Published in final edited form as:
Child Dev. 2008 ; 79(5): 1395–1414. doi:10.1111/j.1467-8624.2008.01195.x.

The Family Check-Up With High-Risk Indigent Families: Preventing Problem Behavior by Increasing Parents' Positive Behavior Support in Early Childhood

Thomas J. Dishion,
University of Oregon

Arin Connell,
Case Western Reserve University

Chelsea Weaver,
University of Pittsburgh

Daniel Shaw,
University of Pittsburgh

Frances Gardner, and
Oxford University

Melvin Wilson
University of Virginia

Abstract

Seven hundred thirty-one income-eligible families in 3 geographical regions who were enrolled in a national food supplement program were screened and randomized to a brief family intervention. At child ages 2 and 3, the intervention group caregivers were offered the Family Check-Up and linked parenting support services. Latent growth models on caregiver reports at child ages 2, 3, and 4 revealed decreased behavior problems when compared with the control group. Intervention effects occurred predominantly among families reporting high levels of problem behavior at child age 2. Families in the intervention condition improved on direct observation measures of caregivers' positive behavior support at child ages 2 and 3; improvements in positive behavior support mediated improvements in children's early problem behavior.

Problem behavior in middle childhood and adolescence is a predictable outgrowth of problematic adjustment in early childhood (Brook, Whiteman, Cohen, & Tanaka, 1992; Brook, Whiteman, Gordon, & Cohen, 1986; Campbell, Shaw, & Gilliom, 2000; Caspi, Moffitt, Newman, & Silva, 1998; Hawkins, Lishner, Catalano, & Howard, 1986; Lyons-Ruth, Zeanah, & Benoit, 1996; Shaw, Gilliom, Ingoldsby, & Nagin, 2003; Vicary & Lerner, 1983). Longitudinal studies begun with children as young as age 3 years (e.g., Caspi et al., 1998) have revealed an association between early behavior problems and long-term profiles of risk, including substance dependence in young adulthood.

Our study was motivated by three principles: (a) the prevention of problem behavior in children and adolescents must be family centered and ecologically focused; (b) for the most effective long-term impact on health, empirically supported family interventions must be brief and

Correspondence concerning this article should be addressed to Thomas J. Dishion, Child and Family Center, Department of Psychology, University of Oregon, 195 W. 12th Avenue, Eugene, OR 97401. Electronic mail may be sent to E-mail: dishion@uoregon.edu..

therefore more cost effective and must be embedded in existing service systems (Hoagwood & Koretz, 1996); and (c) developmental transition points such as toddlerhood, school entry, and early adolescence offer unique opportunities for health promotion and risk reduction because child and family behaviors reorganize at these points (Dishion & Stormshak, 2007; Sameroff & Fiese, 1987).

Intervening during the first of these transition points, when the child begins to walk and becomes physically autonomous (ages 1 − 2 years), is an important strategy for preventing adolescent problem behaviors such as delinquency and substance use. Parent – child interaction patterns during this transitional developmental period are challenged by normative increases in child mobility, language, independence, and physical aggression and noncompliance. Families' adaptation to this developmental transition forms the basis for subsequent developmental stages (Shaw, Bell, & Gilliom, 2000; Shaw & Gross, in press).

It is increasingly clear that parenting practices are at the core of early-onset problem behavior and adjustment problems and are integral to the solution (Dishion & Stormshak, 2007). Negative and neglectful parenting practices when children are age 2 are prognostic of later problem behavior, whereas the predictive validity of the child's behavior emerges somewhat later in development (Shaw & Gross, in press). It is clear that the covariation between early parenting practices, children's problem behavior, and later adjustment problems is multidetermined, including factors such as temperament, social context, and proximal factors describing the parents' adjustment (Shaw et al., 2000). Specifically, we know that among children assessed to be at genetic risk for problem behavior, punitive and harsh parenting practices greatly exacerbate that risk (Caspi et al., 2002). Studies of the genetic contributions to the development of antisocial behavior suggest a vulnerability model, in that some children are simply more vulnerable to pathogenic environments. The upside of this conclusion is that vulnerable children, in theory, will be more responsive to positive changes in the environment, such as those effected by systematic interventions. Intervention research with young adults diagnosed with liability for schizophrenia reveal that an emphasis on positive family management reduces the negative affective tone of the family and the mental health difficulties associated with the disorder (Falloon et al., 1985).

Thus, it is important to go beyond telling parents what they should not do (e.g., use harsh punitive parenting) and to identify and promote positive parenting practices that prevent the development of children's problem behavior and replace negative parenting practices. In their children's early years, parents can support the development of the children's competence by using a combination of parenting practices that includes a warm, trusting relationship (Shaw et al., 2000), attentive involvement (Glik, Greaves, Kronenfeld, & Jackson, 1993), positive reinforcement for skill development (Forgatch & Toobert, 1979; Supplee, Unikel, & Shaw, 2007), and proactively structuring situations to promote the development of self-regulation and minimize problem behavior (Gardner, 1994; Gardner, Sonuga-Barke, & Sayal, 1999). Positive parenting strategies such as these are consistent with what has been referred to as *positive behavior support strategies*, a prevalent and effective educational behavior management principle that emphasizes the use of nonaversive, reinforcing adult – child interactions to promote development (e.g., Horner & Carr, 1997; Sugai, Horner, & Sprague, 1999).

A key early intervention strategy, therefore, is to strengthen parents' use of positive behavior support strategies in early childhood to manage and prevent common toddler problem behaviors (Gardner et al., 1999; Gardner, Ward, Burton, & Wilson, 2003; Sanders, 1999). Consistent with this notion, Pettit and Bates (1989) found increased parent – child play and social contact in the 1st and 2nd years of a child's life to be associated with fewer conduct problems at age 4. Similarly, Gardner et al. (1999) found that if parents of toddlers timed their positive interaction strategies to anticipate troublesome situations, 2 years later the risk of child

behavior problems was diminished. Successfully engaging parents in positive behavior support practices may help increase the frequency of seemingly mundane parent – child interactions such as conversation and play, which are formative to language development and self-regulation (Baldwin, 1995; Baldwin, Bill, Desjardins, Irwin, & Markman, 1996; Hart & Risley, 1995).

