

Behavioral Control in At-Risk Toddlers: The Influence of the Family Check-up

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This study examines the role of one component of emotion regulation, behavioral control, in the growth of children's early behavior problems by examining whether increases in parental positive behavior support brought about by a family-centered intervention were associated with greater child behavioral control, and whether greater behavioral control at age 3 mediated the association between improvements in aspects of positive behavior support from ages 2 to 3 and decreases in growth of behavior problems from ages 2 to 4. The sample included 713 at-risk children (50% female) and their primary caregivers (50% European American, 28% African American, 13% biracial, 9% other) who were randomly assigned to the intervention or control group. Children had a mean age of 29.91 months at the initial assessment. Data were collected through home visits at child ages 2 to 4, which involved questionnaires for primary caregivers and structured and unstructured play activities for children with primary and alternative caregivers and siblings. Results indicated that the intervention improved parental positive behavior support and reduced growth of child behavior problems. One dimension of positive behavior support, proactive parenting, was modestly associated with behavioral control at age 3, which in turn was significantly associated with growth in behavior problems from ages 2 to 4, with greater behavioral control related to lower levels of growth in behavior problems. Results provide support for the notion that proactive parenting is an important factor in the development of children's behavioral control and that behavioral control plays an important role in the growth of behavior problems.

Longitudinal research on antisocial behavior consistently has shown that persistent behavior problems in early childhood present a risk for the development of

more serious antisocial behavior in later childhood and adolescence (Campbell, 2002; Shaw, Bell, & Gilliom, 2000). The term *behavior problems* describes

problematic child conduct encompassing a broad range of oppositional and aggressive behaviors. Given the serious implications of persistent behavior problems, including the potential for criminality (Caspi, Moffitt, Newman, & Silva, 1996), 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 development of child behavior problems. Moreover, interventions designed to modify risk factors have demonstrated promising potential for success (e.g., Domitrovich, Cortes, & Greenberg, 2007; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006).

Two factors associated with behavior problems in early childhood and shown to be modifiable through interventions are emotion regulation and parenting. Problems with emotion regulation, particularly regulating anger and dealing with frustrating situations, have differentiated typical children from those with behavior problems (Cole, Teti, & Zahn-Waxler, 2003). Because young children are reliant on caregivers to assist them in managing their emotions and behavior (Thompson, 1994), it is important to consider how parents affect the development of emotion regulation.

EMOTION REGULATION

The adaptive regulation of emotions is an important aspect of development for young children (Kopp, 1989), and difficulty with regulating one's emotions is implicated in multiple forms of psychological maladjustment, including behavior problems and mood disorders (Cole, Michel, & Teti, 1994). Specific types of regulatory strategies and emotional expressions have been shown to play a role in the persistence of behavior problems (Cole et al., 2003). Therefore, improved understanding of emotion regulation has the potential to provide evidence about how to prevent the development or exacerbation of behavior problems in early childhood.

Emotion Regulation Defined

There is a great deal of debate regarding what the term *emotion regulation* refers to and how it should be distinguished from related constructs such as self-regulation. As a result, emotion regulation has been defined in various ways. Emotion regulation is a complex process encompassing physiological, cognitive, and behavioral elements (Thompson & Calkins, 1996), and because of this complexity, one approach has been to define emotion regulation quite broadly. For example, Cole, Martin, and Dennis (2004) defined emotion regulation as the "systematic changes associated with activated emotions" (p. 320), including changes in aspects of emotions (e.g., intensity)

and in psychological processes (e.g., attention). This conceptualization is attractive for its inclusion of changes in elements of both emotional expression, such as an increase in fear response, and changes in other processes that result from an emotion, such as a child refocusing attention and changing behavior when presented with a fear-inducing stimulus. However, Eisenberg and Spinrad (2004) suggested that a weakness of Cole and colleagues' broad view is that it neglects to differentiate between unintentional, involuntary, and externally initiated behaviors that occur subsequent to an emotional expression from goal-oriented attempts to modulate emotion and behavior (e.g., intentionally distracting oneself from a distressing stimulus to reduce fear). One compelling viewpoint that lends itself to a narrower focus on goal-oriented behavior utilized in the service of regulating one's emotions is the functionalist perspective, which conceptualizes emotion regulation 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). In the current study, we take a functionalist approach and examine strategies that children use in the service of modulating emotions in the context of a frustrating waiting task during which a goal (obtaining a cookie) is blocked. We focus on one aspect of emotion regulation, children's behavioral control, conceptualized as one's ability to manage behavior in a challenging situation.

Factors affecting emotion regulation. Researchers have hypothesized that regulatory ability develops from a very dependent process during infancy to one that becomes more independently directed as children move into the toddler and preschool periods (Cole et al., 2003; Kopp, 1989), making proximal extrinsic factors related to its development especially important to consider during early childhood. Although relationships with others such as peers and teachers become increasingly important as children age and spend more time outside of the home, young children are most reliant on primary caregivers, who therefore are typically the most influential extrinsic factor affecting how young children learn to manage emotions and behavior. Although much theoretically oriented research has highlighted the important influence that parents have on the development of children's regulatory abilities (Fox & Calkins, 2003; Thompson, 1994), the number of empirical studies examining the effects of parenting on emotion regulation in samples of preschool-age children experiencing various risk factors (e.g., child-level, family-level, and sociodemographic risks) has been limited (Cole et al., 2003). Research has suggested that for children who experience difficulties in their regulatory strategies, the ways parents interact with them affects

how they cope with stressors (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002), with harsh parental responding linked to more intense emotional reactions and poorer social competence (Fabes, Leonard, Kupanoff, & Martin, 2001).

Although aspects of parenting such as greater involvement and engagement with children and reinforcing positive behavior may be associated with more adaptive child behavioral control, defined in this study as children's ability to manage behavior in a challenging situation, anticipatory proactive parenting might be especially instrumental in preventing children from becoming easily upset and promoting the development of adaptive behavioral control. For example, Thompson (1994) hypothesized that parents can extrinsically manage children's emotional experiences by helping to control the types of arousing situations to which they are exposed. Such planful parental management could promote adaptive behavioral control. In addition, parents may teach proactive ways of handling situations likely to elicit negative emotions by serving as models to their children through their own responses of adaptive regulation to emotionally stimulating events (Cole et al., 1994). The way that parents talk about feelings can also help children learn to better manage emotions and develop behavioral control strategies, as work on emotion coaching has demonstrated (Katz & Windecker-Nelson, 2004). Therefore, it is important to explore parents' proactive management of situations that likely cause children distress by use of proactive parenting behaviors, which include anticipating problems, proactively structuring situations, and communicating in a calm and understandable manner, (Gardner, Shaw, Dishion, Burton, & Supplee, 2007; Gardner, Sonuga-Barke, & Sayal, 1999), particularly compared to other positive but less proactive dimensions (e.g., involvement, reinforcement), which indicate a positive reaction to a child's behavior but are not preemptive behaviors aimed to prevent negative consequences. Further examining how specific dimensions of positive parenting are associated with behavioral control is of particular interest for this study.

