3 Hypothesis 3: Family Check-Up and Emotion Regulation Mediated by Positive Behavior Support

To test hypothesis 3, the PBS latent factors from ages 2 and 3 were added to the previously tested model. This model provides a reasonable fit to the data, $\chi^2 (df = 53) = 141.08, p = .00; CFI$

$=.92$; $TLI = .90$; $RMSEA = .05$; $SRMR = .05$. As can be seen in Figure 4 (which also includes all covariates), in line with previous findings (Dishion et al., 2008) the FCU was associated with improvements in PBS from ages 2 to 3. However, the associations between the FCU and ER at age 3 and PBS and ER at age 3 were not significant. Additionally the indirect effect testing the mediational role of improvements in PBS on the association between the FCU and ER was not significant. These results suggest that improvements in PBS brought about by the FCU did not relate to improvements in child ER. The model with covariates added (see Figure 4) demonstrated similar fit to the data, $\chi^2 (df = 81) = 202.32$, $p = .00$; $CFI = .90$; $TLI = .88$; $RMSEA = .05$; $SRMR = .05$. Significant associations ($p < .05$) were found between PBS at age 2 and income, with caregivers from higher income families demonstrating more PBS at age 2, and between minority status and PBS at age 2, with the mothers of European American children demonstrating more PBS than the mothers of minority children. Models examining each indicator of ER independently showed similar results. Results from models examining each indicator of PBS separately also demonstrated similar results with the exception that some associations that were significant in the model with the latent factor became trends or nonsignificant. In addition, the path between the FCU and ER at age 3 was significant in the unexpected direction, with the intervention group showing poorer ER, in the models with proactive parenting and positive reinforcement at the $p < .05$ level.

