Published in final edited form as:

J Clin Child Adolesc Psychol. 2015 ; 44(6): 970–984. doi:10.1080/15374416.2014.940623.

Parenting and the Family Check-Up: Changes in Observed Parent-Child Interaction Following Early Childhood Intervention

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Abstract

Coercion theory posits a cyclical relationship between harsh and coercive parent–child interactions and problem behavior beginning in early childhood. As coercive interactions have been theorized and found to facilitate the development and growth of early conduct problems, early interventions often target parenting to prevent or reduce early disruptive problem behavior. This study utilizes direct observations of parent–child interactions from the Early Steps Multisite study ($N = 731$; 369 boys) to examine the effect of the Family Check-Up, a family-centered intervention program, on measures of parent–child positive engagement and coercion from age 2 through 5, as well as on childhood problem behavior at age 5. Results indicate that high levels of parent–child positive engagement were associated with less parent–child coercion the following year, but dyadic coercion was unrelated to future levels of positive engagement. In addition, families assigned to the Family Check-Up showed increased levels of positive engagement at ages 3 and 5, and the association between positive engagement at age 3 and child problem behavior at age 5 was mediated by reductions in parent–child coercion at age 4. These findings provide longitudinal confirmation that increasing positive engagement in parent–child interaction can reduce the likelihood of coercive family dynamics in early childhood and growth in problem behavior.

Parenting practices and child conduct problems (CP) are two reliable predictors of later antisocial behavior beginning in early childhood (Shaw & Gross, 2008). With early-starting CP linked to higher rates of antisocial behavior in adolescence and early adulthood (Campbell & Ewing, 1990; Campbell, Pierce, March, Ewing, & Szumowski, 1994; Campbell, Pierce, Moore, Marakovitz, & Newby, 1996; Egeland, Erickson, Clemenhausen-Moon, Hiester, & Korfmacher, 1990; Shaw, Bell, & Gilliom, 2000), the need to identify and

reduce risk factors associated with CP in early childhood is evident. Although negative parenting practices are associated with early starting CP (Campbell et al., 1996; Shaw, Hyde, & Brennan, 2012; Stormshak, Bierman, McMahon, Lengua, & Conduct Problems Prevention Research Group, 2000) and some parenting interventions have been successful in reducing rates of CP (Brotman et al., 2005; Gardner, Shaw, Dishion, Supplee, & Burton, 2007; Olds, 2002; Webster-Stratton, Reid, & Hammond, 2001), parenting changes that account for these effects are less understood. From a theoretical and practical perspective, parenting interventions typically decrease negative parent–child interactions by initially focusing on increasing levels of positive interaction. The purpose of this article is to explore longitudinal and bidirectional associations between positive and negative parent–child interactions and test whether a brief parenting intervention affects the frequency of both positive and negative interactions, and subsequent CP during early childhood.

COERCION THEORY AND CP

In his seminal work, Patterson (1982) identified coercive cycles in family interactions as a core process by which children develop CP. Coercion theory posits that children who are involved in frequent coercive interactions with caregivers are more likely to exhibit acrimonious and disruptive behaviors when interacting with other children and adults, resulting in higher levels of oppositional and aggressive behavior as children move into the preschool and school-age periods (Shaw & Bell, 1993). Research supports a link between coercive parent–child interaction and later CP (Patterson, Reid, & Dishion, 1992), including studies initiated during early childhood (Dumas & LaFreniere, 1993; Dumas, LaFreniere, & Serketich, 1995; Shaw, Keenan, & Vondra, 1994; Shaw et al., 1998). Shaw and colleagues (Shaw & Bell, 1993; Shaw, Bell, & Gilliom, 2000) have thus proposed that coercive processes emerge during the toddler period (i.e., the “terrible twos”) when parents begin to set limits on children because of their increasing physical mobility and less developed cognitive maturity.

Although Patterson and colleagues initially tested the validity of the coercion model with school-age children (Patterson, DeBaryshe, & Ramsey, 1989), the theory of an early starting coercive process has since gained empirical support in studies with younger children (Martin, 1981; Scaramella & Leve, 2004; Shaw et al., 1994; Shaw et al., 1998). Further, there is strong empirical evidence supporting an association between coercive, harsh, and inconsistent parenting in very early childhood and emerging CP. For example, child maltreatment, an extreme form of harsh and rejecting parenting, has been linked to early-starting CP (Eckenrode et al., 2001). In a high-risk sample, Aguilar, Sroufe, Egeland, and Carlson (2000) found that physical maltreatment prior to age 2 and uninvolved and harsh parenting at age 3 distinguished children who engaged in early-starting CP from those who did not. In a study of 310 low-income boys, harsh and unresponsive parenting as early as age 2 has been linked to trajectories of CP from ages 2 to 10 (Shaw, Gilliom, Ingoldsby, & Nagin, 2003) and to more covert and serious forms of antisocial behavior from ages 10 to 17 (Shaw et al., 2012). Furthermore, maternal unresponsiveness, low positivity, and harsh discipline as early as age 1 has been linked to later CP from toddlerhood through the school-age period (Campbell et al., 1996; Martin, 1981; Shaw et al., 1994; Shaw et al., 1998; Wakschlag & Hans, 1999; Wakschlag et al., 1997).

PARENTING INTERVENTIONS AND REDUCING COERCIVE PROCESSES

Based on the established findings that coercive parent–child interactions and harsh parenting practices are reliably related to early-starting CP, it seems intuitive that interventions would focus on reducing such noxious interchanges. However, reducing coercive parent–child interaction is more complicated from a social learning model of behavioral change. According to social learning theory, a behavior is learned when it results in a reward and is extinguished as a result of punishment. However, parenting practices that are characterized as harsh and high in coercion are rarely effective in reducing rates of CP in the long term despite the punitive nature of some of these parenting practices (e.g., use of severe corporal punishment; Gershoff, 2002). Although often effective in reducing aversive child behavior in the short term, the use of verbally and/or physically aggressive parenting techniques can often serve as a negative reinforcement (or escape conditioning) for children’s problem behavior because in many cases, children’s noncompliance and aversive behavior serves to avoid, escape, or turn off parent’s demands or negative behavior (Dishion & Patterson, 2006; Gardner, 1989; Patterson, 1982). When both parent and child are engaged in this coercive effort to “win” a conflict, escalation is the rule rather than an exception (Snyder, Edwards, McGraw, Kilgore, & Holton, 1994).

Hence, successful parenting interventions often involve increasing the density of positive exchanges between parents and the child, teaching prosocial behavior as well as reducing the functional utility of coercive exchanges (Forgatch & Patterson, 2010). Therefore, even though the ultimate goal of social learning approaches is to reduce negative, coercive interactions between parents and children, this is typically accomplished by reinforcing parents for using alternative and positive methods of communicating their expectations and setting limits with children. These methods include learning to anticipate children’s needs to preempt potentially problematic scenarios (e.g., bringing toys to entertain young children for long car rides or during trips to the store; Gardner, Sonuga-Barke, & Sayal, 1999) as positive parenting has been negatively associated with CP (Gardner et al., 2007; Pasalich, Dadds, Hawes, & Brennan, 2011; Stormshak et al., 2000).

Social learning-based parenting interventions are thus strength based in their approach to improve parenting practices, specifically by addressing coercive cycles by increasing parental positive engagement (Dishion et al., 2008; Gardner, Hutchings, Bywater, & Whitaker, 2010). Research supports the use of strength-based, social learning approaches for improving parenting skills and reducing problem behavior during adolescence (Connell & Dishion, 2008; Dishion & Connell, 2008), at school entry (Webster-Stratton et al., 2001), reducing emerging CP in early childhood (Dishion et al., 2008; Piquero, Farrington, Welsh, Tremblay, & Jennings, 2009; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006; Zisser & Eyberg, 2010), and treating antisocial behavior in middle childhood and adolescence (Forgatch & Patterson, 2010; Kazdin, 2010; D. K. Smith & Chamberlain, 2010). Theoretically, intervention that takes place during early childhood is likely to have the added benefit of disrupting the coercive cycle prior to the stabilization of CP and parent–child interactions during the preschool years (Shaw, Gilliom, & Giovannelli, 2000; Shaw & Gross, 2008), as both parenting practices and children’s behavior are likely to be more

malleable during early childhood when compared to later in children's development (Reid, 1993).