Behavioral control and behavior problems. Across age groups and time, research has shown a consistent relationship between children's regulatory abilities and risks for behavior problems, including during early childhood (e.g., Cole, Zahn-Waxler, Fox, Usher, & Welsh, 1996; Gilliom et al., 2002; Hill, Degnan, Calkins, & Keane, 2006). As early as the toddler and preschool years, emotion regulation has been associated with problematic behavior, both concurrently and longitudinally. In one study of preschoolers, difficulty with emotion regulation, specifically negative emotional

expression or lack of expression, was linked to more behavior problems concurrently and at a follow-up in first grade (Cole et al., 1996). Similarly, a study examining persistent behavior problems found that girls (but not boys) who had had poorer regulatory skills measured by emotional reactivity and behavioral control strategies at age 2 had more chronic behavior problems concurrently and at ages 4 and 5 (Hill et al., 2006). Although these findings suggest early problems with regulatory abilities are linked with later behavior problems, there is a lack of experimental data examining this relationship, an issue addressed in the current study.

Specific types of behavioral control strategies have been shown to be differentially related to child behavioral outcomes. A consistent finding in the 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., Gilliom et al., 2002; Grolnick, Bridges, & Connell, 1996). In a longitudinal study of at-risk boys, Trentacosta and Shaw (2009) 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 behavioral control in the current study at age 3, was related to peer rejection at ages 10 to 12, which in turn was related to increased antisocial behavior in adolescence. This finding and others from research using observational procedures that elicit individual differences in behavioral control (e.g., Gilliom et al., 2002) suggest that strategies used by young children have important implications for behavior problems. Preventive interventions also have been designed to improve aspects of emotion regulation such as behavioral control, including the Promoting Alternative Thinking Strategies (Domitrovich et al., 2007) and Emotions Course (Izard et al., 2008) programs, which have shown success in preventing behavior problems.

IMPORTANCE OF PARENTING AND PARENTING INTERVENTIONS

Preventive interventions focusing on parenting have been successful in reducing early behavior problems even among samples of children at heightened risk based on family, child, and socioeconomic factors (Baydar, Reid, & Webster-Stratton, 2003; Dishion et al., 2008; Shaw 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. Based on the transactional nature of the relationship between early child emotional and behavioral regulatory abilities and child

behavior, such regulatory abilities may play an important role in the relationship between parenting interventions and early behavior problems.

Basic research indicates strong associations between several dimensions of parenting and behavior problems, with rejection, harshness, and unresponsiveness implicated (McLeod & Shanahan, 1993; Pettit, Bates, & Dodge, 1997). Positive parenting skills, including warmth (Pettit et al., 1997), anticipating problematic situations (Gardner et al., 1999), and responsiveness (Martin, 1981), have also been found to play a protective role against behavior problems. As previously noted, parenting-focused interventions have been consistently linked to improvements in child behavior problems, including during early childhood (e.g., Dishion et al., 2008; Webster-Stratton, Reid, & Hammond, 2001). The Family Check-up (FCU) is one such preventive intervention that combines aspects of motivational interviewing with parent training for at-risk youth that has demonstrated promising outcomes in reducing problem behavior in adolescence (e.g., substance use for adolescents; Connell, Dishion, Yasui, & Kavanagh, 2007) and early childhood (Dishion et al., 2008; Shaw et al., 2006). The FCU provides a comprehensive assessment of child and family functioning, and data obtained from assessments are shared with families in feedback sessions to enhance their motivation for change (Miller & Rollnick, 2002). Mediation models have shown that changes in positive behavior support, including proactive parenting, parent involvement, positive reinforcement, and engaged parent-child interaction, mediated the effect of the FCU on behavior problems at a 2-year follow-up from ages 2 to 4 (Dishion et al., 2008). Based on the links between parenting and child behavior problems, between child behavioral control and behavior problems, and between parenting and the development of behavioral control abilities, it seems likely that parenting interventions successful in modifying child behavior problems might operate through child behavioral control.

THE CURRENT STUDY

The current study aims to increase our understanding of how improvements in specific components of positive behavior support (PBS), including proactive parenting, parent involvement, positive reinforcement, and engaged parent-child interaction, may be associated with greater child behavioral control and whether behavioral control plays a mediating role in the relationship between improvements in aspects of PBS and decreases in child behavior problems in a sample of high-risk toddlers recruited on the basis of multiple risk factors for behavior problems and followed from ages 2 to 4. The

rationale for focusing on this developmental period is because the “terrible twos” has been shown to be an important transitional period for families and a time during which the caregiving environment is particularly influential in moderating the development of behavior problems (Shaw et al., 2000). It is also a time during which the greater regulatory, language, and social understanding skills begin to emerge (e.g., Brownell, Ramani, & Zerwas, 2006). With regard to behavioral control, research has shown that the period from 2 to 4 marks a lessening of the use of self-soothing behaviors and the onset of more mature and active strategies such as distraction (Grolnick et al., 1996). One unique aspect of the current article is that we attempt to unpack the mechanism involved in how improvements in parenting are associated with reductions in the growth of child behavior problems. Whereas previous work with this sample has focused more specifically on understanding changes in parenting related to child behavior (Dishion et al., 2008), this article attempts to further our understanding of how changes in parenting might be associated with improved behavioral control, which in turn could explain how improvements in parenting lead to reductions in behavior problems. For the current study, it was hypothesized that across the entire sample early behavioral control skills measured at age 3 would be negatively associated with behavior problems measured at age 4 (Hypothesis 1). Further, it was hypothesized that children in the intervention group, who received the FCU administered initially at child age 2, would show higher levels behavioral control at age 3 compared to children in the control group (Hypothesis 2). Based on previous findings showing associations between parenting and the development of regulatory abilities (Cole et al., 2003; Fabes et al., 2001), it was hypothesized that the effect of the FCU on behavioral control measured at age 3 would be mediated by improvements in PBS from ages 2 to 3. Specifically, the intervention group was expected to show greater improvement in aspects of PBS from ages 2 to 3, which in turn would be related to higher levels of behavioral control at age 3 (Hypothesis 3). Finally, it was hypothesized that differences in behavioral control between children in the intervention and control group measured at age 3 would mediate the effects of improvements in aspects of PBS from ages 2 to 3 on behavior problems measured at ages 2, 3, and 4. Thus, the intervention group was expected to show greater improvement in PBS from age 2 to 3, which in turn would be related to higher levels of behavioral control at age 3, which in turn would be related to less growth in behavior problems from ages 2, 3, and 4 (Hypothesis 4). This study focuses on changes in parenting from ages 2 to 3 to follow-up the findings from previous work with this sample (Dishion et al., 2008) to examine whether sequential mediation is supported.