As shown in Figure 1, the infusion of positive behavior support strategies in early development is thought to reduce the development of problem behavior and thereby decrease the likelihood of reactive parenting strategies and coercive escalations (Patterson, 1982;Snyder, Edwards, McGraw, Kilgore, & Holten, 1993). Parent – child coercive interactions serve to increase the likelihood of new forms of child misbehavior and more serious forms of antisocial behavior (Dumas, Lemay, & Dauwalder, 2001;Patterson, Reid, & Dishion, 1992). These early-onset problem behaviors also tend to disrupt children's development of positive skills and adjustment to school (Campbell, Pierce, Moore, Marakovitz, & Newby, 1996;Dishion, 1990;Ingoldsby, Shaw, & Garcia, 2001;Shaw, Owens, Vondra, Keenan, & Winslow, 1996). Accordingly, problem behavior in middle childhood as identified by teachers or parents is prognostic of continuity to adolescence, including more serious antisocial activity (e.g., arrest), substance use, and sexual activity begun between ages 11 and 15 (Loeber & Dishion, 1983;Patterson et al., 1992;Shaw & Gross, in press). In addition to exacerbating child problem behavior, coercive parent – child interactions and a history of child antisocial behavior often undermine the parent – child relationship (Patterson & Dishion, 1988), making efforts to intervene at later developmental stages more challenging because parents may have “given up” their efforts to influence and socialize their child (Dishion, Nelson, & Bullock, 2004;Dishion & Patterson, 1992).

Family Interventions

If a small subset of children has the highest rate of problem behavior and psychopathology within a community and these risk factors can be reliably identified in early childhood, intervention programs logically would prioritize these children's families. If effective, the prevention efforts would improve parent – child interactions and reduce risk among the most vulnerable youth, on a variety of adjustment indices. The Family Check-Up (FCU) intervention specifically targets disrupted and unskilled family management practices in early childhood to reduce and prevent later problem behavior and focuses on parenting factors and variables found to compromise parenting quality (e.g., temperament, parental well-being) that have also been shown to be directly related to trajectories of persistent problem behavior. The term *family management* describes a collective set of parenting skills known to be highly related to child success (Bullock & Forgatch, 2005; Forgatch, Bullock, & Patterson, 2004; Patterson, 1982; Patterson et al., 1992).

That family-centered strategies are effective for reducing child problem behavior is strongly supported in the treatment and prevention science literatures across developmental periods (e.g., Brody et al., 2004; Conduct Problems Prevention Research Group, 2002; Dishion & Patterson, 1992; Eddy & Chamberlain, 2000; Forgatch & DeGarmo, 1999; Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998; Kazdin, 2003; Liddle, 1999; Sanders, 1999; Spoth, Redmond, & Shin, 1998), including early childhood (Brinkmeyer & Eyberg, 2003; Olds, 2002; Olds et al., 1997; Webster-Stratton, 1990). Family-centered interventions have undergone a critical shift in the past 20 years, moving from a treatment model that is delivered to clients in clinic settings to a prevention model involving proactive recruitment of parents to engage in interventions in home and community settings such as schools, day care, and community support services (Gardner, Burton, & Klimes, 2006; Hutchings et al., 2007; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006).

It is not difficult to argue that the earlier one intervenes with a family, the easier it is to make significant developmental changes and reduce the likelihood of early-starting conduct problems and later drug-use risk. There are three reasons for the early intervention hypothesis. First, early interventions target the child behavior before more serious forms of antisocial behavior develop. Noncompliant and oppositional behavior is easier to remediate than are lying, stealing, and proactive aggression. Targeting behavior early is expedient because a child's ecology expands with development and moves from home into school and neighborhood settings that are less predictable and that involve relationships with teachers (Pianta, Steinberg, & Rollins, 1995) and same-age and older peers (Dishion, Duncan, Eddy, Fagot, & Fetrow, 1994; Ingoldsby & Shaw, 2002). Eventually, peers may transform reactive aggression into proactive aggression and may support other forms of negative behavior (Poulin & Boivin, 2000). By adolescence, peers can become a powerful context within which delinquency, drug use, and sexual experimentation are embedded (Capaldi, Crosby, & Stoolmiller, 1996; Dishion & Owen, 2002; French & Dishion, 2003; Patterson, Dishion, & Yoerger, 2000). Thus, family interventions initiated in early childhood are more likely to meet the objective of preventing a variety of later behavior problems.

The second advantage of early intervention is that parents are probably younger and have undergone fewer development transitions themselves, including having multiple children and multiple partner transitions, and they may likely engage in fewer high-risk behaviors that compromise their own health. In particular, divorce and remarriage have disruptive effects on the parent – child relationship and child adjustment, and although these transitions can be opportune times to intervene (e.g., Martinez & Forgatch, 2001), it certainly would be better to prevent their occurrence in the first place. Early interventions by Olds and colleagues not only reduced the number of caregiver relationship transitions but also the number of ensuing children (Olds, Hill, Robinson, Song, & Little, 2000; Olds et al., 1997).

Third, the sense of optimism caregivers have regarding the possibility of parent – child relationship change is much higher during their offspring's early childhood. As noted earlier, parents' motivation to change may be significantly reduced after years of predominantly acrimonious interchanges with a child compared with when they are parents of toddler-age offspring. We found that parents of adolescents were more likely to drop out of behavioral family therapy treatment than were parents seeking treatment with younger children (Dishion & Patterson, 1992). In the FCU model, only 25% of the parents of adolescents engaged in the intervention (Connell, Dishion, Yasui, & Kavanagh, 2007), whereas more than 75% of families in early childhood trials engaged in the FCU (Shaw et al., 2006).

The empirical evidence for the effectiveness of family-centered interventions during early childhood is impressive. The pioneering work of Webster-Stratton and colleagues is exemplary. By using videotaped examples and promoting the use of systematic, behavioral therapy-based parenting skills that build a productive parent – child relationship and strengthen family management, significant improvements have been observed and replicated (e.g., Webster-Stratton & Taylor, 2001). In the family management model, the interventions are offered in a parent group format, and caregivers' discussions about the videotaped examples are a compelling source of change.