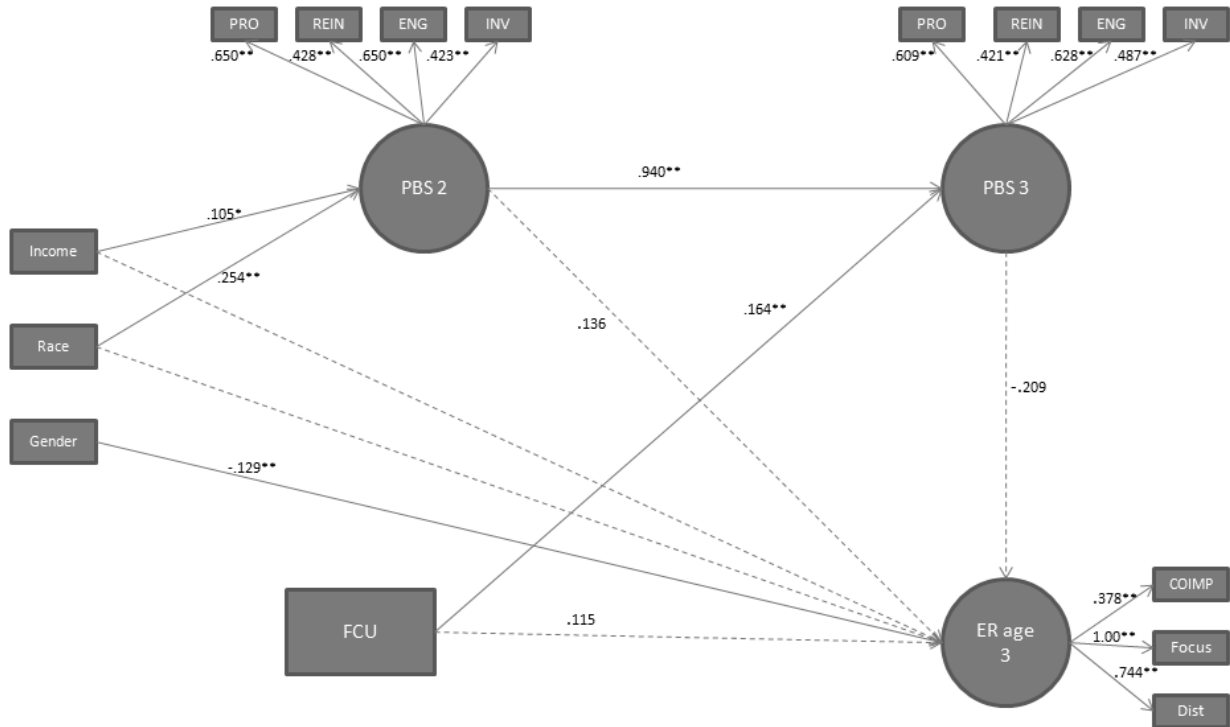


Figure 4: Hypothesis 3

** $p < .01$, * $p < .05$

Indirect Effect (PBS 3 as mediator): -0.034, ns

5.2.4 Hypothesis 4: Positive Behavior Support and Growth in Conduct Problems Mediated by Emotion Regulation

To test hypothesis 4, separate models were examined for the CBCL Externalizing factor and the Eyberg Problem factor. For the CBCL Externalizing factor model, growth in conduct problems was examined by modeling a slope factor composed of age 2-4 CBCL scores and an intercept factor set at age 2 (unstandardized values from measurement model: mean of slope = -2.402, $p < .01$, variance of slope = 10.912, $p < .01$; mean of intercept = 20.621, $p < .01$, variance of intercept = 40.923, $p < .01$). The model provides a reasonable fit to the data, $\chi^2 (df = 85) = 208.11$, $p =$

.00; *CFI* =.94; *TLI* = .92; *RMSEA* = .05; *SRMR* =.06. As can be seen in Figure 5 (which also includes all covariates), the intercept of CP was significantly associated with ER at age 3, such that children with higher levels of CP at age 2 demonstrated poorer ER at age 3. Additionally, although there were significant associations in the expected direction between ER at age 3 and the growth of CP from ages 2-4, between intervention group status and the growth of CP from ages 2-4, and between PBS at age 3 and the growth of CP from ages 2-4, the indirect effect testing the mediational role of ER on the association between improvements in PBS and growth of CP was not significant. These results suggest that the level of ER at age 3 is associated with the rate of growth in conduct problems, such that those with poorer ER at age 3 demonstrate less rapid declines in CP from ages 2-4. However, these effects are not associated with intervention status or improvements in PBS. The model with covariates added (see Figure 5) demonstrated similar fit to the data, $\chi^2 (df=116) =269.61, p = .00; CFI =.92; TLI = .90; RMSEA = .04; SRMR =.05$, and a significant association ($p < .05$) was found between the intercept of CP and income, with children from higher income families demonstrating lower levels of CP at age 2.