Thus, the study examined parenting at ages 2 to 3, behavior problems across ages 2 to 4, and behavioral control at age 3 (see Figures 2 and 3, in which nonsignificant paths are not depicted for simplicity). Although it was hypothesized that all aspects of PBS would be associated with behavioral control, it was expected that proactive parenting might be most strongly associated, given that anticipatory proactive parenting has been theorized to be especially instrumental in preventing children from becoming upset and promoting regulatory abilities (Fox & Calkins, 2003; Thompson, 1994).

METHOD

Participants

The study involved participants from the Early Steps Multisite project, an ongoing study designed to examine the effectiveness of a tailored, family-based intervention for children at risk for externalizing problems on the basis of child, family, and sociodemographic factors (described in more detail in Dishion et al., 2008). Participants in the current study included 713 ($n=708$ mothers, 99% of sample; $n=5$ grandmothers, 1% of sample) primary caregiver-child dyads of the original 731, as 18 dyads involving primary caregivers who were fathers were excluded from analyses (details on the reason follow). Participants were 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 (behavior problems, high conflict relationships with adults), (b) family problems (maternal depression, parenting challenges, substance problems, teen parents), and (c) sociodemographic risk (low educational achievement and low family income using WIC criteria). Participants were from urban (38% from Pittsburgh, PA), rural (26% from Charlottesville, VA), and suburban (36% from Eugene, OR) locations and self-reports of primary caregivers' ethnicity was as follows: 50% European American, 28% African American, 13% biracial, and 9% other groups. Fourteen percent self-reported as Hispanic American. Fifty percent of participant children were female. As can be seen in Figure 1 (Shaw, Connell, Dishion, Wilson, & Gardner, 2009), of the 1,666 parents who were approached at WIC sites across the three study sites and had children in the appropriate age range, 879 families met the eligibility requirements (52% in Pittsburgh, 57% in Eugene, 49% in Charlottesville) and 731 (83.2%) agreed to participate (88% in Pittsburgh,

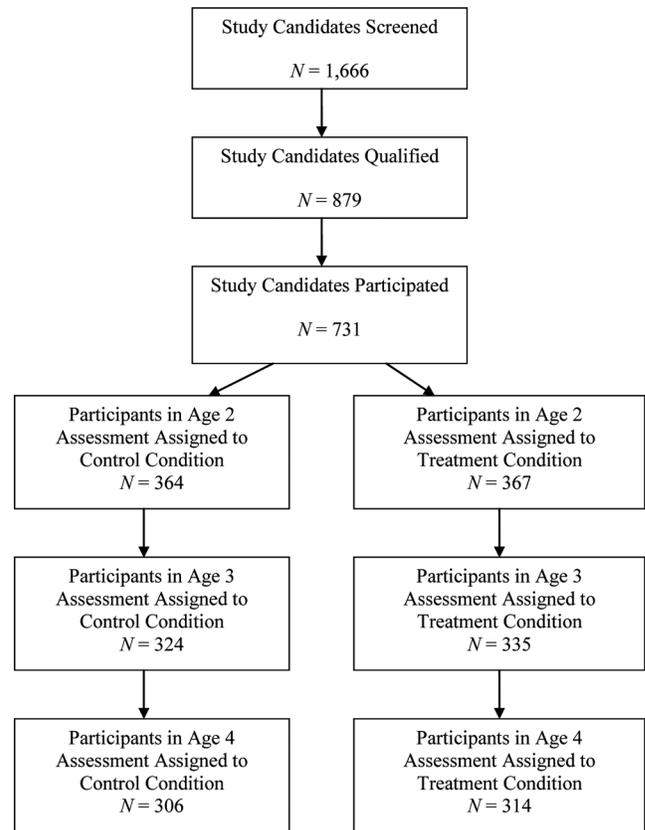


FIGURE 1 Participant flow chart [Shaw, D. S., Connell, A., Dishion, T. J., Wilson, M. N., & Gardner, F. (2009). Improvements in maternal depression as a mediator of intervention effects on early childhood problem behavior. *Development and Psychopathology*, 21, 417-439. doi:10.1017/S0954579409000236, reproduced with permission].

84% in Eugene, 76% in Charlottesville). More than two thirds of families had an annual income of less than \$20,000 at recruitment (2002-03).

The families were assessed annually when children were age 2 ($M=29.91$ months, $SD=3.12$ months), age 3 ($M=41.81$ months, $SD=3.31$ months), and age 4 ($M=53.82$ months, $SD=3.44$ months). After the initial age 2 assessment, participants were randomly assigned to the intervention ($n=367$) or control group ($n=364$). Of the 731 families who initially participated, 659 (90%) participated at the 1-year age 3 follow up, and 620 (85%) participated at the 2-year age 4 follow-up. At ages 3 and 4, selective attrition analyses revealed no significant differences by site, race, ethnicity, sex, or caregiver-reported children's behavior problems. Randomization appeared to be successful as there were no differences at age 2 prior to group assignment on measures of caregiver-reported children's behavior problems or observations of caregiver PBS. Furthermore, there were no differences in the number of participants not retained in the control versus intervention

groups at ages 3 ($n = 40$, 32, respectively) and 4 ($n = 58$, 53, respectively).

Assessment Protocol

Primary caregivers who agreed to participate in the study were scheduled for annual home visits at child ages 2 to 4. Assessment visits were identical for control and intervention group participants and involved structured and unstructured play activities for the target child with 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 minor deviations in task selection in accord with the child's developmental status: a 15-min free-play session, a 5-min cleanup session, a 3- to 5-min delay task (described in greater detail next), four 3-min teaching tasks, a second 4-min free play, a second 4-min cleanup task, 2 min each of two inhibition-inducing toys, and a 20-min 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 to 3 hr. Parental written consent was obtained for all participants. Institutional Review Board approval was received.