The Ecological Approach to Family Intervention and Treatment Model

Despite these promising findings, current forms of empirically supported family interventions arguably require more efficient and brief interventions that can be rolled out via service delivery systems that have contact with large numbers of children and families (Hoagwood & Koretz, 1996). The ecological approach to family intervention and treatment (EcoFIT) was designed with a public health focus to ensure that the needs of a wider range of children and families

are met, from prevention to treatment. The focus also ensures efficiency in terms of cost and in delivery in settings that reach a large number of children, such as public school systems (Dishion & Stormshak, 2007). The intervention is “ecological” in that it is designed to improve children's adjustment across settings (home, school, and neighborhood) by motivating positive behavior support practices in those settings. Two key features of the intervention are that it is assessment driven and tailored to the needs of youth and families as revealed by family observations, assessments in extrafamilial contexts (e.g., schools), and reports from important individuals in the child's life (e.g., parents, teachers, youth when of age), and that typically, intervention is brief.

The EcoFIT model is predicated on the FCU (Dishion & Kavanagh, 2003), which is a brief parenting intervention that emphasizes motivation to change (Miller & Rollnick, 2002). The FCU involves three sessions. The first step is a meeting with parents to explore their perceptions and concerns regarding their family setting and child's behavior. The second step is a comprehensive assessment that includes videotaping parent – child interactions. The third step is a structured feedback session that is based on the results of the assessment and that emphasizes parenting and family strengths yet draws attention to possible areas of change. The intervention is motivational in that it stimulates caregivers to address key problems in parenting either on their own or with the support of a professional. Interventions that follow the FCU are thus tailored to each family's needs on the basis of the assessment and of the parents’ motivation to change. Consequently, some parents may focus on only one dimension of their parenting practices, unlike with conventional parenting intervention programs that tend to emphasize a standard curriculum of parenting practices to all parents.

The tailored, adaptive, and motivational aspect of the intervention results in relatively brief interventions. The application of the EcoFIT to families of young adolescents within the school setting revealed that an average of six sessions for the highest risk families during the course of 2 − 3 years resulted in enduring reductions in drug use and problem behavior and improved parental monitoring practices (Connell et al., 2007; Dishion, Nelson, & Kavanagh, 2003).

In pilot work leading to this study, we applied the FCU intervention to high-risk families of toddlers involved in a national family nutrition and health program for young families referred to as the Women, Infants, and Children Nutrition Program (WIC). We randomly assigned 120 families of toddlers to either WIC as usual or WIC with one FCU at child age 2 and found that the intervention reduced subsequent problem behavior and improved parent involvement at child ages 3 and 4, respectively (Shaw et al., 2006). Moreover, videotaped home observation sessions showed that random assignment to the FCU had resulted in improvements in caregivers’ use of proactive parenting practices and reduced child negative behavior at age 3 (Gardner, Shaw, Dishion, Burton, & Supplee, 2007). These findings generally fit with those of two dissertation projects that used the FCU with families with toddlers and revealed improved parenting and reduced child problem behavior (Jones, 2004; O'Leary, 2000).

The WIC study of the FCU was limited in terms of sample size, intervention services offered to the families, and use of only male children from an urban community. Our current study, referred to as the Early Steps Multisite Study, remedies these limitations. First, the sample includes 731 at-risk families; half were randomly assigned to the FCU/EcoFIT intervention and the remainder to WIC as usual. Second, the families were recruited from three geographically and culturally diverse regions, including metropolitan Pittsburgh, PA; suburban Eugene, OR; and rural Charlottesville, VA. The sample also reflects cultural diversity, including African American, European American, and Latino families. Third, we used the entire EcoFIT model in that families were provided additional services following the FCU, consistent with an adaptive, tailored approach to intervention. We examined outcomes on parent reports of child problem behavior and direct observations of positive behavior support

practices, including positive reinforcement, proactive parenting, parent involvement, and joint-attention verbal interaction.

In this study, we hypothesize that families at high risk involved in WIC and randomized to the EcoFIT would (a) report reductions in problem behavior from child age 2 to 4 years compared with control families, (b) show increases in caregiver involvement and direct observations of positive behavior support practices at child ages 2 and 3 compared with control participants, and (c) show that reductions in problem behavior would be mediated by improvements in positive behavior support practices, as measured by home visitor ratings and direct observations of parent – child interaction.

Method

Participants

Participants included 731 mother – child dyads recruited between 2002 and 2003 from WIC programs in the metropolitan areas of Pittsburgh, PA, and Eugene, OR, and in and outside the town of Charlottesville, VA. Families were contacted at WIC sites and invited to participate if they had a son or daughter between age 2 years 0 month and 2 years 11 months, following a screen to ensure that they met the study criteria by having socioeconomic, family, and/or child risk factors for future behavior problems. Risk criteria for recruitment were defined at or above 1 *SD* above normative averages on several screening measures in the following three domains: (a) child behavior (conduct problems, high-conflict relationships with adults), (b) family problems (maternal depression, daily parenting challenges, substance-use problems, teen parent status), and (c) sociodemographic risk (low education achievement and low family income, relevant to WIC criterion). Two or more of the three risk factors were required for inclusion in the sample.

Recruitment—As shown in Figure 2 and in Table 1, of the 1,666 families who had children in the appropriate age range and who were contacted at WIC sites across the three study sites, 879 met the eligibility requirements (52% in Pittsburgh, 57% in Eugene, and 49% in Charlottesville) and 731 (83.2%) agreed to participate (88% in Pittsburgh, 84% in Eugene, and 76% in Charlottesville). The children in the sample had a mean age of 29.9 months (*SD* = 3.2) at the time of the age 2 assessment.

Of the 731 families (49% female), 272 (37%) were recruited in Pittsburgh, 271 (37%) in Eugene, and 188 (26%) in Charlottesville. Across sites, primary care-givers self-identified as belonging to the following ethnic groups: 28% African American, 50% European American, 13% biracial, and 9% other groups (e.g., American Indian, Native Hawaiian). Thirteen percent of the sample reported being Hispanic American. During the 2002 − 2003 screening period, more than two thirds of those families enrolled in the project had an annual income of less than $20,000, and the average number of family members per household was 4.5 (*SD* = 1.63). Forty-one percent of the population had a high school diploma or general education diploma (GED), and an additional 32% had 1 − 2 years of post – high school training.