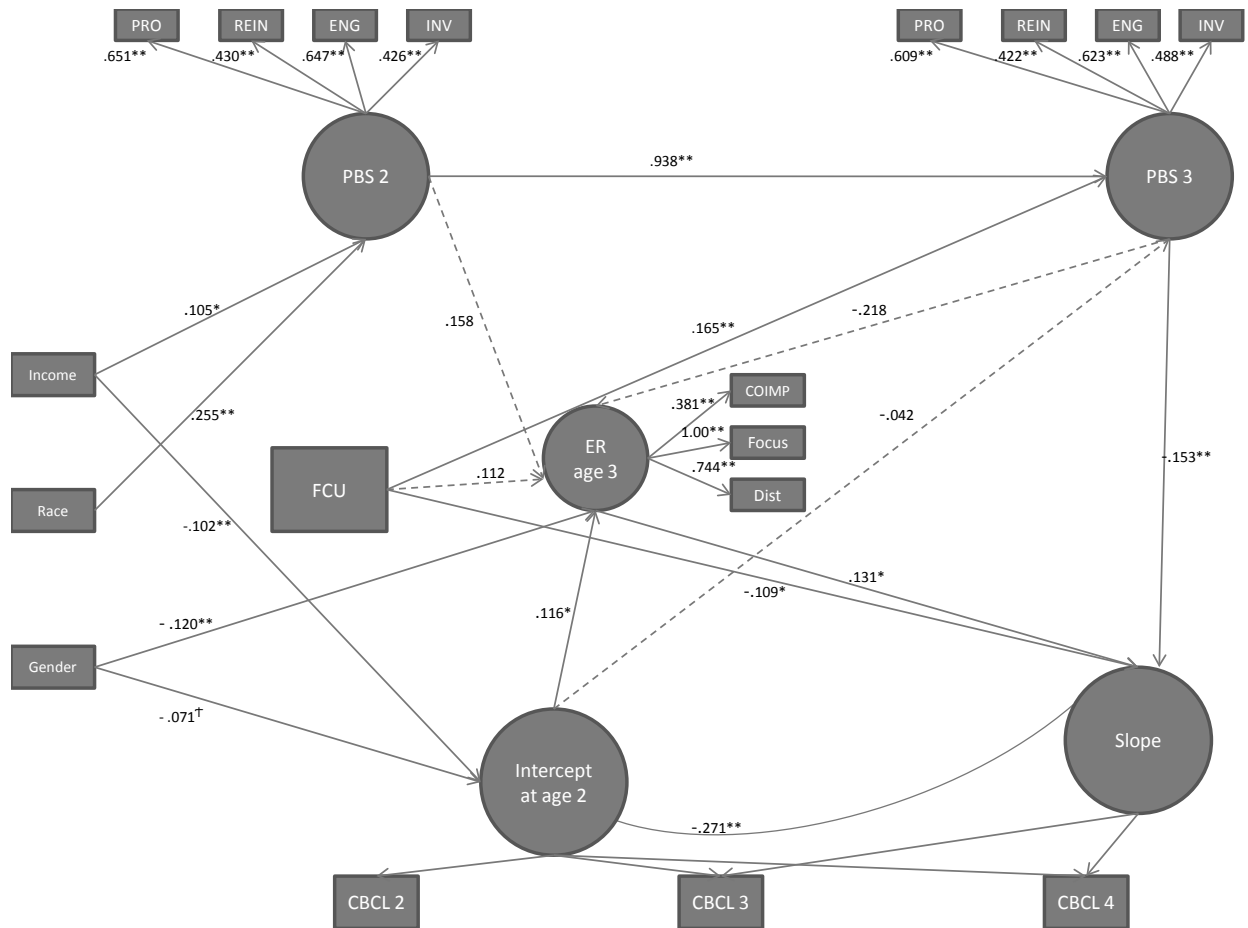


Figure 5: Hypothesis 4 with CBCL Externalizing Factor

**p<.01, * p <.05, † p<.10

Indirect Effect 1 (PBS 3 as mediator): -.036, ns

Indirect Effect 2 (ER as mediator): -.029, ns

Indirect Effect 3 (dual mediation); -.005, ns

Models examining each indicator of ER independently without constructing the ER latent factor showed similar results, although some associations that were significant in the model with the latent factor became trends or nonsignificant. Results from models examining each indicator of PBS separately also demonstrated similar results, again with some associations that were significant in the model with the latent factor becoming trends or nonsignificant. There were two other exceptions: the model examining proactive parenting demonstrated a significant path at the $p < .05$ level between the FCU and ER at age 3 in the unexpected direction, and the model examining parental involvement demonstrated a significant path at the $p < .05$ level between the intercept of CP and parental involvement at age 3; children who had higher levels of CP at age 2 had mothers who demonstrated less involvement at age 3.

For the Eyberg Problem factor, growth in conduct problems was examined by modeling a slope factor composed of age 2-4 Eyberg Problem scores and an intercept set at age 2 (unstandardized values from measurement model: mean of slope = 0.123, *ns*, variance of slope = 12.431, $p < .01$; mean of intercept = 14.189, $p < .01$, variance of intercept = 23.109, $p < .01$). This model provides a reasonable fit to the data, $\chi^2 (df = 85) = 191.071$, $p = .00$; $CFI = .94$; $TLI = .92$; $RMSEA = .04$; $SRMR = .05$. Similar to results from the model examining the CBCL Externalizing factor, the results indicate that age 2 CP (intercept) was associated with ER at age 3, suggesting that more problematic CP at age 2 is associated with poorer ER at age 3. In addition, as seen in Figure 6 (which also includes all covariates), although there were significant findings in the expected direction between ER at age 3 and the growth of CP from ages 2-4, between intervention group status and the growth of CP from ages 2-4, and between PBS at age 3 and the growth of CP from ages 2-4, the indirect effect testing the meditational role of ER on the association between improvements in PBS and growth of CP was not significant. These

results suggest that the level of ER is associated with the rate of growth in CP, such that children showing poorer ER demonstrated a more rapid increase in CP from ages 2-4, albeit with a slope factor that was nonsignificant in the measurement model. However, these effects are not associated with intervention status or improvements in PBS. The model with covariates added (see Figure 6) demonstrated similar fit to the data, $\chi^2 (df = 116) = 253.59, p = .00; CFI = .92; TLI = .90; RMSEA = .04; SRMR = .04$, and a significant association was found between the slope of CP and race, with European American children demonstrating a less rapid increase in CP over time than minority children.