Intervention Protocol: The FCU

A more complete description of the FCU can be found in Dishion et al. (2008). The FCU is a brief intervention based on motivational interviewing techniques and modeled after the Drinker's Check-Up (Miller & Rollnick, 2002). Families randomly assigned to the intervention were scheduled to meet with a parent consultant for two or more sessions, depending on their preference. The three meetings in which families were typically involved included an initial contact meeting, an assessment meeting, and a feedback session. To optimize internal validity by preventing differential dropout rates in the intervention and control groups, 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 with optional follow-up sessions. Intervention families received a \$25 gift certificate for completing the FCU and feedback.

After the first meeting (the assessment described previously), the second visit called the "get to know you" meeting consisted of the parent consultant meeting with the caregiver(s) 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. Objectives of the feedback involve assessing the caregiver's willingness to change problematic parenting practices, identifying ways to support parenting strengths, and providing services appropriate to the family's needs. Parents also have the option to participate in follow-up sessions focused on parenting practices and contextual issues (e.g., coparenting, child care resources, or housing). Intervention families received the FCU after the age 2 and 3 assessments. Of the families assigned to the FCU, 73.8% ($n = 271$) participated in the "get to know you" and feedback at child age 2 and 62.7% ($n = 230$) at age 3.¹

Measures

Demographics questionnaire. During the child ages 2, 3, and 4 visits, a demographics questionnaire was administered to the primary caregivers including questions about family structure, parental education and income, parental criminal history, and areas of familial stress.

Early childhood behavior problems. A construct similar to that described in Dishion et al. (2008) was utilized to measure child behavior problems in the current study. The Child Behavior Checklist (CBCL) for ages 1.5 to 5 (Achenbach & Rescorla, 2000) is a 99-item questionnaire that assesses behavior problems in young children, which was administered to primary caregivers at ages 2, 3, and 4. Data from the age 2 to 4 assessments were used for the current study. The 24-item, broadband Externalizing factor was used as a 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 established measure of child behavior problems was also administered to primary caregivers—the 36-item Eyberg Child Behavior Inventory (ECBI; Robinson, Eyberg, & Ross, 1980). The ECBI 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 each of the 36 problem behaviors is a problem for them ($\alpha = .84$, $.90$, and $.94$ for ages 2, 3, and 4 in current sample, respectively). Sample items include "Says 'no' to parental commands" and "Repeats misbehavior after being told not

¹Note that these engagement figures are slightly lower than those reported in Dishion et al. (2008) because past studies calculated engagement based on a subsample that had both assessments and feedback sessions and this current figure now includes the percentage of families that had a feedback session out of the total intervention half of the 731 participant total sample.

to do it.” Although both the CBCL Externalizing factor and the ECBI Problem factor assess behavior problems, they were analyzed separately to replicate models tested in Dishion et al. (2008) and to test sequential mediation.

PBS. 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 next) and from coding videotaped interactions between caregivers and children in the home from the age 2 (preintervention) and 3 (postintervention) assessments. A team of undergraduates coded the tasks at ages 2 and 3 using the Relationship Process Code (RPC; Jabson, Dishion, Gardner, & Burton, 2004; average team RPC percentage agreement = .87, $\kappa = .86$; Dishion et al., 2008) and then completed impressions of proactive and positive parenting.

Previous research with this sample has utilized a latent factor of PBS composed of four indicators: proactive parenting, parent involvement, positive reinforcement, and engaged parent-child interaction (Dishion et al., 2008). To examine variation among these factors and to assess which aspects of parenting might be most closely associated with children’s behavioral control, separate models were tested for each parenting construct in the current study; therefore the latent construct was not modeled.

1. *Proactive parenting.* Videotape coders rated each caregiver on 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 six items. Examples include “communicates to child in calm, simple, and clear terms,” “gives understandable, age-appropriate reasons for behavior change,” “adjusts/defines situation to ensure child’s interest, success, and comfort,” and “uses verbal structuring to make task manageable” ($\alpha = .84$).
2. *Parent involvement.* This measure is based on the home visitor’s rating of the caregivers’ involvement using the following items from the Home Observation for Measurement of the Environment inventory (Bradley, Corwyn, McAdoo, & García 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.”
3. *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). It is important to note the distinction that, whereas reinforcement involves reacting to child behavior, proactive parenting uniquely involves playful parental behavior initiated by the parent to prevent children from misbehaving or becoming upset.

4. *Engaged parent-child interaction time.* This score reflects the average duration of episodes that included consecutive parent-child exchanges (turn taking, playing a game) and involves RPC codes such as Talk and Neutral Physical Contact. *T* tests revealed a significant difference between mothers and fathers on proactive parenting ($p < .05$), so father-child dyads were excluded from analyses ($n = 18$), reducing the sample from 731 dyads to 713. Differences were not found between mothers and grandmothers, so grandmother-child dyads were retained.

Age 2 disruptive behavior. Although the age 2 assessment did not involve an identical delay task with which to measure behavioral control at baseline (described next), another comparable measure of child behavior was assessed during a similar waiting task. Disruptive behavior was measured observationally from the parent busy task (5 min) conducted 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 PBS, disruptive behavior was coded using the RPC based on the presence of negativity, which was defined as the child being verbally or physically negative (yelling at or hitting the caregiver) or giving a negative demand, which involves a child giving a threat of some negative consequence toward the parent such as, “If you don’t give me those toys, you’ll be sorry” (average team RPC percentage agreement = .87, $\kappa = .86$).

Behavioral control. During ages 2 to 4, considerable maturational changes occur in cognitive ability and behavior, including the ability to regulate emotions and behavior. Age 3 was chosen as the age at which to examine behavioral control as the midpoint in this period of maturation. Age 3 behavioral control was measured from a waiting task, which required children to wait for a cookie while their primary caregiver completed questionnaires. Similar tasks have been utilized with samples of comparable sociodemographic risk and have been noted to be extremely difficult for children (Gilliom et al., 2002). The coding system is based on work by Grolnick et al. (1996) and adapted by Gilliom et al. (2002) and was utilized by Trentacosta and Shaw (2009) for a similar delay 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 caregiver was finished completing 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 but not reach it and tell their child she or he would receive the cookie after the questionnaires were completed. The toys used in other tasks were also in the room in a covered bin, and the caregiver was instructed not to allow the child to play with them so that there was little of interest for the child in the immediate environment (Gilliom et al., 2002; Trentacosta & Shaw, 2009).