Numerous parenting interventions such as Parent–Child Interaction Therapy (Zisser & Eyeberg, 2010), Parent Management Training–Oregon Model (Forgatch & Patterson, 2010), the Incredible Years (Webster-Stratton & Reid, 2010), and Triple P (Novak & Heinrichs, 2008) have demonstrated that interventions aimed at improving parenting skills can promote child prosocial behavior, reduce child problem behavior, and support optimal development among children. Core parenting skills that have been targets of the aforementioned interventions and linked to improved child outcomes include positive parent involvement and warmth, effective limit setting, communication and problem solving, and skill encouragement. Each of these parent training programs has demonstrated improvements in observed parent–child interaction and reduced child problem behavior.

ADDRESSING PARENTING THROUGH INTERVENTION: THE FAMILY CHECKUP

One empirically based parenting intervention designed to reduce and prevent child problem behavior across the developmental span is the Family Check-Up (FCU). The FCU is a strengths-based and assessment-driven intervention provided annually that addresses motivation as it relates to caregiver engagement on parenting issues (Dishion & Kavanagh, 2003; Dishion & Stormshak, 2007). The FCU stands apart from typical parenting interventions because it begins with a comprehensive ecological assessment. This assessment allows the clinician to create a guiding case conceptualization about the family and child, their interactional dynamics and processes, and broader contextual and cultural factors (discussed in further detail next). During a subsequent feedback session these assessment data are shared and discussed with parents with the aim of enhancing parent motivation to set and work on goals for their child and family. When these goals involve reducing coercive interactions (e.g., “I want Johnny to stop having so many temper tantrums”) and the parents indicate they are interested in follow-up treatment sessions, the clinician strategically begins the family management skills training component, integrating the relevant details from the assessment and feedback.

Family management skills training includes a collective set of family management skills falling within three domains: positive behavior support, healthy limit setting, and relationship building (Everyday Parenting Curriculum: Dishion, Stormshak, & Kavanagh, 2011). In the FCU model, parenting skills are taught with the goal of building on parent strengths and increasing the parents' repertoire of effective and positive child management strategies. Videotaped examples of parent–child interactions are used in sessions, a technique that has been found to be associated with greater intervention effects in parent skills training programs (Fukkink, 2008; J. D. Smith, Dishion, Moore, Shaw, & Wilson, 2013). Attention is drawn to successful interactions to further develop existing positive parenting skills and use unsuccessful examples to pinpoint opportunities for learning new skills. Family management skills following the FCU are tailored to the individual family's needs, with follow-up sessions structured to emphasize active parent engagement (e.g., role-play) of identified family management skills (Dishion et al., 2011; Gill, Dishion, & Shaw,

2014), and to alter frequently occurring coercive parent–child interactions in favor of parents enacting positive influence on child behavior.

CURRENT STUDY

Although social learning theorists posit that coercive interactions between parents and young children leading to early-starting CP can be addressed by increasing parents' repertoire and skill in using more positively based parenting strategies, to our knowledge no prior study has tested directly the relationship between positive parenting and coercion, in the context of a randomized intervention trial. In addition, establishing how positive parent–child dimensions such as engagement relate to more acrimonious styles of interaction, such as coercion, is not well understood, particularly in early childhood. Thus, the aims of this study are (a) to trace bidirectional and longitudinal associations between positive and negative components of parent–child interaction, and (b) to examine whether increasing positive parenting via a family intervention in early childhood is related to lower levels of coercive parent–child interaction at yearly follow-ups from ages 3 to 5, and subsequent reductions in child CP at age 5. The sample includes 731 toddlers identified to be at risk for developing early-starting CP on the basis of socioeconomic, family, and child risk and recruited into a randomized intervention trial. Based on the tenets of social learning theory, we hypothesize that positive engagement will be more strongly related to dyadic coercion over time than coercion is related to positive engagement. Second, we expect the FCU to be associated with increases in parent–child positive engagement between ages 2 and 3 when intervention was initiated and subsequent decreases in coercive parent–child interaction at ages 4 and/or 5. Finally, we hypothesize that increases in parent–child positive engagement will predict decreased levels of child CP at age 5.

METHOD

Participants

Participants were 731 caregiver–child dyads recruited between 2002 and 2003 from Women, Infants, and Children programs, which provide nutritional assistance for impoverished families in and around Pittsburgh, PA; Eugene, OR; and Charlottesville, VA (Dishion et al., 2008). Families were invited to participate if they had a child between 2 years 0 months and 2 years 11 months of age and if they met the study criteria of having a family, child, and/or socioeconomic risk factors for future behavior problems. To be deemed eligible for inclusion, families had to score at least 1 standard deviation above the normative mean in two of the three domains of risk: familial (maternal depression and stress), child (CP and high conflict relationships with adults), and sociodemographic (e.g., poverty, teen parent status).

Of the 1,666 families approached at Women, Infants, and Children sites, 879 met the eligibility requirements and 731 agreed to participate. At the time of the first assessment, the children (49% female) had a mean age of 29.9 months ($SD = 3.2$). Of the 731 families, 272 (37%) participants were recruited in Pittsburgh, 271 (37%) in Eugene, and 188 (26%) in Charlottesville. Across sites, primary caregivers self-identified as belonging to the following racial groups: 50% European American, 28% African American, 13% biracial, and 9% other

groups (e.g., American Indian, Native Hawaiian). Thirteen percent of the sample reported being Hispanic. During the initial screening, more than two thirds of the families enrolled in the project had an annual income of less than \$20,000, and the average number of families members per household was 4.5 ($SD = 1.63$). Forty-one percent of the population had a high school diploma or general education diploma, and an additional 32% had 1 to 2 years of post-high school training.

Of the 731 families who initially participated, 659 (90%) were available at the age 3 follow-up, 619 (85%) participated at the age 4 follow-up, and 621 (85%) participated at the age 5 follow-up. Selective attrition analyses revealed no significant differences in project site, children's race or gender, levels of maternal depression, parent's report of children's externalizing behavior, or intervention status.

Procedures

Home assessment procedure—All assessments were conducted in the home at ages 2, 3, 4, and 5 with primary caregivers, children, and alternate caregivers when available. Assessments were identical for control and intervention group participants and involved structured and unstructured play activities for the target child and caregiver. Each home assessment began by having the child engage in free play with age-appropriate toys while the mother completed questionnaires. After the free-play task (15 min), mother and child participated in a clean-up task (5 min), followed by a delay of gratification task (5 min), four teaching tasks (3 min each), a second free-play (4 min) and clean-up task (4 min), the presentation of inhibition-inducing toys (2 min each), and a meal preparation/lunch task (20 min). All interactions were videotaped for later coding. Relevant to the current study are the teaching tasks (which included mothers assistant their child to put together a puzzle, build two towers, and play a board game together), the inhibition-inducing toys (which included presenting the child with an ambiguous toy), and the meal preparation/lunch task (in which the mother was asked to prepare a meal for the child as she normally would). For a more detailed description of the additional home assessment protocol, please see Dishion et al. (2008). To optimize internal validity of the study, initial assessments at age 2 were completed prior to random assignment to intervention or control group, and research staff were blind to the family's group assignment. In subsequent years, the annual home assessment also took place prior to intervention. The families received \$100 for participating in the age 2 assessment, \$120 for the age 3 assessment, \$140 for the age 4 assessment, and \$160 for the age 5 assessment, each of which lasted 2.5 to 3 hr. Parental written consent was obtained for all participants. Institutional Review Board approval was received.