Retention—Of the 731 families who initially participated, 659 (90%) were available at the 1-year follow-up and 619 (85%) participated at the 2-year follow-up when children were between 4 years and 4 years 11 months old. At ages 3 and 4, selective attrition analyses revealed no significant differences in project site; children's race, ethnicity, or gender; levels of maternal depression; or children's externalizing behaviors (parent reports). Furthermore, no differences were found in the number of participants who were not retained in the control versus the intervention groups at both age 3 ($n = 40$ and $n = 32$, respectively) and age 4 ($n = 58$ and $n = 53$, respectively).

Measures

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

Maternal depression—We used a brief but valid indicator of adult depression referred to as the Center for Epidemiological Studies on Depression Scale (CES – D; Radloff, 1977). The CES – D is a well-established and widely used 20-item measure of depressive symptomatology that was administered to mothers at the child ages 2 and 3 home assessments. Participants report how frequently they have experienced the listed depressive symptoms during the past week on a scale ranging from 0 (*less than 1 day*) to 3 (*5 − 7 days*). Items are summed to create an overall depressive symptoms score. For the current sample, internal consistencies were .76 and .75 at the ages 2 and 3 assessments, respectively.

Early childhood problem behavior—The Child Behavior Checklist (CBCL) for ages 1.5 − 5 (Achenbach & Rescorla, 2001) is a 99-item questionnaire that assesses behavioral problems in young children. Mothers completed the CBCL at the child ages 2, 3, and 4 home assessments. The CBCL includes one broadband factor that assesses externalizing symptoms, Externalizing, which was used as the primary outcome measure in our study. Internal consistencies for Externalizing were .86, .89, and .86 at ages 2, 3, and 4, respectively, in the current study.

At child ages 2, 3, and 4 assessments, we administered the Eyberg Child Behavior Inventory, a widely used 36-item measure of early childhood problem behavior (Robinson, Eyberg, & Ross, 1980). The Eyberg includes two factors that focus on the perceived intensity of a behavior and degree to which the behavior is a problem for caregivers. Because the Intensity factor is similar in content and structure to the CBCL Externalizing factor, for our study, we focused on the Problem factor, which asks caregivers to use a 7-point scale to report the extent to which the behavior is a problem for the parent. The inventory has been demonstrated to be highly correlated with independent observations of children's behavior, to differentiate clinic-referred and nonclinic populations (Robinson et al., 1980) and to show high test – retest reliability (. 86) and internal consistency (.98; Webster-Stratton, 1985). In our study, internal consistencies for the Problem factor were .84, .90, and .94 at ages 2, 3, and 4, respectively.

Procedures

Assessment protocol—Parents (i.e., mothers and, if available, alternative caregivers such as fathers or grandmothers) and children who agreed to participate in the study were scheduled for a 2.5-hr home visit. Each assessment began by introducing children to an assortment of age-appropriate toys and having them play for 15 min while the mothers completed questionnaires. After the free play (15 min), which began with the child being approached by an adult stranger (i.e., undergraduate videographer), each primary caregiver and child participated in a cleanup task (5 min), followed by a delay of gratification task (5 min), four teaching tasks (3 min each, with the last task being completed by alternate caregiver and child), a second free play (4 min), a second cleanup task (4 min), the presentation of two inhibition-inducing toys (2 min each), and a meal preparation and lunch task (20 min). Exactly the same home-visit and observation protocol was repeated at ages 3 and 4 for both the control and the intervention groups. Families received $100 for participating in the age 2 home visit. Families were reimbursed $120 at the age 3 assessment and $140 at the age 4 assessment.

The randomization sequence was computer generated by a staff member who was not involved with recruitment. Randomization was gender balanced to ensure an equal number of males and females in the control and intervention subsamples. To ensure that the randomization was blinded, the examiner opened a sealed envelope, revealing the family's group assignment only

after the assessment was completed, and shared this information with the family. Examiners carrying out follow-up assessments were not informed of families' randomly assigned condition.

Relevant to this study, we present maternal reports of child externalizing problems from ages 2, 3, and 4 assessments and direct observations of parent – child interaction from the child ages 2 and 3 assessments. Coding of family assessment videotapes was completed for ages 2 and 3 to test the hypothesis of a link between improvements in positive behavior support in response to the intervention and change in young children's problem behavior.

Coding of videotaped parent – child interactions—A team of undergraduates coded the videotaped family interaction tasks by using the Relationship Process Code (RPC; Jabson, Dishion, Gardner, & Burton, 2004). The average team RPC percent agreement = .87, κ = .86. The RPC is a third-generation code derived from the Family Process Code (Dishion, Gardner, Patterson, Reid, & Thibodeaux, 1983) used extensively in previous research. After coding each family interaction, coders completed a coder impressions inventory regarding proactive and positive behavior support practices, for the purpose of this research study. All family interaction tasks were evaluated in the scoring of positive behavior support practices. In addition, the home visitors' ratings of parent involvement with the young child were used as another indicator of the positive behavior support construct. Although coders were predominantly European American (90%), protocols developed by using examples of culturally diverse coding categories and by extensive training ensured that coding of family interactions was culturally sensitive. Our previous research revealed that cultural biases in coding of African American family interactions existed when coders were untrained in the coding system and that coder training resulted in eliminations of coding differences between European American and African American coders (Yasui & Dishion, 2007).

In detail, the following items were entered into the positive behavior support scores:

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

redirects the child to more appropriate behavior if the child is off task or misbehaves; parent uses verbal structuring to make the task manageable (α= .835).

Intervention protocol: The FCU—Families randomly assigned to the intervention condition were then scheduled to meet with a parent consultant for two or more sessions, depending on the family's preference. The FCU is a brief, three-session intervention based on motivational interviewing and modeled after the Drinker's Check-Up (Miller & Rollnick, 2002). Typically, the three meetings include an initial contact session, an assessment session, and a feedback session (Dishion & Kavanagh, 2003). However, to optimize the internal validity of the study (i.e., prevent differential drop out for experimental and control conditions), the assessments were completed before random assignment results were known to either the research staff or the family. Thus, for the purpose of research studies only, the sequence of contacts comprised an assessment (baseline), randomization, an initial interview, a feedback session, and possibly follow-up sessions. Families were given a gift certificate for $25 for completing the FCU at the end of the feedback session, which could be used at local supermarkets or video stores.