Behaviors from videotapes of the 3-min age 3 delay task were coded for their presence or absence during each of the 10-s intervals. For every interval, children were coded as engaging in at least one code and could employ more than one strategy in an interval. Based on previous research on behaviors related to emotion regulation and behavior problems, the codes of interest for the current study included (a) *Distraction*—behavior in which the focus of attention is not on the delay object or the task including solitary distraction (e.g., dancing around the room, singing, imaginary play) and interactive distraction (e.g., behavior in which the child is distracting himself/herself by engaging with another person) and (b) *Focus on delay object*—includes the child touching the delay object, crying, tantruming, attempting to break into the toys, leaving the room, or breaking a rule set by the caregiver (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 with kappas of .63 for distraction and .69 for focus. To increase the generalizability of our construct, we included one coder impression item completed by examiners at the end of the age 3 assessment based on behavior during the entire visit. On a 9-point Likert scale, examiners rated children on the question, “Does child seem dysregulated and difficult to manage?” For all analyses, distraction was reverse scored so all variables loaded in the same direction (i.e., higher scores indicate poorer behavioral control and lower scores indicate higher behavioral control).

Data Analytic Plan

An intent-to-treat design was used for all analyses, such that those who were assigned to the FCU and chose not to take part in the FCU were included. Correlations were first computed to examine associations between variables in a univariate framework. Next, structural equation modeling was utilized using maximum likelihood estimation with robust standard errors (MLR) in

Mplus 5.21 (Muthén & Muthén, 2007) to examine hypotheses from a multivariate perspective, including covariates. MLR is robust to nonnormality and adjusts for missing data by estimating parameters of all available data for the estimation of a specific parameter (Muthén & Muthén, 2007). Hypotheses were tested sequentially in steps in the process of model building. Separate models were computed for the CBCL and ECBI factors. The models addressing the mediational role of behavioral control in the association between proactive parenting and growth in behavior problems involved latent growth curve modeling (Muthén & Muthén, 2007).

RESULTS

Descriptive Statistics and Bivariate Correlations

Descriptive statistics including means, standard deviations, and ranges are included for primary study variables in Table 1. For ease of interpretation, *t* scores are presented for behavior problems measures, although raw scores were used for the models to avoid potential age and gender corrections. Not surprisingly, because children were screened based on behavior problems, the age 2 measures of CBCL Externalizing and ECBI Problem Behavior factors had mean scores approximately 1 standard deviation above normative scores. Using the borderline clinical cutoff for the CBCL (i.e., ≥ 84 th to 90th percentile), 49.2% of children were reported to have clinically elevated scores on the Externalizing factor at age 2, compared to rates of 34.7% at age 3 and 28.7% at age 4. Bivariate correlations are displayed for all study variables in Table 1.

Bivariate correlations addressing the hypothesis that age 3 measures of behavioral control would be related to age 4 indices of behavior problems indicated significant, albeit modest correlations (i.e., $r_s = .10$ to $.23$, $p_s < .01$ to $< .05$) in the expected direction between all three indicators of behavioral control and the age 4 CBCL Externalizing and ECBI Problem factors.

Bivariate correlations examining associations between the FCU and indicators of age 3 behavioral control were not supportive of Hypothesis 2, as non-significant associations were found between the FCU and all three indicators. Five of 24 correlations involving indicators of ages 2 and 3 PBS and age 3 behavioral control were significant in the expected direction, with one significant association in the unexpected direction. Most notably, proactive parenting and behavioral control indicators were most consistently associated in the expected direction. Age 2 proactive parenting was significantly associated with the coder impression ($r = -.12$, $p < .05$) and at a trend level with focus ($r = -.09$,

TABLE 1
Correlations Between All Observed Variables

	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Family Check-up		1												
2. Proactivity Age 2	5.88 (1.44)	.02	1											
3. Proactivity Age 3	6.22 (1.51)	.13**	.49**	1										
4. Reinforcement Age 2	.123 (0.10)	-.01	.28**	.23**	1									
5. Reinforcement Age 3	.118 (0.10)	.09*	.22**	.27**	.23**	1								
6. Engagement Age 2	.303 (0.12)	-.06	.41**	.31**	.32**	.24**	1							
7. Engagement Age 3	.287 (0.11)	.07†	.25**	.33**	.26**	.23**	.46**	1						
8. Involvement Age 2	2.21 (0.89)	-.06	.26**	.21**	.10*	.12**	.30**	.24**	1					
9. Involvement Age 3	2.13 (0.97)	.01	.30**	.32**	.16**	.24**	.25**	.33**	.22**	1				
10. CBCL Externalizing Age 4	53.73 (10.50) ^a	-.10*	-.17**	-.18**	-.09†	-.11*	-.08†	-.08†	-.06	-.14**	1			
11. ECBI Problem Age 4	59.67 (10.94) ^a	-.09*	-.10†	-.13**	-.07	-.15**	-.05	-.02	-.06	-.10*	.69**	1		
12. Focus on Delay Object	.122 (0.17)	.03	-.09†	-.12*	.02	-.04	-.03	.03	-.04	-.08*	.18**	.18**	1	
13. Reverse Active Distraction	.084 (0.13)	.01	-.08	-.12*	.03	-.02	-.02	.01	.00	-.06	.12**	.10*	.76**	1
14. Impression of Regulation	3.28 (2.13)	-.01	-.12*	-.26**	.11*	.04	.01	.07†	-.06	-.07†	.23**	.13**	.37**	.27**

^a*t* scores are presented for Child Behavior Checklist (CBCL) and Eyberg Child Behavior Inventory (ECBI) measures for ease of interpretation; all other values are raw values.

†*p* ≤ .10. **p* ≤ .05. ***p* ≤ .01.

p < .10), whereas age 3 proactive parenting was significantly associated with all three indicators (i.e., *r*s = -.12 to -.26, *p*s < .01 to < .05).