The FCU procedure—The FCU is an annual, brief three-session intervention that is individually tailored to the needs of youths and families on the basis of results obtained via an ecological assessment. Typically, the three meetings include an initial contact session, a home-based multi-informant ecological observational assessment session, and a feedback session (Dishion & Stormshak, 2007). During the assessment session a parent consultant explores parent concerns, focusing on family issues that are critical to the child's well-being. Feedback emphasizes parenting and family strengths yet draws attention to possible areas of change. One goal of the FCU feedback session is to enhance the family's motivation to

change by using collaborative, therapeutic techniques based on motivational interviewing, such as promoting change talk and fostering motivation to address key problems in parenting. The FCU is designed to make assessment-based decisions about the need for follow-up parenting services that are tailored to meet the families' specific needs. If follow-up sessions are warranted and parents indicate they are interested, follow-up treatment sessions consistent with several approaches to parent management training but specifically linked to the Oregon model (Forgatch & Patterson, 2010) are administered. The (previously discussed) Everyday Parenting curriculum was used to guide the follow-up interventions (Dishion et al., 2011).

For the purposes of this randomized trial, to assure that assessments were not biased by the potential for intervention, families were first assessed and then invited to engage in the initial interview session and feedback. Therapists in this randomized trial were found to have delivered the FCU with adequate fidelity, which was related to improvements in parenting and subsequent changes in children's problem behaviors between ages 2 and 4 (J. D. Smith et al., 2014). Engagement in the intervention was generally high as most families assigned to the intervention participated in the FCU: 76% at age 2, 69% at age 3, 70% at age 4, and 66% at age 5. Of the families participating in the FCU, the majority engage in the additional follow-up sessions: 72% at age 2 with a mean of 3.4 sessions, 70% at age 3 with a mean of 3.1 sessions, 74% at age 4 with a mean of 3.5 sessions, and 74% at age 5 with a mean of 5.5 sessions. For the purposes of the current study, an intention to treat design was utilized, such that all families assigned to the FCU were included in the treatment group.

Measures

Dyadic interactions—At ages 2, 3, 4, and 5 the videotaped interaction tasks involving the child and the primary caregiver were coded using the Relationship Affect Coding System (RACS; Peterson, Winter, Jabson, & Dishion, 2008), a microsocial coding system that captures the topography of relationship behaviors, as well as the affect within parent-child interactions (i.e., emotional displays, or lack thereof). The RACS coding system reflects three dimensions of behavior for each of the family participants simultaneously. The three dimensions that are captured are verbal behaviors, physical behaviors, and affect. Verbal codes reflect two different types of events: general conversation (positive, negative, or neutral) and attempts at changing the behavior of another (directives, negative directive, and positive structure). Physical behaviors are those that involve a physical interaction (positive physical contact, negative physical contact, and neutral physical contact). Affect codes reflect the general affect displayed by the parent and child in an interaction (anger/disgust, validation, distress, positive affect, and ignore). The cues used for code selection are based on facial expression, vocal tone, and nonverbal cues, such as body posture and/or orientation.

At any given moment during an interaction, the parent and child can have one code (or event or state) recorded from each of these three data streams. The RACS coding was recorded using Noldus Observer XT, Version 11.0 (Noldus Information Technology, 2012), which allows for continuous coding of an interaction between the child and caregiver simultaneously. Because there are three simultaneous data streams for each participant in the

interaction tasks, we created six behavior clusters that summarize the three data streams for each person in the interaction. The six behavior summary clusters are positive, neutral, directives, negative, no talk, and ignore. For example, the positive cluster included behaviors like positive verbal, structure, affect or physical, and validation; the negative cluster included anger and disgust, negative verbal statements, and negative physical interaction. Decision rules were created to determine which behavior stream would win out in the event of two different behavior streams being present simultaneously. For example, a caregiver could say something negative to the child (negative verbal) and then laugh (positive affect) at the same time. In such a case the decision rules dictated that the negative interaction would trump the positive. The order of trumping was as follows: ignore, negative, positive, directive, no talk, and neutral behavior. Given the new behavior clusters we could observe at each time point which state or cluster the child was in at the same time as the parent, thereby arriving at dyadic states. Using this approach, it is possible to calculate durations and frequencies of behavior clusters for each family member, but more important for the dyadic states, the interaction dynamic between family members.

The dyadic states we derived were Positive Engagement, Neutral Engagement (e.g., conversation), Coercive Engagement, and Noninteractive. The duration of dyadic states reflects both the parent's and child's interactive state. A summary score was created for observed *dyadic positive engagement* that reflected the duration of Positive and Neutral Engagement between the caregiver and the child. As shown in Figure 1, this includes the duration of time that the caregiver or child was engaged in positive (POS) or neutral (NEU) behavior, whereas the other member of the dyad was also engaged in POS or NEU engagement. The dyadic region identified as positive engagement included four out of 36 possible cells on the grid. Similarly, a summary score was created for *dyadic coerce*, which identified mutually coercive behaviors between the caregiver and child. Dyadic coerce included interactions in which either participant was negatively engaged (NEG) or directive (DIR), and the other member of the dyad responding by not talking (NTK), ignoring (IGN), NEG, or DIR (see Figure 1), and included 12 out of 36 possible cells on the grid.

Finally, the total duration each caregiver–child dyad was observed in this region was calculated and divided by the overall session time to calculate a duration proportion score. Reliability coefficients were in the “good” to “excellent” range, with overall Kappa scores at each age of .93, and agreement of 93%, 94%, 93%, and 94% at ages 2, 3, 4, and 5, respectively. Kappa coefficients were obtained from Noldus Observer. The Kappas are computed based on the duration and sequencing of coded behavior. Only interaction tasks administered at the home assessments across all four ages (the teaching, inhibition, and meal tasks) were included in the analysis.

Child oppositional-aggressive behavior (OPP/AGG)—A measure of child OPP/AGG was created from the Child Behavior Checklist for ages 1.5 to 5 and ages 6 to 18 (CBCL; Achenbach & Rescorla, 2000, 2001) at ages 2 and 5, respectively. The CBCL is an empirically validated measure of child behavior problems administered to primary caregivers at each assessment. The CBCL asks caregivers to rate the validity of several statements regarding potential child behaviors on a 3-point Likert scale from 0 (*not true*) to 1 (*somewhat, sometimes true*) to 2 (*very true, often true*). To generate a factor of

oppositional and aggressive behavior that was both developmentally meaningful in the age 2 through 5 age period and clinically relevant, individual items that were consistent and/or similar on the CBCL at both ages and reflected oppositional and aggressive behaviors (OPP/AGG, eight items) were chosen. The items included at age 2 were “cruel to animals,” “destroys his/her own things,” “destroys things belonging to his/her family or other children,” “gets in many fights,” “physically attacks people,” “defiant,” “disobedient,” and “temper tantrums or hot temper.” At age 5 the items were “cruel to animals,” “destroys his/her own things,” “destroys thing belong to her/her family or others,” “gets in many fights,” “physically attacks people,” “breaks rules at home, school, or elsewhere,” “disobedient at home,” and “temper tantrums or hot temper.” A composite variable was computed by averaging the values for these items at each assessment age. The OPP/AGG factor was retained in favor of the CBCL established factor of aggression for multiple reasons. First, because two different versions of the CBCL were administered at age 2 and 5, the OPP/AGG factor used in the current study utilizes only the eight oppositional and aggressive items that were present at both ages, allowing for a more conservative comparison of behaviors at those two time points. Second, we have utilized the OPP/AGG factor in previous publications (Dishion et al., 2014) and retention of it allows for comparison across studies. Most important, we believe the behaviors assessed by the OPP/AGG factor more accurately capture those associated with conduct disorder or oppositional defiant disorder, as they were selected based on their inclusion in *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.) criteria (American Psychiatric Association, 2000). In contrast, the Achenbach Aggression factor includes 10 items that are not found in the DSM on either conduct disorder or oppositional defiant disorder, including “bragging, boasting,” “demands a lot of attention,” and “easily jealous.” Finally, despite retaining the OPP/AGG factor in the models reported next, we also recomputed the analyses using the established Achenbach Aggression and Oppositional factors at age 5 and the same pathways remained significant in the final model. Internal consistencies for the OPP/AGG scale were acceptable at each age (at age 2 $\alpha = .71$ and at age 5 $\alpha = .80$).