As described earlier, the initial meeting was an assessment conducted with research staff, during which the family engaged in a variety of in-home videotaped tasks of parent – child interaction and caregivers completed several questionnaires about their own, their child's, and their family's functioning. Also during this home assessment, staff completed ratings of parent involvement with and supervision of their child. The second session was an initial interview by the parent consultant, during which the consultant explored parent concerns, focusing on family issues that were currently the most critical to the child's well-being. The third meeting involved a feedback session, during which the parent consultant summarized the results of the assessment by using motivational interviewing strategies. An essential objective of the feedback session is to explore the parents' willingness to change problematic parenting practices, to support existing parenting strengths, and to identify services appropriate to the family needs. The parents were also offered follow-up sessions that focused on parenting practices, other family management concerns (e.g., coparenting), and contextual issues (e.g., child care resources, marital adjustment, housing, vocational training).

Parent consultants who completed the FCU and follow-up parenting sessions were a combination of Ph.D.- and master's-level service workers, all of whom had previous experience in carrying out family-based interventions but at the study's outset had no experience in using the FCU. The parent consultants were of diverse ethnic status, including Latino, African American, European American (the majority), and mixed ethnicity. The consultants were initially trained for 2.5 − 3 months by using a combination of strategies, including didactic instruction and role playing, followed by ongoing videotaped supervision of intervention activity. Before working with study families, parent consultants were initially certified by lead parent consultants at each site who had been certified by the intervention developer (Dishion, 1990). Certification was established by reviewing videotapes of feedback and follow-up intervention sessions to evaluate whether the parent consultants were competent in all critical components of the intervention as described later in this article. This process is repeated yearly to reduce drift from the intervention model and adheres to the methods of Forgatch, Patterson, and DeGarmo (2005), which revealed that direct observations of therapist fidelity to parent management training predicted change in parenting practices and child behavior. In addition, cross-site case reviews were convened weekly via videoconference to further enhance fidelity. Finally, annual parent consultant meetings were held to update training, discuss possible changes in the intervention model, and address special intervention issues reflected by the needs of families across sites.

Of the families assigned to the treatment condition, 77.9% participated in the initial interview and feedback sessions at child age 2, and 65.4% participated at child age 3 (see Table 1 for site-specific data). Of those families who met with a parent consultant, the average number of sessions per family was 3.32 (*SD* = 2.84). The number of sessions was uncorrelated with future levels of problem behavior after controlling for initial levels.

Data analysis—We used a variety of strategies to test the hypotheses guiding this research. Latent growth mixture modeling (LGMM) analyses were conducted using Mplus 4.21 (Muthén & Muthén, 2007) to examine heterogeneity in developmental trajectories of early problem behaviors and positive parenting, including possible heterogeneity in intervention response. Three separate sets of analyses were conducted, examining possible heterogeneity in (a) Eyberg Problem Behavior trajectories, (b) CBCL Externalizing behavior trajectories, and (c) change in the Positive Parenting latent variable. Mixture modeling is an active area of methods research regarding the optimal approach to determining the number of latent classes (e.g., Nylund, Asparouhov, & Muthén, 2006). We attempted to obtain fit indices for conditional models with one to six classes at each age. Models with different numbers of latent classes are not nested; therefore, Muthén and Muthén (2000) have recommended the following four criteria for selecting the optimal number of latent classes in factor mixture models: (a) the Bayesian information criterion (BIC) and a sample-size-adjusted version of the BIC (adj. BIC), with lower scores representing better fitting models; (b) the quality of classification across models, represented by entropy, with higher entropy values indicating better classification of individuals into their most likely trajectory class; (c) the Lo – Mendel – Rubin – likelihood ratio test (LMR – LRT) and the bootstrap likelihood ratio test (BLRT), each of which provides a statistical comparison of the fit of a given model with a model of one fewer classes; and (d) the theoretical relevance and usefulness of latent trajectory classes. Recent simulation studies by Ny-lund et al. (2006) supported the use of adj. BIC and BLRT for selection of the optimal number of classes in latent class analysis models, with the BLRT providing particularly consistent correct results. In light of these findings, primary weight was placed on the BLRTand the adj. BIC values in selecting the number of classes. All analyses were conducted using 100 randomized start values run for 10 iterations each, with the best fitting 25 randomized start values run to model convergence.

Subsequent mediator analyses examined the indirect effect of intervention on the rate of change in problem behaviors through the effect of intervention on maternal positive behavior support at child age 3. The basic mediation model is shown in Figure 3. In the mediation models, the slope of problem behaviors was regressed on age 3 positive behavior support and intervention status, and positive behavior support at child age 3 was regressed on intervention status, the initial level of child problem behaviors, and positive behavior support at child age 2. Thus, this model tests whether intervention is related to the change in positive behavior support from child ages 2 to 3, and whether this change in positive behavior support, in turn, predicts the rate of change in child behavior problems from ages 2 to 4, controlling for the direct effect of intervention. A statistical test of the significance of the indirect effect from intervention to the change in maternal symptoms to the rate of change in problem behavior was examined, with standard errors for indirect effects calculated using the delta method described by MacKinnon and colleagues (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002;MacKinnon, Lockwood, & Williams, 2004).

Results

Descriptive statistics for all variables are shown in Table 2. For ease of interpretation, we present t scores on the Eyberg and CBCL measures, although raw scores were used for models to avoid potential age and gender corrections. The percentage of the respondents in the clinical range on these measures at each age is also presented in Table 2. In terms of validating children's

problem behavior status, for both the CBCL Externalizing and the Eyberg Problem Behavior factors, mean scores were approximately 1 SD above normative scores at age 2. Using the borderline clinical cutoff of the 90th percentile for the CBCL, 48.6% of children were reported to have clinically elevated scores on the Externalizing factor at age 2. This percentage was reduced over time to 24% at age 4.

Correlations for problem behavior variables from age 2 to 4 and correlations for positive behavior support variables from age 2 to 3 are shown in Table 3. It is important to note that no significant associations were found between treatment group and child gender or ethnicity, levels of maternal depressive symptoms, or any type of child problem behavior at age 2, suggesting that randomization was successful. Modest to moderate associations were consistently found among the observed indicators of positive behavior support. In addition, modest but significant negative associations were found between ethnicity and dimensions of positive behavior support, with African American mothers observed to show lower levels than European American mothers.