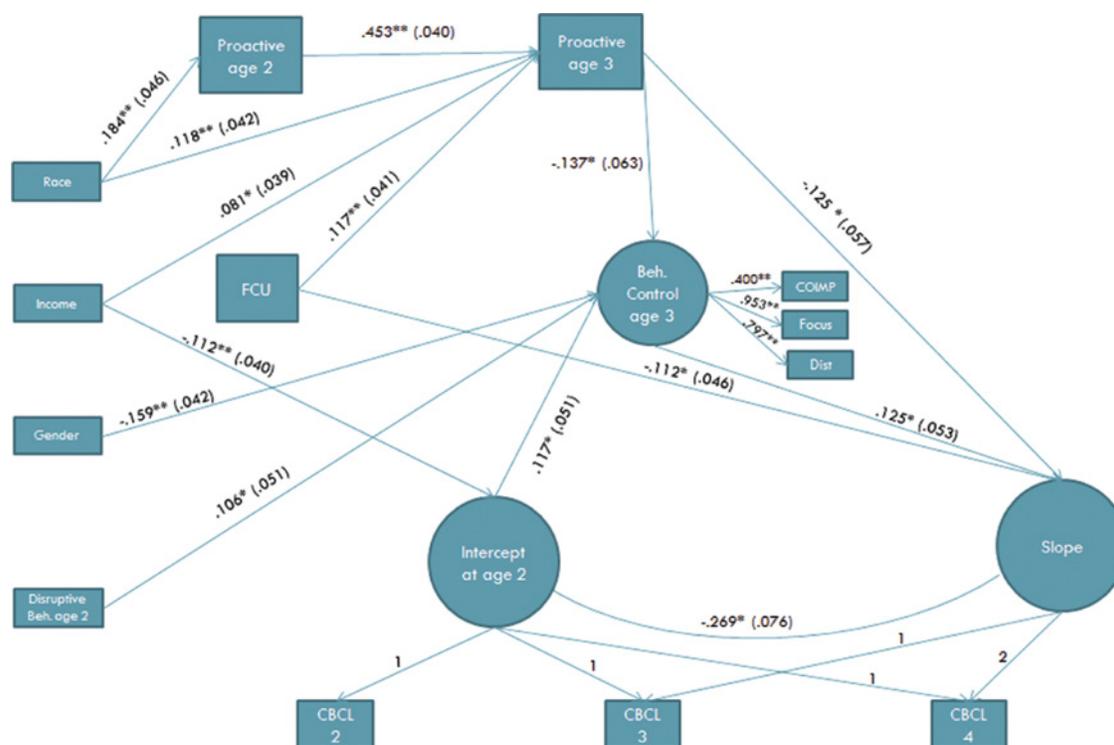
Models Testing Central Hypotheses

To build up the full model depicted in Figures 2 and 3, in which nonsignificant paths are not depicted for simplicity, parts of the model were first estimated. The covariates of family income, child gender, and child race/ethnicity were added to each model. Because boys and girls do not reliably differ in rates of temperamental problems, behavioral inhibition, and internalizing and externalizing problems until the age of 4 (Keenan & Shaw, 1997), no specific hypotheses about gender were generated. Because of relatively low numbers of racial/ethnic minorities outside of African Americans, minority status was examined as a dichotomous variable. Models included a path from disruptive behavior at age 2 to behavioral control at age 3 to control for baseline negative behavior during the wait task. First, the measurement model for the latent factor of behavioral control was initially examined including the following indicators: (a) coder impression of dysregulation, with higher scores indicating lower regulation; (b) ratio of the number of intervals a child focused on the delay object to the total number of intervals; and (c) the reverse score of the ratio of the number of intervals a child utilized active distraction to the total number of intervals. Both the focus and distraction indicators demonstrated a skewed distribution, so the data were transformed using the natural log transformation in SPSS 16.0, which reduced skewness. The measurement model, a saturated model, provided a perfect fit to the data, $\chi^2(0) = 0.00$, *p* = .00; comparative fit index (CFI) = 1.00, Tucker–Lewis index

(TLI) = 1.00, root mean square error of approximation (RMSEA) = .00, standardized root mean square residual (SRMR) = .00, and supported the construction of the behavioral control latent factor.

To test the relation between behavioral control and behavior problems at age 4, the age 4 CBCL measure of behavior problems was regressed on the latent factor of behavioral control. This model provided a reasonable fit to the data, $\chi^2(11) = 40.58$, *p* = .00; CFI = .95, TLI = .90, RMSEA = .06, SRMR = .04. The significant path (standardized path coefficient = .170, *p* < .01) indicated that poorer behavioral control at age 3 was associated with greater behavior problems at age 4, and the effect size of the path was small (*R*² = .03). There was also a significant path (standardized path coefficient = .109, *p* < .05) between disruptive behavior at age 2 and behavioral control at age 3 and a significant path (standardized path coefficient = -.163, *p* < .01) and between behavioral control at age 3 and gender, with female subjects showing greater behavioral control than male subjects. Similarly, the relation between behavioral control and the ECBI Problem factor measured at age 4 was examined in a separate model, which also provided a reasonable fit to the data, $\chi^2(11) = 32.98$, *p* = .00; CFI = .96, TLI = .92, RMSEA = .05, SRMR = .03, and a significant path (standardized path coefficient = .180, *p* < .01) indicated that poorer behavioral control at age 3 was associated with greater behavior problems at age 4 (*R*² = .03). In addition, there was also a significant path (standardized path coefficient = -.107, *p* < .01) between income and behavior problems, with lower income related to greater behavior problems.

To examine the association between treatment group status and child behavioral control, a model examining the path between the FCU and the latent factor of