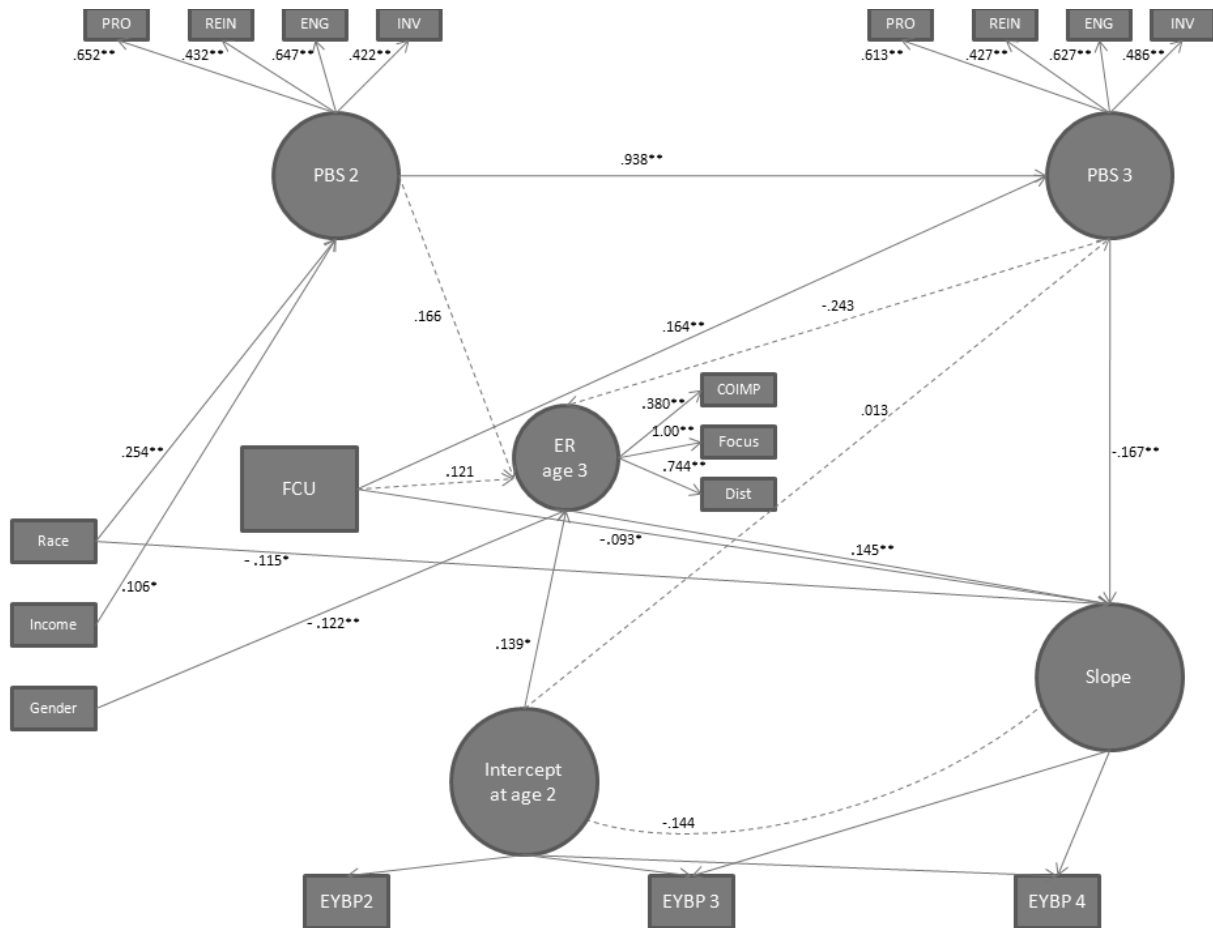


Figure 6: Hypothesis 4 with Eyberg Problem Factor

**p<.01, * p <.05, † p<.10

Indirect Effect 1 (PBS 3 as mediator): -.040, ns

Indirect Effect 2 (ER as mediator): -.035, ns

Indirect Effect 3 (dual mediation); -.006 ns

Models examining each indicator of ER independently without constructing the ER latent factor showed similar results, although some associations that were significant in the model with the latent factor became trends or nonsignificant. Results from models examining each indicator of PBS separately also demonstrated similar results, again with some associations that were significant in the model with the latent factor becoming trends or nonsignificant and a few other exceptions. The model examining proactive parenting demonstrated a significant relationship between proactive parenting at age 3 and ER at age 3 at the $p < .05$ level, such that children whose mothers utilized more proactive parenting demonstrated better ER and a significant relationship between the FCU and ER at age 3 at the $p < .05$ level in the unexpected direction. The model examining positive reinforcement also demonstrated a significant relationship between the FCU and ER at age 3 at the $p < .05$ level in the unexpected direction.