The central analyses tested the following hypotheses: (a) that random assignment to a family-centered intervention would result in reductions in the frequency of externalizing problems and those problems being perceived as problematic by mothers, (b) that intervention would also result in improvement in parenting practices, and (c) that reduction in the frequency of externalizing symptoms and those symptoms that were a problem for mothers would be mediated by improvements in parenting. All analyses were conducted using Mplus 4.1 and used full information maximum likelihood estimation (Muthén & Muthén, 2004), which provides a method for accommodating missing data by estimating each parameter by using all available data for the estimation of that specific parameter.

Hypothesis 1: Problem Behavior in Early Childhood

For the Eyberg Problem Behavior scale, model fit indices converged to indicate that a two-class LGMM provided optimal fit to the data. Most centrally, both the LMR – LRT and the BLRT were significant for the two-class versus one-class model (LMR – LRT = 51.24, Δdf = 11, $p < .05$; BLRT = 51.24, $\Delta df = 11$, $p < .05$), and the adj. BIC value was lower for the two-class (adj. BIC = 13232.43) versus the one-class model (adj. BIC = 13246.06). Models with three or more classes yielded higher adj. BIC values (three-class adj. BIC = 13239.57) and nonsignificant LMR – LRT and BLRT values (e.g., three-class LMR – LRT = 25.69, Δdf = 10, $p = .20$; BLRT = 25.69, $\Delta df = 10$, $p = .20$).

Entropy for the two-class model was relatively low (.52), indicating that the two classes were not well discriminated. The two classes appeared to be ordered along a severity dimension, with 56% of youth in an elevated-problem class and 44% of youth in a lower problem class, with the average class trajectories nearly parallel from ages 2 to 4. Membership in the elevated-problem class was predicted by male gender (logit = −.69, *SE* = .29, $p < .05$). In the elevated class, ethnic minority status predicted both the initial level (β = 3.31, *SE* = 1.27, $p < .05$) and the slope of problem behaviors (β = 3.56, *SE* = 1.30, $p < .05$). Intervention status significantly predicted reduced growth in problem behaviors in the elevated-problems class (β = −1.03, *SE* = .44, $p < .05$; B = −.16). In the lower problems class, ethnic minority status predicted reductions in both the initial level (β = −3.43, *SE* = 1.49, $p < .05$) and the slope of problem behaviors (β = −5.67, *SE* = 1.07, $p < .05$). Intervention status was not significantly related to the problem behavior slope, however (estimate = −.27, *SE* = .38, *ns*). Results for intervention effects in these two classes are depicted graphically in Figure 4.

For the CBCL Problem Behavior scale, model fit indices did not support the existence of heterogeneous trajectory classes, indicating that a one-class LGMM provided the best fit to the data. Most centrally, LMR – LRT and BLRT results indicated that a two-class model did not

result in significantly improved model fit over a one-class model (LMR – LRT and BLRT = 55.15, *ns*). Thus, we used a one-class model to test the hypothesis that the intervention reduced child behavior problems on the CBCL.

The latent growth model for the externalizing scale from the CBCL provided excellent fit to the data, $\chi^2(df = 3) = 6.01$, $p = .11$; comparative fit index (CFI) = .99; root mean square error of approximation (RMSEA) = .04; standardized root mean residual (SRMR) = .02. The model yielded significant intercept (estimate = 20.63, *SE* = .27) and slope values (estimate = −2.00, *SE* = .22), as well as significant residual variance in the intercept (estimate = 41.57, *SE* = 3.82) and slope parameters (estimate = 11.24, *SE* = 1.79). The effect of intervention on the rate of change in problem behavior was significant (estimate = −.82, *SE* = .29; β = −.12), with more growth in problem behavior in the control group.

An additional series of latent growth models examined possible gender and ethnicity differences in the effect of intervention on the rate of change in problem behavior. First, to examine possible gender differences in the effect of intervention, we examined the fit of a two-group model comparing results for males and females. The difference in the chi-square value across a model with all paths constrained to be equal across genders, and a model allowing the intervention effect to vary by gender was found to be nonsignifi-cant for both the Eyberg Problem Behavior ($\Delta\chi^2 = 1.60$, $\Delta df = 1$, *ns*) and the Externalizing Behavior Problem scales ($\Delta\chi^2 = 2.21$, $\Delta df = 1$, *ns*), indicating that the intervention effect did not vary by gender.

Second, possible ethnicity differences in the effect of intervention were examined by comparing the fit of models constraining all paths to be equal for European American and ethnic minority families with models allowing the intervention effect to vary across ethnicity groups. The difference in the chi-square value across a model with all paths constrained to be equal across ethnicity groups and a model allowing the intervention effect to vary by ethnicity was found to be nonsignificant for both the Eyberg Problem Behavior ($\Delta\chi^2 = .85$ $\Delta df = 1$, *ns*) and the Externalizing Behavior Problem scales ($\Delta\chi^2 = 2.52$, $\Delta df = 1$, *ns*), indicating that the intervention effect did not vary by ethnicity. In light of the nonsignificant differences in the effects of intervention across either gender or ethnic groups, no further differences in effects across groups were explored.

Hypothesis 2: Observations of Positive Behavior Support Practices

To test Hypothesis 2, we examined the measurement model for the positive behavior support construct, which included the following indicators: (a) home visitor ratings of parent involvement, (b) direct observations of positive behavior support (positive reinforcement, positive prompting, and structuring), (c) direct observation of the engaged parent – child interaction time (parent – child interact time), and (d) coder impressions of proactive parenting.

For the positive parenting latent variable, model fit indices did not support the existence of heterogeneous classes, indicating that a one-class LGMM provided the best fit to the data. Most centrally, LMR – LRT and BLRT results indicated that a two-class model did not result in significantly improved model fit over a one-class model (LMR – LRT and BLRT = 81.20, *p* = *ns*). Thus, we approached the analysis of the impact of the intervention on positive behavior support by using a one-class, autoregressive model, as shown in Figure 3.