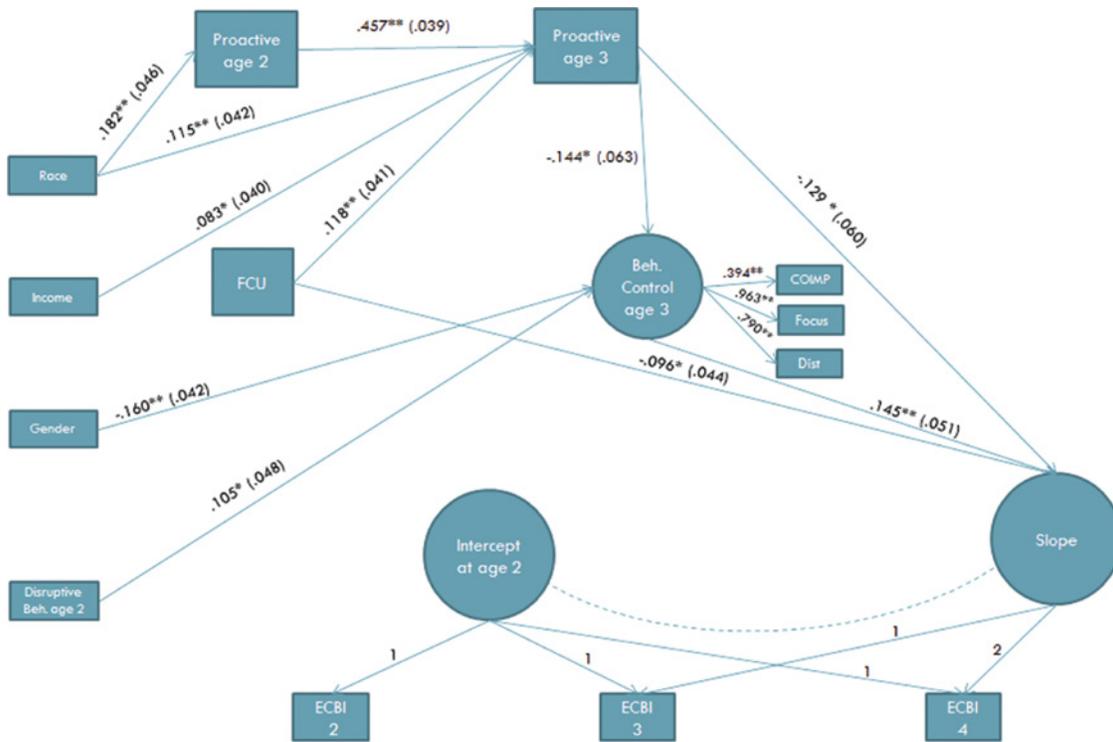
Fit indices: $\chi^2(37) = 109.16, p = .00$; CFI = .95, TLI = .91, RMSEA = .05, SRMR = .05.
 Indirect Effect 1 (Proactive parenting at age 3 as mediator): $-.016$ (.009), $p < .10$.
 Indirect Effect 2 (Behavioral control as mediator): $-.017$ (.011), *ns*.
 Indirect Effect 3 (sequential mediation): $-.002$ (.001), *ns*.
 * $p < .05$. ** $p < .01$.

FIGURE 2 Hypothesis 4 with Child Behavior Checklist (CBCL) Externalizing factor. *Note:* Pathways that were not significant are not depicted in this model. FCU = family check-up (figure appears in color online.)

behavioral control was estimated. This model provided a reasonable fit to the data, $\chi^2(10) = 25.35, p = .00$; CFI = .97, TLI = .95, RMSEA = .05, SRMR = .03. However, the association between the FCU and behavioral control at age 3 was not significant (standardized path coefficient = .040, $p = .34$).

To examine whether there was an indirect effect between the FCU and child behavioral control through changes in aspects of PBS, the parenting constructs from ages 2 and 3 (proactive parenting, parent involvement, positive reinforcement, and engaged parent-child interaction) were individually added to the previously tested model, with the relation between the age 2 and age 3 measures of each parenting construct and the indirect pathway estimated. It was hypothesized that the FCU would affect each aspect of PBS at age 3, which in turn would affect behavioral control at age 3. The model examining proactive parenting provided a reasonable fit to the data, $\chi^2(17) = 60.89, p = .00$; CFI = .94,

TLI = .88, RMSEA = .06, SRMR = .04. In line with previous findings (Dishion et al., 2008) the FCU was associated with improvements in proactive parenting from ages 2 to 3 (standardized path coefficient = .119, $p < .01, R^2 = .01$). In addition, there was a significant association between improvements in proactive parenting from ages 2 to 3 and behavioral control at age 3 (standardized path coefficient = $-.148, p < .05, R^2 = .02$). The association between the FCU and behavioral control at age 3 was not significant. In addition, the indirect effect testing the role of improvements in proactive parenting in the association between the FCU and behavioral control was significant at a trend level (indirect effect = $-.018, SE = .01, p = .07$). In addition to our primary variables of interest, a significant positive association was found between proactive parenting at age 3 and income (standardized path coefficient = .081, $p < .05$), with higher income caregivers demonstrating higher levels of proactive parenting at age 3, and



Fit Indices: $\chi^2(37) = 82.88, p = .00$; CFI = .96, TLI = .93, RMSEA = .04, SRMR = .04.
 Indirect Effect 1 (Proactive age 3 as mediator): $-.017 (.010), p < .10$.
 Indirect Effect 2 (Behavioral control as mediator): $-.021 (.012), p < .10$.
 Indirect Effect 3 (sequential mediation): $-.002 (.002), ns$.
 * $p < .05$. ** $p < .01$.

FIGURE 3 Hypothesis 4 with Eyberg Child Behavior Inventory (ECBI) Problem factor. Note: Pathways that were not significant are not depicted in this model. FCU = family check-up (figure appears in color online.)

between majority versus minority status and proactive parenting at age 2 (standardized path coefficient = .181, $p < .01$) and at age 3 (standardized path coefficient = .114, $p < .01$), with the primary caregivers of European American children demonstrating more proactive parenting than the primary caregivers of minority children. Results from models examining other dimensions of PBS (i.e., involvement, positive reinforcement, and engaged interaction) found no significant associations with behavioral control. Hence, the remaining presentation of results and discussion focuses on models involving proactive parenting.

Finally, to test whether behavioral control mediated the association between improvements in proactive parenting and growth in behavior problems, modeling the growth of behavior problems was added to the previous model. For the CBCL Externalizing factor model, growth in behavior problems was modeled as linear based on the repeated measures of behavior problems

composed of age 2 to 4 CBCL scores. The Intercept factor was modeled to estimate the behavior problems level at age 2 (M intercept = 20.68, $p < .01$; variance of intercept = 40.81, $p < .01$) and the slope factor to estimate the change rate in behavior problems per year (M slope = $-2.40, p < .01$; variance of slope = 10.94, $p < .01$). The model provided a reasonable fit to the data, $\chi^2(37) = 109.16, p = .00$; CFI = .95, TLI = .91, RMSEA = .05, SRMR = .05. As can be seen in Figure 2, which includes standardized path coefficients for significant paths and excludes nonsignificant paths, the intercept of behavior problems was significantly associated with behavioral control at age 3 such that children with higher levels of behavior problems at age 2 demonstrated less behavioral control at age 3. In addition, there were significant associations between behavioral control at age 3 and the slope factor of behavior problems (the effect size of this path was small: $R^2 = .01$), between the FCU and the slope factor of behavior problems, and between

proactive parenting at 3 and the slope factor of behavior problems. There was also a significant association between proactive parenting at age 3 and greater behavioral control at age 3 controlling for proactive parenting at age 2. A significant association ($p < .01$) was also found between the intercept of behavior problems and income, with children from higher income families demonstrating lower levels of behavior problems at age 2. The indirect effect testing the role of proactive parenting in the association between the FCU and behavioral control was significant at a trend level ($p = .09$).