Demographics—Demographic data were collected at the age 2 home visit and included as covariates in these analyses. Gross annual family income ranged from less than \$4,999 to more than \$90,000. Income was dummy coded as families having annual income of “up to \$14,999” = 0 with a comparison group of “\$15,000 or more” = 1. The primary caregiver’s level of educational attainment was dummy coded as “less than high school education” = 0 and “high school education or higher” = 1. Parents indicated the target child’s gender, race, and ethnicity. Child gender was coded as male = 0 and female = 1. Child’s race was dummy coded as Caucasian/other = 0 with Black African American/biracial being the comparison group = 1. Child’s ethnicity was dummy coded as Caucasian/non-Hispanic = 0, and Hispanic being the comparison group = 1. Finally, as data were collected from three sites, two dummy coded variables were created to represent site location with families located in Oregon treated as the comparison group.

Analytic Strategy

To investigate the effectiveness of the FCU on parenting and children's CP, a series of nested models was tested (see Figure 2). Model 1 evaluated the stability and the

contemporaneous correlations of the dyadic constructs and served as a baseline for other models. In Model 2, cross-lag pathways from dyadic coerce to positive engagement the following year were added (pathways marked with an “a” in Figure 2). Model 3 included cross-lag paths from positive engagement to dyadic coerce, but no pathways from dyadic coerce to positive engagement (pathways marked with a “b” in Figure 2). Finally, Model 4 included the same cross-lag paths as in Model 3 and added paths from age 2 dyadic coerce to all later dyadic coerce variables and paths from age 2 dyadic engagement to all later dyadic engagement variables (pathways marked with a “c” in Figure 2). In all models dyadic coercion and positive engagement were permitted to correlate at concurrent age time points. All analyses controlled for family income, mother’s education, child’s gender, race, ethnicity, site location, and OPP/AGG at age 2. To examine its effectiveness, FCU status was regressed on all variables assessed at age 3 and older. All models were tested with Mplus 6.12 (Muthén & Muthén, 2012). Although the data were determined to be missing at random as per recommendations of Schafer and Graham (2002) and Acock (2005), the dyadic coerce variables were nonnormally distributed. Therefore, maximum likelihood estimation with robust standard errors was utilized, as it provides unbiased and more valid estimates when dependent variables are skewed.

RESULTS

Table 1 presents descriptive statistics for all study variables, including frequency of binary demographic covariates for the intervention and control groups. No significant differences were found between the intervention and control groups on any of the covariates at baseline, age 2. However, as expected, there were differences in some parenting measures at subsequent ages. The intervention group displayed higher levels of dyadic positive engagement at ages 3, $t(633) = -3.065, p < .01$, and 5, $t(633) = -2.037, p < .05$. There were no significant differences in any measures of dyadic coercion, nor were there differences positive engagement at age 4. Bivariate correlations are presented in Table 2. Correlations between the dyadic coerce and positive engagement are all negative and significant with correlations from concurrent years in the moderate to high range (range = $-.67$ to $-.47, p < .01$).

To evaluate the fit of the structural model, several fit indices were used. The chi-square statistic was utilized in addition to the comparative fit index (CFI; Bentler, 1990), the root mean square error of approximation (RMSEA; Steiger, 1990), and the standardized root mean square residual (SRMR; Hu & Bentler, 1999), all of which are used as practical indices of fit. Acceptable values of fit for the CFI should be greater than .90 with greater than .95 indicating a good fit to the data. The RMSEA and SRMR are indices of absolute fit with values under .05 indicating a close fit to the data and values between .05 and .08 indicating a reasonable fit (Hu & Bentler, 1999). In addition, when comparing nested models using maximum likelihood estimation with robust standard errors, the Satorra-Bentler scaled-chi square test is recommended as it accounts for non-normality within the data (Satorra & Bentler, 2010).

Table 3 presents the fit indices for each model. Analyses revealed that Model 4, including pathways from age 2 dyadic interactions to later dyadic interaction variables and cross-lag

paths from positive engagement to dyadic coercion (but not from dyadic coercion to positive engagement), was the best fitting model, with fit statistics indicating a good fit to the data, $\chi^2(25) = 70.296$, CFI = .975, RMSEA = .052, SRMR = .023. Model 4 was retained as the final model and is presented in Figure 3.

Analyses revealed positive engagement and dyadic coercion were moderately stable between adjacent years from ages 2 to 5. Direct paths from dyadic coercion at age 2 to dyadic coercion at age 4 ($B = .23, p < .01$) and age 5 ($B = .16, p < .01$) were also significant, as were direct paths from positive engagement at age 2 to positive engagement at age 4 ($B = .13, p < .01$) and age 5 ($B = .20, p < .01$). Regarding our first aim, to trace bidirectional associations between positive engagement and coercion over time, positive engagement was related to significant declines in later dyadic coercion at all ages (positive engagement at age 2 to coercion at age 3: $B = -.16, p < .01$; positive engagement at age 3 to coercion at age 4: $B = -.11, p < .05$; positive engagement at age 4 to coercion at age 5: $B = -.10, p < .01$). However, no significant pathways from dyadic coercion to later positive engagement were evident in Model 2 (see Figure 2).

Regarding our second aim, whether randomization to the FCU was associated with increased levels of positive engagement and lower levels of coercion and later child CP, effects of the FCU were evident on positive engagement at age 3 ($B = .11, p < .01$) and age 5 ($B = .07, p < .05$). Direct effects of the intervention were also evident on coercive interaction at age 4 ($B = .08, p < .05$) and on decreased OPP/AGG at age 5 ($B = -.08, p < .05$). A significant pathway from positive engagement at age 4 to OPP/AGG at age 5 was not evident, but dyadic coercion at age 4 was positively related to OPP/AGG at age 5 ($B = .12, p < .01$). Finally, although not included in Figure 3 for parsimony, covariates were included in the analyses. OPP/AGG at age 2 was significantly related to OPP/AGG at age 5 ($B = .47, p < .01$) but no other indicators in the model. Families in Pittsburgh were observed to demonstrate significantly lower levels of positive engagement at ages 3 ($B = -.09, p < .05$) and 5 ($B = -.17, p < .01$) and higher coercive interaction at age 4 ($B = .13, p < .01$) and OPP/AGG at age 5 ($B = .11, p < .01$) when compared to those living in Oregon. When compared to Caucasian families, African American and mixed race families displayed significantly less positive engagement at age 3 only ($B = -.09, p < .05$) and Hispanic families reported less OPP/AGG at age 5 ($B = -.08, p < .05$).

To further examine whether increasing positive engagement in early childhood would be related to lower levels of coercive parent-child interaction at yearly follow-ups from ages 3 to 5, and subsequent reductions in child CP at age 5 tests of indirect effects were run. Mediation effects are displayed in Table 4, although for brevity, only significant and trend level effects are presented. Positive engagement at ages 3 and 4 mediated the relationship between the FCU and dyadic coercion at age 5 ($B = -.01, p < .05$).