We examined simultaneously the convergent validity of these indicators of parenting and the stability and the intervention effect, as shown in Figure 5. Factor loadings were constrained to be equal across ages 2 and 3. Figure 5 shows that the four indicators formed a coherent construct and were highly stable from ages 2 to 3 (β = .81). Despite the high stability, random assignment to the intervention resulted in statistically reliable improvements in observed positive behavior

support. The model shown in Figure 3 provides a good fit to the data, $\chi^2(df = 26) = 32.48$, $p = .18$; CFI = .99; RMSEA = .02; SRMR = .04.

Hypothesis 3: Positive Behavior Support and Child Problem Behavior

As indicated, Hypothesis 3 was tested with mediator analyses, examining the indirect effect of intervention on the rate of change in problem behaviors through the effect of intervention on maternal parenting at child age 3. For ease of interpretation, these results are shown in Figures 6 and 7. Because LGMM analyses indicated that there was no heterogeneity in positive behavior support or in CBCL externalizing problems, we tested mediation by using one-class models (i.e., a typical latent variable model including an autoregressive model for positive behavior support and a latent growth model for child behavior problems). As shown in Figure 6, the model for externalizing problem behavior from the CBCL provided reasonable fit to the data by most indices of model fit, $\chi^2(df = 66) = 88.85$, $p = .04$; CFI = .98; RMSEA = .02; SRMR = .04, and the nonsignificant chi-square may be related to the large sample size. In this model, the direct effect of intervention on the problem behavior slope was not significant with maternal parenting included in the model. Treatment significantly predicted improvements in positive behavior support from child ages 2 to 3. More positive behavior support predicted less growth in problem behavior. The indirect effect from intervention to more positive behavior support to decreased growth in problem behavior was statistically significant, although small in magnitude, indicating a significant partial mediation effect of positive behavior support.

As shown in Figure 7, the model for problem behavior from the Eyberg Child Behavior Inventory provided reasonable fit to the data by most indices of model fit, $\chi^2(df = 66) = 89.45$, $p = .03$; CFI = .98; RMSEA = .02; SRMR = .04, and the nonsignificant chi-square may be related to the large sample size. The direct effect of intervention on the problem behavior slope was not significant with positive behavior support in the equation. The family-centered intervention significantly predicted improvements in positive behavior support from child ages 2 to 3. More positive behavior support predicted less growth in problem behavior in early childhood. The indirect effect from intervention to more positive behavior support to less growth in problem behavior was statistically reliable.

Discussion

These data support the hypothesis that a brief, adaptive, and tailored approach to supporting positive behavior support practices can prevent the growth of problem behavior in young children at a critical 2-year period in development (ages 2, 3, and 4 years). Moreover, reduction in growth of early childhood problem behavior was associated with improvement in positive behavior support practices from child ages 2 to 3. The effect sizes for the impact of the intervention were in the small to moderate range ($d = .33$, positive behavior support; $d = .23$, problem behavior) when a one-group intention to treat design analysis was used. Similarly, when a person-centered analysis strategy was used, it was revealed that the intervention effect in child problem behavior was most pronounced among the children who were at highest risk at age 2 and was found to be larger than the effect for the entire sample ($d = .33$).

Three significant points can be considered when evaluating effect sizes in general and those resulting from this study in particular (McCartney & Rosenthal, 2000). First, this is a preventive intervention, and many of the families, although at risk, did not display problem parenting or child behavior and therefore change was not to be expected. The EcoFIT was designed in terms of a health maintenance framework; therefore, continued health is an explicit goal and cannot truly be evaluated until the children are in the next developmental stage, which is school age. Second, it appears that a small to moderate effect size is potentially of some practical significance, if indeed these levels of reduction in problem behavior translate to preventing coercive interaction cycles and escalating patterns of problem behavior that might be expected

among the highest risk toddlers (Shaw et al., 2003). In an ongoing study by Shaw and colleagues, indices of parenting assessed at age 2 are being found to predict youth reports of arrest at age 15, for which even modest reductions would be an important outcome (Shaw & Gross, in press). Third, the developmental time span for evaluating the preventive impact of the EcoFIT delivered at this age is truncated, and it is possible that the effect sizes may increase over time, as has been found in several other prevention trials (Connell et al., 2007; DeGarmo, Patterson, & Forgatch, 2004; Ialongo, Poduska, Werthamer, & Kellam, 2001; Olds et al., 1997).

Given these considerations, we propose that the relatively small effect sizes may be of practical significance, although more extensive follow-up of this sample is needed to more formally evaluate this expectation. Given the potential continuity of antisocial behavior over time (Loeber & Dishion, 1983; Olweus, 1979) and the likelihood that early onset leads to multiple forms of problem behavior by adolescence (Dishion & Patterson, 2006), the potential for preventing early-onset and serious problem behavior by adolescents could result in enormous economic savings and benefits to children's lives (Miller, 2004).

It is worth noting that the risk of early-onset antisocial behavior in this sample is considerable. In earlier research, we found that early-onset externalizing problems could be predicted by a combination of maternal depression and active, fearless temperament when children were age 2 (Shaw et al., 2006). We in fact screened the population in this study to include mothers and children with multiple risk factors, including maternal depression and child temperament and behavior problems. Therefore, our ability to effectively engage families, briefly intervene to promote positive behavior support, and reduce growth in problem behavior has three major implications.

First, the EcoFIT model in general and the FCU in particular are promising strategies that can be used as an inexpensive intervention in service settings that involve a large number of families at high risk. The WIC venue is especially suitable because its primary goal is to promote the health of young children ages $0 - 5$. Low-income families in need of nutritional and financial support could also be offered cost-effective parenting services that, for many, could have substantial benefits in the long-term reduction of risk. Although it is certainly true that many of the families would benefit from or require more support than the FCU can provide, the use of assessments to target and focus treatment services significantly reduces the cost of the services and improves the engagement of families at high risk (Dishion & Stormshak, 2007). Communities concerned about promoting the behavioral health of children and ensuring school readiness could use WIC as a venue for empirically supported prevention practices.

Second, this study provides an important addition to a sparse literature on intervention mechanisms (Weersing & Weisz, 2002) by showing that even a brief, individually tailored intervention that typically involves limited opportunity for skills training effectively mediates change in positive behavior support style and skill. Other studies finding this effect have used considerably longer interventions that involved more extensive behavioral skills training (Gardner et al., 2006; Gardner, Hutchings, & Bywater, 2007; Martinez & Forgatch, 2001).