For the ECBI Problem factor, growth in behavior problems was also modeled as linear based on the repeated measures of scores from age 2 through 4. The intercept factor was modeled to estimate the behavior problems level at age 2 (M intercept = 14.28, $p < .01$; variance of intercept = 23.30, $p < .01$) and the slope to estimate the change rate per year (M slope = 0.08, ns ; variance of slope = 12.45, $p < .01$). This model provided a reasonable fit to the data, $\chi^2(37) = 82.88$, $p = .00$; CFI = .96, TLI = .93, RMSEA = .04, SRMR = .04. As seen in Figure 3, which includes standardized path coefficients for significant paths and excludes nonsignificant paths, results for the ECBI model were similar to those found in the CBCL model with three exceptions: the associations between the intercept of behavior problems and income and between the intercept and slope became nonsignificant, and the indirect effect of behavioral control on the association between improvements in proactive parenting and the slope of behavior problems reached trend level significance (mediated effect = $-.021$, $SE = .01$, $p = .07$).

DISCUSSION

Research has demonstrated that early difficulty with emotion regulation 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. Consistent with hypotheses, greater child behavioral control at age 3 was associated with reduced levels of child behavior problems at age 4 and reduced growth of child behavior problems from ages 2 to 4. In the growth model involving the CBCL Externalizing factor, children with better behavioral control demonstrated a more rapid decline in behavior problems from ages 2 to 4. Similarly, in the growth model involving the ECBI Problem factor, children with better behavioral control demonstrated a less rapid increase in behavior problems.

Similar to findings reported by Dishion et al. (2008), the current study demonstrated that the FCU was associated with improvements in proactive parenting from ages 2 to 3. In the ECBI model, improvements in proactive parenting were significantly related to better

behavioral control at age 3. In addition, the mediational role of behavioral control in the association between improvements in proactive parenting and growth in behavior problems was significant at a trend level, as was the indirect effect of proactive parenting in the association between the FCU and behavioral control. In the CBCL model, the association between proactive parenting and better behavioral control was significant and the indirect effect of proactive parenting on the association between the FCU and behavioral control was significant at a trend level. These differences may reflect the different growth patterns of behavior problems seen in the CBCL (significant decrease) and ECBI (nonsignificant increase) models. By examining each component of PBS separately, proactive parenting was found to be particularly important to the development of behavioral control. In terms of implications for intervention, proactive parenting might be a specific target for parents of children with poorer behavioral control.

Contrary to hypotheses, the FCU was not associated with greater behavioral control. The FCU did not involve directly working with the child, and thus perhaps this nonsignificant main effect is not surprising. Despite the nonsignificant main effect, some support was found for an indirect positive effect of the FCU on behavioral control via improvements in proactive parenting. As hypothesized, in both models children's greater behavioral control was related to lower behavior problems from ages 2 to 4, suggesting that behavioral control plays an important role in the reduced growth of behavior problems. Both models also found a link between age 2 behavior problems and age 3 behavioral control, suggesting that this relationship is bidirectional.

Limitations and Future Directions

Although the current study has 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 sequential mediation, there were also several limitations. First, effect sizes from the present study for changes in parenting, behavioral control, and behavior problems were small. However, as highlighted by Dishion et al. (2008), the FCU is a preventive intervention and therefore although families are high risk, not all demonstrate problems in parenting or child problem behavior, leaving less room for change in some families. These effects, although small, might be practically significant if they prevent coercive cycles from escalating (Dishion et al., 2008). Effect sizes of preventive interventions that are offered broadly to samples in which not all individuals are experiencing elevated levels of psychological problems also tend to be more modest than in interventions with indicated samples or clinical trials in which

families actively seek help for children rather than being “recruited into therapy” (e.g., Horowitz & Garber, 2006).

Second, an issue that is often raised about research examining links between regulation, reactivity, or temperament and measures of problem behavior, and one from which the current study is not exempt, is the debate surrounding the degree of overlap in the measurement of these constructs (e.g., Keenan, 2000). Behavioral control is not only an important facet of emotion regulation but also represents a facet of behavior problems. However, it is important to differentiate between strategies children use in the face of a frustrating stimulus, as behavioral control was assessed in this study, from overall caregiver ratings of patterns of child behavior. Also, correlation analyses showed that behavioral control and behavior problems were only modestly related ($r_s = .06$ to $.23$, $p = ns$ to $<.01$). Nevertheless, future studies should address the overlap issue by use of multiple measurement methods and having a clear conceptual distinction.

Third, although a focus was examining whether the FCU was related to children’s behavioral control, the FCU did not specifically target behavioral control. Future research should investigate whether interventions more specifically focused on improving behavioral control would lead to greater improvements in behavior problems. Possible targets could be improving child behavioral control skills directly and/or addressing other types of parenting practices (e.g., emotion coaching) that might be more directly related to children’s behavioral control. It would also be apt to investigate potential changes in behavioral control across a much longer period using a diverse set of observational tasks that would be corroborated by reports of behavioral control from multiple informants and methods (e.g., examiner impressions, interviews and questionnaires from parents, day care providers, and teachers). Although the measure of child disruptive behavior at age 2 served as an approximate baseline measure, it was not identical. Another important future direction is examining moderators to better understand for whom the FCU is most successful, as there may be subgroups in which behavioral control does improve. Given the significant link between child sex and behavioral control found in this study, child sex would be one important moderator to examine in a more intensive moderation study using multigroup modeling to explore potential differences in model specification by sex.

Fourth, the generalizability of the current results may be limited. The current low-income, community sample was screened based on child problem behavior, family problems, and/or sociodemographic risk. Whereas there are advantages to using a high-risk sample (e.g., higher rates of psychopathology), the findings may not be generalizable to normative samples.

In summary, the current study sought to advance our understanding of the association between behavioral control and behavior problems and determine whether increasing proactive parenting through a parenting intervention would translate to changes in child behavioral control and, in turn, improve behavior problems. The findings suggest that improvements in proactive parenting may be modestly associated with better behavioral control and that behavioral control is an important mechanism relating to behavior problems that potentially is a valuable target for further intervention research. Additional research is necessary to clarify the role of behavioral control and how it might be improved in a way to influence behavior problems.

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