DISCUSSION

Although past theory has postulated the salience of coercive parent-child interactions in the development of early CP behaviors (Patterson, 1982), and empirical support for such processes has been found beginning in early childhood (Martin, 1981; Shaw et al., 2003;

Shaw et al., 1994; Shaw et al., 1998), our understanding of how positive dimensions of parent–child interaction might be related to the development of early coercion is not well understood. Although many studies have investigated how parenting interventions successfully affect change in child CP via the mediating mechanism of change in positive parenting (Dishion et al., 2008; Forgatch & DeGarmo, 1999; Sanders, 1999), there has been very little investigation of further mediating pathways, including how change in positive parenting affects coercive processes. The current article, therefore, sought to fill gaps in our understanding of transactional associations between parent–child positive engagement and coercion and investigate the process by which the FCU might reduce child CP by increasing positive engagement and/or reducing parent–child coercion in early childhood. Consistent with the premise of social learning theory that positive reinforcement is a stronger determinant of learning than punishment, higher levels of positive engagement were found to lead to lower levels of dyadic coercion at adjacent years from ages 2 to 5, but higher levels of dyadic coercion were not related to later frequencies of positive engagement. The FCU also was found to increase levels of positive engagement from ages 2 to 3, which in turn were associated with indirect effects on reduced rates of later dyadic coercion and child CP at ages 4 and 5, respectively. Similar to past research (Gardner, 1987), the current study extends our understanding of the origins of coercive processes by noting the salience of positive dyadic engagement, or lack thereof, in the toddler and preschool period; however, the current study suggest that it is possible to decreases rates of CP through family intervention.

Cross-Lagged Effects Between Positive Engagement and Coercion

In terms of furthering our understanding of the development and maintenance of dyadic coercion during the toddler and preschool periods, the results consistently implicate the contribution of more positive parent–child interactions (or lack thereof), specifically those that are both positive and neutral. Previous research with this sample has documented the role of neutral parenting in the development of children’s language abilities and inhibitory control (Lunkenheimer et al., 2008). Thus, although it is important for parents to demonstrate and promote positive affect in their interactions with children, it also appears critical to maintain low levels of affect, especially low levels of negative affect. As many of the dyadic interaction tasks were designed to elicit mild levels of frustration and distress in children (e.g., exposure to novel stimuli, working on puzzles that were challenging to complete on their own), those parents who were able to refrain from becoming emotionally frustrated and promote comparably positive or neutral behavior in children showed lower levels of dyadic coercion at subsequent assessments, and had children who demonstrated lower levels of CP at age 5.

The Effectiveness of the FCU

The results indicate that dyadic coercion and subsequent child CP were reduced among families who received the FCU indirectly via increased rates of positive engagement during both the toddler period and from ages 4 to 5. In addition, in the multivariate analyses there was a positive pathway to dyadic coercion at age 4, such that participation in the intervention was related to *increased* levels of dyadic coercion. However, it is noteworthy that there were no significant differences in coercive interaction between the FCU and

control group in the univariate analyses (see Table 1) or unexpected effects of coercion at other time points (i.e., at age 5 in fact there was a nonsignificant trend for the intervention to reduce coercion in the expected direction), so it is possible that the direct effect of the intervention on coercive interaction at age 4 is spurious in nature.

Although many parenting interventions using a social learning perspective operate under the premise that increasing positive parenting will reduce negative parent–child interactions, and hence child CP (Forehand & McMahon, 1981; Forgatch & Patterson, 2010; McMahon & Forehand, 2003; Webster-Stratton et al., 2001), the current study is the first to test each of these theoretically salient steps across separate time points. It is important to note that we do this during early childhood when rates of parent–child coercion have been shown to increase (Patterson, 1982; Shaw & Bell, 1993). Further, the current study is the first study to test how social learning-based parenting approaches indirectly decrease dyadic coercion by increasing frequencies of both neutral and positive parent–child interaction using novel microsocial coding of dyadic interactions during early childhood. For intervention providers, the results from the current study relating to positive parenting practices have important implications. Specifically, interventions need to continue to enable parents to utilize positive engagement, which appears to predict positive outcomes not only for their children but also future interactions between parents and offspring. Thus, even more adult-centered parents might be motivated to engage in more positive interactions with children if they know such efforts might decrease their daily levels of stress caused by noxious interchanges with their oppositional and defiant children. Encouraging the use of alternative and more positively oriented approaches also should be well received by more child-centered parents who may lack the repertoire of skills to prevent the development or remove themselves from more acrimonious parent–child interactions.

Stability of Interactions Over Time

Although not the intention of the current study, the longitudinal analyses also serve to inform the field in regard to the stability of parent–child interactions during early childhood as results indicated that both positive engagement and coercion in the parent–child dyad were moderately stable over time. These findings provide partial support to research from Dallaire and Weinraub (2005), who found, utilizing a large longitudinal sample, relative stability in positive parenting behaviors during the first 6 years of life. However, in contrast to the current findings, Dallaire and Weinraub found less stability in negative parenting behaviors. As the current study assessed *dyadic interaction*, and Dallaire and Weinraub assessed only parent behavior, the higher level of stability found for coercion found in the current study suggests that the child is an active agent in the interaction rather than a passive recipient.

Based on the relative stability of parent–child interactions in the current study, including coercive interactions, it makes sense to initiate intervention during early childhood before such dyadic patterns become less malleable to change and child disruptive behavior becomes more serious in nature (Reid, 1993). Moreover, although this study focused on a high-risk sample, the results may have some generalizability to less socioeconomically impoverished families, as research indicates that 67% of American parents use harsh

parenting as a form of discipline in the first 3 years of their toddler's life (Regalado, Sareen, Inkelas, Wissow, & Halfon, 2004). These results also highlight the importance of intervening early before dyadic patterns of interaction are too firmly established. The results support the effectiveness of the FCU in disrupting that process. Future studies should examine whether positive engagement in parent-child interactions remains stable during times of difficult transition (e.g., school entry, emerging adolescence).

Limitations

Strengths of the current study include a large sample of ethnically diverse children and families identified on the basis of risk factors in multiple domains, the use of an experimental design, a longitudinal prospective design, and the use of microsocial coding to quantify observational patterns of both positive and negative parent-child interactions. However, some limitations should be considered when interpreting the findings. First, although a strength in terms of generalizability to other children at risk for serious problem behavior, the generalizability of the findings may be limited to families from lower socioeconomic backgrounds. A second limitation is that both the positive engagement and dyadic coercion variables were derived from the same set of parent-child interactions. Although it was impossible for a dyad to receive a code that endorsed positive engagement and dyadic coercion simultaneously, the concurrent constructs were moderately correlated (see Table 2). Although increased risk of Type II errors should therefore be considered, it is noteworthy that the correlations fell within an acceptable range based on the large sample size and high reliability of measures (Grewal, Cote, & Baumgartner, 2004). In addition, the directionality of the pathways consistently suggested that positive engagement was negatively related to later dyadic coercion, but dyadic coercion was not significantly related to later positive engagement (as tested in Model 2), further supporting the distinction between the two constructs. In addition, because of the higher stability of positive engagement relative to coercion, it may have been easier to identify a cross-lagged effect of positive engagement on coercion rather than vice versa (Rogosa, 1980). A final caveat to the interpretation of findings is that the analyses utilized an intention-to-treat design, so that any families assigned to the intervention group were considered to have received "treatment." As an intention-to-treat analysis fails to consider actual engagement in the intervention, it is possible that the results underestimated the effectiveness of the intervention, as 13.6% of families assigned to the FCU did not have contact with our interventionists and 18.5% did so only once during the 3 years intervention services were provided between child ages 2 to 4.