6.0 DISCUSSION

The purpose of the present study was to examine whether a parenting-focused intervention previously found to lead to improvements in early CP was associated with more adaptive ER skills, and whether more adaptive ER skills mediated later changes in the reduced growth of CP. Consistent with hypotheses, higher levels of child emotional regulation at age 3 were associated with reduced levels of child CP at age 4 and reduced growth of child CP from ages 2-4. In the growth model involving the CBCL Externalizing factor, children with more adaptive ER demonstrated a more rapid decline in CP from ages 2-4, and in the growth model involving the Eyberg problem factor, children with more adaptive ER demonstrated a less rapid increase in CP from ages 2-4. In accord with previously published findings, the current study also demonstrated that the FCU was associated with improvements in PBS from ages 2 to 3, which in turn was associated with the reduced growth of CP (Dishion et al., 2008). Contrary to hypotheses, the FCU was not associated with more adaptive child ER at age 3, and in some cases, the FCU was unexpectedly associated with poorer ER. Also contrary to hypotheses, improvements in PBS from ages 2 to 3 were not associated with more adaptive child ER at age 3. Models testing the mediating role of ER in the association between improvements in PBS and growth in CP were also not supported.

6.1 EMOTION REGULATION AND CONDUCT PROBLEMS

In both univariate and multivariate frameworks, the hypothesized link between ER and CP was supported, such that poorer ER was associated with greater CP. Each indicator of ER (coder impression of ER, low distraction, and focus) and the ER latent variable were related to age 4 CP measured by both the CBCL and the Eyberg. Consistent with prior research (e.g., Cole et al., 1996; Stifter, Spinrad, & Braungart-Rieker, 1999; Gilliom et al., 2002), the current results indicate that children with poorer emotion regulation at age 3 demonstrated higher levels of conduct problems at age 4. While relatively few studies have examined the link between ER and CP longitudinally (Keenan, 2000), research has demonstrated that early difficulty with ER presents a risk for later problem behavior (Cole et al., 1996; Hill et al., 2006), a pattern that was also supported by the current study's results.

6.2 THE FAMILY CHECK-UP AND EMOTION REGULATION

Contrary to hypotheses, the Family Check-Up was not associated with more adaptive ER in children at age 3. In fact, in some models the FCU was unexpectedly associated with poorer ER. However, it is difficult to interpret these findings given the inconsistency of this association in that in some models, this pathway was significant and in other models, including the models looking at each indicator of ER independently, this pathway was nonsignificant. The success that the intervention had in reducing children's CP and the association demonstrated between ER and CP suggested that ER might also be influenced by the FCU in a positive manner, especially given that aspects of parenting have been found to be associated with more adaptive ER skills (e.g., Fabes et al., 2001; Gilliom et al., 2002).

Of the three indicators of ER, intervention status was semi-reliably associated with only one indicator in the unexpected direction: child focus on the delay object. As noted previously, the child focus code is applied to behaviors such as the child touching the delay object, crying, tantruming, attempting to break into the forbidden box of toys, or leaving the room. It can also be coded if a child repeatedly breaks a rule that was set by the primary caregiver if the primary caregiver continues to enforce the rule. It is possible that parents in the intervention group were more likely to employ parenting behaviors such as setting limits and enforcing the rules during the waiting task, behaviors that are likely to prove very beneficial in the long term but could be associated with more negative reactions and therefore increased focus on delay. Parenting behaviors related to limit setting were examined to explore this possibility, including three coder impressions covering the entire home visit and one measure limited to parenting behavior during the wait task. However, none of these was associated with intervention status. Thus, it remains unclear why the intervention might be associated with higher levels of focus on the delay object.