Conclusions

In summary, the current study sought to advance our understanding of the development of early dyadic coercion and the process by which the FCU reduces problem behavior in children. The findings suggest that positive parenting practices are more strongly related to subsequent rates of negative parent-child interactions but that negative parent-child interactions do not exert a simultaneous cross-lagged effect on positive parent-child interactions. Further, the results suggest that the FCU indirectly reduces levels of dyadic coercion and subsequent child CP in the preschool period by increasing levels of dyadic positive engagement during the toddler period. Additional research is needed to determine if

the benefits associated with the FCU and increases in positive engagement extend into middle childhood and adolescence.

REFERENCES

- Achenbach, TM.; Rescorla, LA. Manual for the ASEBA preschool forms and profiles. Burlington: University of Vermont Department of Psychiatry; 2000.
- Achenbach, TM.; Rescorla, LA. Manual for the ASEBA school-age forms and profiles. Washington, DC: Library of Congress; 2001.
- Acock AC. Working with missing values. *Journal of Marriage and Family*. 2005; 67:1012–1028.
- Aguilar B, Sroufe LA, Egeland B, Carlson EA. Distinguishing the early-onset/persistent and adolescence-onset antisocial behavior types: From birth to 16 years. *Development and Psychopathology*. 2000; 12:109–132. [PubMed: 10847620]
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th. Washington, DC: Author; 2000. text rev
- Bentler PM. Comparative fit indexes in structural models. *Psychological Bulletin*. 1990; 107:238–246. [PubMed: 2320703]
- Brotman LM, Gouley KK, Chesir-Teran D, Dennis T, Klein RG, Shrout P. Prevention for preschoolers at high risk for conduct problems: Immediate outcomes on parenting practices and child social competence. *Journal of Clinical Child and Adolescent Psychology*. 2005; 34:724–734. [PubMed: 16232069]
- Campbell SB, Ewing LJ. Hard-to-manage preschool children: Adjustment at age nine and predictors of continuing symptoms. *Journal of Child Psychology and Psychiatry*. 1990; 31:871–889. [PubMed: 2246339]
- Campbell SB, Pierce EW, March CL, Ewing LJ, Szumowski EK. Hard-to-manage preschool boys: Symptomatic behavior across contexts and time. *Child Development*. 1994; 65:836–851. [PubMed: 8045171]
- Campbell SB, Pierce EW, Moore G, Marakovitz S, Newby K. Boys' externalizing problems at elementary school: Pathways from early behavior problems, maternal control, and family stress. *Development and Psychopathology*. 1996; 8:701–720.
- Connell A, Dishion T. Effects of a school-based family intervention on 3-year trajectories of adolescent depressive symptoms. *Journal of Family Psychology*. 2008; 22:574–585. [PubMed: 18729671]
- Dallaire DH, Weinrub M. The stability of parenting behaviors over the first 6 years of life. *Early Childhood Research Quarterly*. 2005; 20:201–219.
- Dishion TJ, Brennan LM, McEachern A, Shaw DS, Wilson MN, Weaver CM. The prevention of early onset problem behavior through periodic family check ups in early childhood: A health maintenance model with indigent, high risk families. *Journal of Abnormal Child Psychology*. 2014; 42:343–354. [PubMed: 24022677]
- Dishion, T.; Connell, A. An ecological approach to family intervention to prevent adolescent drug use: Linking parent engagement to long-term reductions of tobacco, alcohol and marijuana use. In: Heinrichs, N.; Hahlweg, K.; Doepfner, M., editors. *Strengthening families: Different evidence-based approaches to support child mental health*. Muenster, Germany: Psychotherapie Verlag; 2008. p. 403-433.
- Dishion, TJ.; Kavanagh, K. Intervening with adolescent problem behavior: A family centered approach. New York, NY: Guilford; 2003.
- Dishion, TJ.; Patterson, GR. The development and ecology of antisocial behavior. In: Cicchetti, D.; Cohen, DJ., editors. *Developmental psychopathology: Vol. 3. Risk, disorder, and adaptation*. 2nd. Hoboken, NJ: Wiley; 2006. p. 503-541.
- Dishion TJ, Shaw DS, Connell A, Gardner FEM, Weaver C, Wilson M. The Family Check-Up with high-risk indigent families: Preventing problem behavior by increasing parents' positive behavior support in early childhood. *Child Development*. 2008; 79:1395–1414. [PubMed: 18826532]

- Dishion, TJ.; Stormshak, EA. Intervening in children's lives: An ecological, family-centered approach to mental health care. Washington, DC: American Psychological Association; 2007.
- Dishion, TJ.; Stormshak, EA.; Kavanagh, K. Everyday parenting: A therapist's guide for supporting family management practices. Champaign, IL: Research Press; 2011.
- Dumas JE, LaFreniere PJ. Mother-child relationships as sources of support or stress: A comparison of competent, average, aggressive, and anxious dyads. *Child Development*. 1993; 64:1732–1754. [PubMed: 8112116]
- Dumas JE, LaFreniere PJ, Serketich WJ. "Balance of power": A transactional analysis of control in mother-child dyads involving socially competent, aggressive, and anxious children. *Journal of Abnormal Psychology*. 1995; 104:104–113. [PubMed: 7897032]
- Eckenrode J, Zielinski D, Smith E, Marcynyszyn LA, Henderson CR, Kitzman H, Olds DL. Child maltreatment and the early onset of problem behaviors: Can a program of nurse home visitation break the link? *Development and Psychopathology*. 2001; 13:873–890. [PubMed: 11771912]
- Egeland B, Erickson MF, Clemenhausen-Moon J, Hiester MK, Korfmacher J. 24 months tools coding manual: Project STEEP revised 1990 from mother-child project scales. Unpublished manuscript, University of Minnesota, Minneapolis. 1990
- Forehand, R.; McMahon, RJ. Helping the noncompliant child: A clinician's guide to effective parent training. New York, NY: Guilford; 1981.
- Forgatch MS, DeGarmo DS. Parenting through change: An effective prevention program for single mothers. *Journal of Consulting and Clinical Psychology*. 1999; 67:711–725. [PubMed: 10535238]
- Forgatch, MS.; Patterson, GR. Parent management training–Oregon model: An intervention for antisocial behavior in children and adolescents. In: Weisz, R.; Kazdin, AE., editors. Evidence-based psychotherapies for children and adolescents. New York, NY: Guilford; 2010. p. 159–178.
- Fu"kkink RG. Video feedback in widescreen: A meta-analysis of family programs. *Clinical Psychology Review*. 2008; 28:904–916. [PubMed: 18359136]
- Gardner F. Positive interaction between mothers and conduct-problem children: Is there training for harmony as well as fighting? *Journal of Abnormal Child Psychology*. 1987; 15:283–293. [PubMed: 3611525]
- Gardner F. Inconsistent parenting: Is there evidence for a link with children's conduct problems? *Journal of Abnormal Child Psychology*. 1989; 17:223–233. [PubMed: 2745902]
- Gardner F, Hutchings J, Brywater T, Whitaker C. Who benefits and how does it work? Moderators and mediators of outcomes in an effectiveness trial of a parenting intervention. *Journal of Clinical Child and Adolescent Psychology*. 2010; 39:568–580. [PubMed: 20589567]
- Gardner F, Shaw DS, Dishion TJ, Supplee LA, Burton J. Randomized prevention trial for early conduct problems: Effects on proactive parenting and links to toddler disruptive behavior. *Journal of Family Psychology*. 2007; 21:398–406. [PubMed: 17874925]
- Gardner F, Sonuga-Barke E, Sayal K. Parents anticipating misbehaviour: An observational study of strategies parents use to prevent conflict with behaviour problem children. *Journal of Child Psychology and Psychiatry*. 1999; 40:1185–1196. [PubMed: 10604397]
- Gershoff ET. Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin*. 2002; 128:539–579. [PubMed: 12081081]
- Gill, AM.; Dishion, TJ.; Shaw, DS. The Family Check-Up: A tailored approach to intervention with high risk families. In: Landry, S., editor. Well being and children and families. Oxford, UK: Wiley-Blackwell; 2014.
- Grewal R, Cote JA, Baumgartner H. Multicollinearity and measurement error in structural equation models: Implications for theory testing. *Marketing Science*. 2004; 23:519–529.
- Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. 1999; 6:1–55.
- Kazdin, AE. Problem-solving skills training and parent management training for Oppositional Defiant Disorder and Conduct Disorder. In: Weisz, JR.; Kazdin, AE., editors. Evidence-based psychotherapies for children and adolescents. 2nd. New York, NY: Guilford; 2010. p. 211–226.

- Lunkenheimer ES, Dishion TJ, Shaw DS, Connell A, Gardner F, Wilson MN, Skuban EM. Collateral benefits of the Family Check Up on early childhood school readiness: Indirect effects of parents' positive behavior support. *Developmental Psychology*. 2008; 44:1737–1752. [PubMed: 18999335]
- Martin JA. A longitudinal study of the consequences of early mother–infant interaction: A microanalytic approach. *Monographs of the Society for Research in Child Development*. 1981; 46(3):59.
- McMahon, RJ.; Forehand, R. *Helping the noncompliant child: A clinician's guide to effective parent training*. 2nd. New York, NY: Guilford; 2003.
- Muthén, LK.; Muthén, BO. *Mplus (Version 6.12)*. Los Angeles, CA: Muthen & Muthen; 2012.
- Noldus Information Technology. *The Observer XT reference manual 11.0*. Wageningen, the Netherlands: Author; 2012.
- Novak C, Heinrichs N. A comprehensive meta-analysis of Triple P-Positive Parenting Program using hierarchical linear modeling: Effectiveness and moderating variables. *Clinical Child and Family Psychology Review*. 2008; 11:114–144. [PubMed: 18509758]
- Olds DL. Prenatal infancy home visiting by nurses: From behind randomized trials to community replication. *Prevention Science*. 2002; 3:153–172. [PubMed: 12387552]
- Pasalich DS, Dadds MR, Hawes DJ, Brennan J. Do callous-unemotional traits moderate the relative importance of parental coercion versus warmth in child conduct problems? An observational study. *The Journal of Child Psychology and Psychiatry*. 2011; 52:1308–1215. [PubMed: 21726225]
- Patterson, GR. *Coercive family process*. Eugene, OR: Castalia; 1982.
- Patterson GR, DeBaryshe BD, Ramsey E. A developmental perspective on antisocial behavior. *American Psychologist*. 1989; 44:329–335. [PubMed: 2653143]
- Patterson, GR.; Reid, JB.; Dishion, TJ. *Antisocial boys*. Eugene, OR: Castalia; 1992.
- Peterson J, Winter C, Jabson JM, Dishion TJ. Relationship affect coding system. Unpublished coding manual, University of Oregon, Child and Family Center, Eugene. 2008
- Piquero AR, Farrington DP, Welsh BC, Tremblay R, Jennings WG. Effects of early family/parent training programs on antisocial behaviour and delinquency. *Journal of Experimental Criminology*. 2009; 5:83–120.
- Regalado M, Sareen H, Inkelas M, Wissow LS, Halfon N. Parents' discipline of young children: Results from the National Survey of Early Childhood Health. *Pediatrics*. 2004; 113:1952–1958. [PubMed: 15173466]
- Reid JB. Prevention of conduct disorder before and after school entry: Relating interventions to developmental findings. *Development and Psychopathology*. 1993; 5:243–262.
- Rogosa D. A critique of cross-lagged correlation. *Psychology Bulletin*. 1980; 88:245–258.
- Sanders MR. Triple P-Positive Parenting Program: Toward an empirically validated multilevel parenting and family support strategy for the prevention of behavior and emotional problems in children. *Clinical Child and Family Psychology Review*. 1999; 2:71–90. [PubMed: 11225933]
- Satorra A, Bentler PM. Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika*. 2010; 75:243–248. [PubMed: 20640194]
- Scaramella LV, Leve LD. Clarifying parent-child reciprocities during early childhood: The early childhood coercion model. *Clinical Child and Family Psychology Review*. 2004; 7:89–107. [PubMed: 15255174]
- Schafer JL, Graham JW. Missing data: Our view of state of the art. *Psychological Methods*. 2002; 7:147–177. [PubMed: 12090408]
- Shaw DS, Bell RQ. Developmental theories of parental contributors to antisocial behavior. *Journal of Abnormal Child Psychology*. 1993; 21:493–518. [PubMed: 8294650]
- Shaw DS, Bell RQ, Gilliom M. A truly early starter model of antisocial behavior revisited. *Clinical Child and Family Psychology Review*. 2000; 3:155–172. [PubMed: 11225751]
- Shaw DS, Dishion TJ, Supplee L, Gardner F, Arnds K. Randomized trial of a family-centered approach to the prevention of early conduct problems: 2-year effects of the family check-up in early childhood. *Journal of Consulting and Clinical Psychology*. 2006; 74:1–9. [PubMed: 16551138]

- Shaw, DS.; Gilliom, M.; Giovannelli, J. Aggressive behavior disorders. In: Zeanah, CH., editor. Handbook of infant mental health. 2nd. New York, NY: Guilford; 2000. p. 397-411.
- Shaw DS, Gilliom M, Ingoldsby EM, Nagin D. Trajectories leading to school-age conduct problems. *Developmental Psychology*. 2003; 39:189–200. [PubMed: 12661881]
- Shaw, DS.; Gross, H. What we have learned about early childhood and the development of delinquency. In: Lieberman, A., editor. The long view of crime: A synthesis of longitudinal research. New York, NY: Springer; 2008. p. 79-127.
- Shaw DS, Hyde LW, Brennan LM. Early predictors of boys' antisocial trajectories. *Development and Psychopathology*. 2012; 24:871–888. [PubMed: 22781860]
- Shaw DS, Keenan K, Vondra JI. The developmental precursors of antisocial behavior: Ages 1–3. *Developmental Psychology*. 1994; 30:355–364.
- Shaw DS, Winslow EB, Owens EB, Vondra JI, Cohn JF, Bell RQ. The development of early externalizing problems among children from low-income families: A transformational perspective. *Journal of Abnormal Child Psychology*. 1998; 26:95–107. [PubMed: 9634132]
- Smith, DK.; Chamberlain, P. Multidimensional treatment foster care for adolescents: Processes and outcomes. In: Weisz, JR.; Kazdin, AE., editors. Evidence-based psychotherapies for children and adolescents. 2nd. New York, NY: Guilford; 2010. p. 243-258.
- Smith JD, Dishion TJ, Moore KJ, Shaw DS, Wilson MN. Effects of video feedback on early coercive parent–child interactions: The intervening role of caregivers' relational schemas. *Journal of Clinical Child and Adolescent Psychology*. 2013; 42:405–417. [PubMed: 23534831]
- Smith JD, Dishion TJ, Shaw DS, Wilson MN, Winter CC, Patterson GR. Coercive family process and early onset conduct problems: A longitudinal analyses of low income families from age 2 to school entry. *Development and Psychopathology*. 2014 Advance online publication.
- Snyder JJ, Edwards P, McGraw K, Kilgore K, Holton A. Escalation and reinforcement in mother-child conflict: Social processes associated with the development of physical aggression. *Development and Psychopathology*. 1994; 6:305–321.
- Steiger JH. Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*. 1990; 25:173–353. [PubMed: 26794479]
- Stormshak EA, Bierman KL, McMahon RJ, Lengua LJ. Conduct Problems Research Group. Parenting practices and child disruptive behavior problems in early elementary school. *Journal of Clinical Child Psychology*. 2000; 29:17–19. [PubMed: 10693029]
- Wakschlag LS, Hans SL. Relation of maternal responsiveness during infancy to the development of behavior problems in high-risk youths. *Developmental Psychology*. 1999; 35:569–579. [PubMed: 10082027]
- Wakschlag LS, Lahey BB, Loeber R, Green SM, Gordon RA, Leventhal BL. Maternal smoking during pregnancy and the risk of conduct disorder in boys. *Archives of General Psychiatry*. 1997; 54:670–676. [PubMed: 9236551]
- Webster-Stratton, C.; Reid, MJ. The Incredible Years Parents, Teachers, and Children Training Series: A multifaceted treatment approach for young children. In: Weisz, J.; Kazdin, A., editors. Evidence-based psychotherapies for children and adolescents. 2nd. New York, NY: Guilford; 2010.
- Webster-Stratton C, Reid JM, Hammond M. Preventing conduct problems, promoting social competence: A parent and teacher training partnership in Head Start. *Journal of Clinical Child Psychology*. 2001; 30:283–302. [PubMed: 11501247]
- Zisser, A.; Eyberg, SM. Parent–child interaction therapy and the treatment of disruptive behavior disorders. In: Weisz, JR.; Kazdin, AE., editors. Evidence-based psychotherapies for children and adolescents. New York, NY: Guilford; 2010. p. 179-193.