6.3 THE FAMILY CHECK-UP AND EMOTION REGULATION MEDIATED BY POSITIVE BEHAVIOR SUPPORT

Another finding contrary to hypotheses was that improvements in PBS from ages 2 to 3 were not associated with more adaptive ER at age 3. As was previously found by Dishion and colleagues (2008), the current study also demonstrated that the FCU was associated with improvements in PBS from ages 2 to 3, indicating that the intervention was successful in bringing about improvements in parenting behavior by age 3. However, the demonstrated improvements in PBS were not related to ER at age 3. Not surprisingly, based on the nonsignificant associations

between the FCU and ER and PBS and ER, the improvements in PBS were not found to mediate the association between the FCU and ER. While it seemed likely that PBS would be associated with ER based on previous research demonstrating that children's abilities to cope with stressors are affected by whether their parents interact with them in warm and supportive versus harsh or controlling ways (e.g., Gilliom et al., 2002), it is possible other parenting behaviors that have been found to be particularly important for children's emotional development, such as emotion coaching (e.g., Katz & Windecker-Nelson, 2006) or maternal emotional expressivity (e.g., Eisenberg, Gershoff, et al., 2001) might be more directly relevant to the development of children's ER. Because of the association between ER and CP, future work on the FCU that expands its reach to target more ER-focused parenting behaviors, in addition to PBS, might demonstrate even greater improvements in CP over time. As the association between proactive parenting and ER at age 3 was found to be significant in correlation analyses and in multivariate analyses in the model examining the Eyberg Problem factor, it suggests that proactivity may be an important area to target to improve children's ER.

In addition, the current study measured ER only one year after the intervention was implemented. One would not necessarily expect to see improvements in ER take shape by age 3. It is possible that examining child ER after a longer duration of participation in the intervention would demonstrate an effect as it might take more than one year for child behavior to change as a result of modifying parenting behavior towards children. Perhaps greater change would be demonstrated at age 4, an issue that will be examined with this sample in the near future. Also, because the FCU was not specifically designed to target children's ER directly (i.e., intervention sessions focused primarily on work with parents and did not typically include children), it is likely that the intervention would have had a greater influence on ER had improving children's

emotional regulatory abilities been a primary focus and had the intervention involved actually teaching skills directly to children.

6.4 POSITIVE BEHAVIOR SUPPORT AND GROWTH IN CONDUCT PROBLEMS MEDIATED BY EMOTION REGULATION

In line with hypotheses, in both models examining the CBCL Externalizing factor and the Eyberg Problem factor, children's ER at age 3 was associated with the slope of CP from ages 2-4, (R-square = 0.009 for CBCL model; R-square = 0.016 for Eyberg model). These results suggest that ER does play an important role in the trajectory of child CP across time. In addition, both models found that age 2 levels of CP were significantly associated with age 3 levels of ER. This is an interesting finding and suggests that the relationship between ER and CP might be bidirectional. Future work should investigate change in both constructs over a longer period of time to examine their interrelation across early childhood. Also in line with hypotheses and as previously reported by Dishion et al. (2008), the FCU was associated with improvements in PBS, which in turn was associated with less growth in CP. However, contrary to hypotheses, neither intervention status nor improvements in PBS from ages 2 to 3 were related to levels of ER at age 3. While a couple of hypothesized pathways were supported, this missing link suggests that further work is necessary to elucidate whether and/or how ER may be improved within the context of a parenting-focused intervention such as the FCU to have a greater impact on reductions in the growth of CP over time. Although PBS was not consistently associated with ER, proactive parenting was the PBS factor most strongly associated with ER. Therefore

proactive parenting potentially is an important focus for future work examining the relationship between specific types of parenting behaviors and children's ER.

6.5 LIMITATIONS AND FUTURE DIRECTIONS

While the current study had many strengths, including the use of a prospective, longitudinal and experimental design, multiple informants and methods, and a high-risk sample, as well as substantively testing a double mediation mechanism, there were also several limitations. First, a problem apparent in most research examining the link between ER and CP, and more broadly between constructs such as regulation, reactivity, or temperament and measures of psychopathology is the debate surrounding the degree of overlap in the measurement of these constructs. This is an issue that is often raised in the developmental psychopathology literature (e.g., Keenan, 2000) and one from which the current work is not exempt. At a conceptual level, there is a clear distinction between ER and CP, with ER conceptualized as a broader construct that relates to children's abilities to regulate their behavior in the face of an emotional stressor. ER is optimally measured after inducing an emotional reaction to see how children behave in the face of an emotion. In contrast, CP typically involves assessing patterns of disruptive behavior that are not specific to an emotional induction. While the measurement of ER includes behaviors that are clearly distinct from CP such as waiting passively, self-soothing, and distracting oneself, other behaviors overlap with measures of CP (such as throwing a temper tantrum), which was true of the measurement of ER in the current study and suggests that the constructs might not be as ideally distinct. However, correlation analyses demonstrated that ER and CP were only modestly related in the current study ($r_s = .05$ to $.24$, $p = ns$ to $<.01$). Other work has provided

evidence that measures of emotionality and ER are distinct from measures of problem behavior; studies have found that after removing overlapping items these constructs continue to be associated with one another (e.g., Lemery, Essex, & Smider, 2002). Nevertheless, this issue of overlap is a problem in the field and one that should be addressed through utilizing multiple measurement methods in the assessment of these constructs and having a clear distinction in their conceptualization and methodology to separate the two.

Second, while one main focus was examining whether the FCU was related to later children's ER, the intervention did not specifically target ER. Future research should investigate whether an intervention more specifically focused on improving ER skills would lead to greater improvements in the reduced growth of CP over time. Possible targets of this intervention could be improving child ER skills directly and/or addressing other types of parenting practices (e.g., emotion coaching) that might be more directly related to changes in children's ER relative to PBS. As mentioned previously, it would also be apt to investigate potential changes in ER across more than one time point, especially because the measurement of ER in the current study occurred only at one time point and only one year following the intervention.

A third limitation relates to the assessment of ER. The waiting task lasts only 3 minutes, and with the exception of the one coder impression of ER, the current measurement method was not corroborated with other methods. Optimally, ER would be measured across a much longer period using a diverse set of observational tasks that would be corroborated by reports of ER abilities from multiple informants and methods (e.g., examiner impressions, interviews and questionnaires from parents, day care providers, and preschool teachers). Nonetheless, coding ER strategies from the waiting task used in the current study has been previously linked to multiple types of child outcomes longitudinally across multiple cohorts (e.g., Gilliom et al.,

2002; Silk et al., 2006; Trentacosta & Shaw, 2008), and was found to be associated with CP in the current study. Another limitation of the measurement of ER relates to the notion that early difficulties in ER were expected to be associated with later CP. Because ER was measured only at age 3 and age 2 CP was related to age 3 ER, the design does not allow one to infer that problems in ER precede CP or vice versa. Future studies that more closely examine this potentially bidirectional association could help to clarify the nature of the relationship between ER and CP over time.

Fourth, the generalizability of the current results may be limited. The current low-income, community sample was screened based on the presence of child problem behavior, family problems, and/or socio-demographic risk. While there are advantages to using such a high-risk sample (e.g., higher rates of psychopathology than a normative sample), the findings may have limited generalizability to normative samples. Additionally, the association between ER and CP might be stronger in a less socioeconomically impoverished sample, as changes in parenting could relate to even more pronounced changes in child outcomes in the absence of other risk factors. This possibility is consistent with research on synergistic models, which has suggested that risk for CP increases with the co-occurrence of additional risk factors (e.g., Schonberg & Shaw, 2007; Rutter, 1979). The stresses on children in the current sample (e.g., low SES, neighborhood dangerousness, and parental psychopathology) are also likely to influence children's CP. Therefore in the current sample, ER might be only one among multiple risk factors influencing CP and parenting might be only one among several important targets to modify. Future studies should examine how these associations might differ as a function of risk level.

Finally, it should also be noted that several of the models tested in the current study demonstrated significant chi-square results, which in contrast to the results of the other fit indices indicated a poor model fit. However, as the chi-square test has been found to be very sensitive to sample size (Kline, 1998) and is almost always significant in models with more than approximately 200 cases (Kenny, 2010), the significance of these tests is likely due to the large sample size rather than a poor model fit.

In summary, the current study sought to advance our understanding of the association between ER and CP and determine whether increasing PBS through a parenting-focused intervention would translate to changes in child ER and in turn, improve CP. The findings suggest that while improvements in PBS did not relate to ER, ER is an important mechanism relating to CP that potentially is a valuable target for further intervention research. Additional research is necessary to clarify the role of ER and how it might be improved in a way to influence CP.

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