FIGURE 1.

Dyadic interaction variables. *Note:* Primary Caregiver (Pc) is shown on the y axis and the Target Child (Tc) is on the x axis. POS= positive engagement; NEU= neutral engagement; DIR = directive; NEG= negative engagement; NTK= no talk; IGN= ignore.

FIGURE 2.

Tested nested models. *Note:* Solid lines indicate pathways that were included in Model 1 and were included in all subsequent models. Pathways with an “a” were included in Model 2 and pathways with a “b” were included in Model 3. Model 4 included pathways marked with “b” and “c.” PA= Pennsylvania; VA = Virginia; OPP/AGG= child oppositional-aggressive behavior.

FIGURE 3.

Final structural model. *Note:* Standardized β scores are reported. The following covariates were included in the analyses but are not shown for parsimony: family income, mother's education, child's gender, race, ethnicity, site location, and OPP/AGG at age 2. OPP/AGG = child child oppositional-aggressive behavior; FCU = Family Check-Up. $^t < .10$. $^*p < .05$.

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

TABLE 1

Descriptive of Study Variables

Covariates (Age 2)	Categories	Intervention Group ^a		Control Group ^b	
		N	% of Sample	N	% of Sample
Gross Family Income	\$14,999 or less	172	46.9	182	50.3
	\$15,000 or more	195	53.1	180	49.7
Education	Less than high school degree	80	21.8	92	25.3
	High school graduate or higher	287	78.2	272	74.7
Child Gender	Male	185	50.4	184	50.5
	Female	182	49.6	180	49.5
Child Race	Caucasian/Other	214	58.3	218	59.9
	Black, African American/Biracial	153	41.7	146	40.1
Child Ethnicity	Non-Hispanic	317	86.4	316	86.8
	Hispanic/Latino	50	13.6	48	13.2
Site Location	Eugene, OR	135	37.1	135	37.1
	Pittsburgh, PA	136	37.1	136	37.4
	Charlottesville, VA	95	25.9	93	25.5

Continuous Study Variables	Intervention Group			Control Group			t Test (df)
	Range	M	SD	Range	M	SD	
Child Oppositional-Aggressive Behavior—Age 2	0–1.88	.667	.348	0–1.75	.639	.321	–1.057 (728)
Child Oppositional-Aggressive Behavior—Age 5	0–1.75	.432	.350	0–1.75	.471	.362	1.363 (612)
Positive Engagement—Age 2	.03–.78	.323	.141	0–.71	.327	.137	.364 (724)
Positive Engagement—Age 3	.02–.72	.370	.138	.02–.85	.336	.141	–3.064 (633)**
Positive Engagement—Age 4	.01–.73	.277	.131	.02–.68	.272	.127	–.414 (559)
Positive Engagement—Age 5	.00–.73	.383	.137	.05–.72	.359	.139	–2.037 (570)*
Dyadic Coerce—Age 2	.00–.41	.112	.078	.00–.40	.111	.073	–.184 (724)
Dyadic Coerce—Age 3	.00–.48	.088	.061	.00–.42	.093	.065	.875 (633)
Dyadic Coerce—Age 4	.01–.39	.091	.057	.00–.30	.085	.050	–.1229 (559)
Dyadic Coerce—Age 5	.00–.30	.061	.046	.00–.33	.067	.049	1.462 (570)

Note: Chi-square test resulted in no significant differences between intervention and control groups on all covariates.

$$N_q = 364$$
$$N_p = 367$$

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TABLE 2

Bivariate Correlations

	CO 2	PE 2	CO 3	PE 3	CO 4	PE 4	CO 5	PE 5	OPP/AGG 2	OPP/AGG 5
Dyadic Coerce 2	1									
Positive Engagement 2	-.61**	1								
Dyadic Coerce 3	.31**	-.28**	1							
Positive Engagement 3	-.30**	.44**	-.55**	1						
Dyadic Coerce 4	.33**	-.23**	.24**	-.27**	1					
Positive Engagement 4	-.25**	.35**	-.22**	.50**	-.47**	1				
Dyadic Coerce 5	.25**	-.24**	.29**	-.22**	.23**	-.23**	1			
Positive Engagement 5	-.20**	.36**	-.23**	.41**	-.19**	.42**	-.54**	1		
OPP/AGG 2	.07	-.06	.02	-.01	-.02	.01	-.01	-.07	1	
OPP/AGG 5	.12**	-.09*	.07	.06	.09*	-.01	-.06	.17**	.48**	1
Treatment Group	.01	-.01	-.04	.12**	.05	.02	.06	.09*	.04	-.06
Income	-.19**	.23**	-.11**	.17**	-.11*	.16**	-.08	.16**	-.12	-.01
Education	-.18**	.18**	-.03	.10*	-.08	.10*	-.06	.08*	.01	-.03
Ethnicity/Hispanic	.17**	-.15**	.09*	-.06	-.01	-.02	.06	.01	.08*	-.15**
Race/AA	.15**	-.15**	.12**	-.17**	.15**	-.19**	.18**	-.20**	.02	.11**
Site Location	.05	-.06	-.01	-.05	.16**	-.17**	-.13**	.16**	.10**	.16**
Gender	-.01	.02	-.01	-.06	-.06	-.04	-.06	.00	-.10**	-.11**

Note: CO = dyadic coercion; PE = positive engagement; OPP/AGG = child oppositional-aggressive behavior; AA = African American.

* $p < .05$.

** $p < .01$.

TABLE 3

Model Fit Statistics

Model	CFI	RMSEA	SRMR	χ^2	df	χ^2 (df) Using a Scaled Correction Factor
1	.924	.077 (.065–.088)	.044	168.69	32	—
2	.923	.081 (.069–.093)	.044	167.37	29	2.075 (3)
3	.938	.072 (.061–.085)	.037	139.507	29	31.560 (3)**
4	.975	.052 (.036–.064)	.023	70.296	25	99.86 (7)**

Note: CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.
**
 $p < .01$.

TABLE 4

Indirect Effects

Pathways That Are Evident in the Final Structural Model	Standardized Estimate	p
FCU → PE 3 → DC 4 → DC 5	-.001	.10
FCU → PE 3 → PE 4 → DC 5	-.010	.05
PE 3 → DC 4 → OPP/AGG 5	-.012	.08
PE 3 → PE 4 → DC 5	-.042	.02
PE 3 → DC 4 → DC 5	-.014	.06

Note: FCU = Family Check-Up intervention; PE = Positive Engagement; DC = Dyadic Coerce.