Third, the sample studied was diverse with respect to both gender and ethnicity. As previously stated, a unique advantage of the adaptive, tailored EcoFIT family intervention is that it is flexibly delivered and responsive to a wide variety of families and children. Indeed, we found no significant differences among our study's ethnic groups in terms of engagement or effectiveness of the intervention. Nevertheless, given our experience with diverse families, it is important to consider further improvements in the intervention model's capacity to meet the needs of a wide variety of families. For example, many minority families in the United States deal with challenges such as acculturation stress, discrimination, or simply maintaining cultural

strengths and coherence in the face of a dominant, majority community. We are currently developing a broader assessment menu that will enable assessment of the strengths and needs of families of various ethnicities that is relevant to factors such as racial socialization and cultural resilience (Yasui & Dishion, 2007). Presently, however, it is reassuring that the flexibility of the EcoFITapproach and the FCU delivered by a culturally sensitive therapist is helpful to majority and minority families.

This study's findings corroborate results from the broader literature on the effectiveness of preventive interventions aimed at reducing child conduct problems in early childhood among families at high risk (Baydar, Reid, & Webster-Stratton, 2003; Olds, 2002). The findings also provide additional support for the effectiveness of the FCU in general (Connell et al., 2007; Dishion et al., 2003) and its application to high-risk families during the toddler period. In an earlier study with a smaller sample of toddler-age boys from an urban community, we found that one session of the FCU reduced subsequent child externalizing problems and increased positive behavior support and parental involvement (Gardner et al., 2007; Shaw et al., 2006). The results of our current study suggest that a repeated FCU session engenders more consistent improvements in child behavior and parenting outcomes with a larger and more ethnically diverse sample of boys *and* girls followed from ages 2 to 4.

Finally, the results of this randomized intervention trial provide an important feedback loop to developmental theory. It was originally hypothesized that early support for family management in toddlerhood would reduce the emergence of problem behavior in early childhood. The effect of the intervention based on observations supports three key ideas relevant to developmental psychology. First, early parenting is malleable and responsive to interventions. Concern often arises from longitudinal studies that do not include interventions that associations observed between parenting practices and child behavior are nothing more than genetic effects (e.g., Harris, 1995; Rutter et al., 1997). Our findings suggest that change in parenting practices indeed translates to improved childhood outcomes, as have the findings of other intervention studies that have pointed to a link between changing parenting practices and child and adolescent outcomes (e.g., Dishion, Patterson, & Kavanagh, 1992; Forgatch & DeGarmo, 1999). Second, some change in parenting can result from focusing on caregivers' motivation rather than on direct training, and this was especially true for the highest risk families. This finding suggests a disruption model of poor parenting, in that many parents would engage in more positive parenting practices in the right circumstances but that stress and other family dynamics may disrupt *performance* in childrearing practices (Patterson, 1983). This is an optimistic perspective for developmental and prevention science and for those concerned with improving long-term outcomes for children. Finally, these data suggest that an early focus on positive and proactive parenting practices can prevent the emergence of parent – child coercion dynamics known to be prognostic of more serious antisocial behavior down the line in development. This finding suggests the need to integrate both relational and positive and negative interaction dynamics to further understand the contribution of the caregiving environment in developmental psychopathology.

Limitations

Our study has methodological limitations that merit consideration. First, although we presented evidence to suggest that the FCU is associated with improvements in child problem behavior and positive behavior support, effect sizes, albeit meaningful from a public health perspective, were relatively modest. There are two reasons for the small effect sizes. One, although families in the study were at high risk, many of them were actually doing well when evaluated with standardized measures of child problem behavior and direct observation. Therefore, a change was not expected or induced. Two, we suspect that for those families with more serious difficulties that do not change, two patterns of core issues are basic to the family disruption.

One is the caregivers' affective adjustment, usually depression as a function of having several young children under conditions of poverty. We considered the effects of the intervention on maternal depression in another analysis of these data and indeed found reduced levels of maternal depression as a function of the intervention (Shaw, Connell, Dishion, Wilson, & Gardner, 2008). The other is a history of maternal trauma that underlies both the depression and the poverty conditions of the family. Psychosocial interventions such as EcoFIT will have limited impact in some contexts and conditions, and these conditions require attention at the broader level of the community and the nation. Nevertheless, the EcoFIT model can be helpful for some caregivers in affective distress (Shaw et al., 2008), and we plan to further develop this component of the intervention model following principles derived from evidence-based practices that target depression, dissociation, and anxiety secondary to difficult circumstances and history.

A second limitation of the study is that for this age, we had only one reporting agent to address the clinical significance of the child's problem behavior. Because participation in the intervention group might have biased later maternal reports of child behavior, it would have been more optimal to have had a second informant of child behavior. Relevant data will be forthcoming from teachers in the coming years. How well a child adapts to the public school environment is a key test of the overall benefit of early intervention because this critical transition has significant long-term consequences for the child's future and adjustment (Kellam & Van Horn, 1997). Continued follow-up of our study sample will shed light on the endurance of intervention gains seen in the home context and whether such effects are evident at school.

Clearly, many traditional models of mental health intervention are wanting with respect to the most vulnerable families and children. Consistent with insights shared by Kazdin (1987) and others (Dishion & Patterson, 1993; Patterson, Dishion, & Chamberlain, 1993), a health maintenance model is likely more appropriate than a "medical model." That is, continued support helps vulnerable families and children continue to maintain healthy parenting practices and relationship patterns that promote children's adjustment through adolescence and into young adulthood. Thus, we now cast EcoFIT as a health maintenance model designed for implementation in contexts that facilitate regular and repeated exposure and influence on children and families and less for freestanding mental health clinics that do not have ties to institutions such as public schools (see Dishion & Storm-shak, 2007).

Our current findings endorse previous evidence that long-term improvements in young children's problem behavior can be achieved with a brief family-based intervention for toddlers. Our study also showed that improving positive behavior support practices mediated positive child behavior change. Reduction in child problem behaviors was achieved using an existing, nationally available service delivery setting for low-income children who are at risk for early-starting pathways of externalizing problem behavior and whose families do not typically use mental health services, especially this early in their child's development. Future follow-up of this study's cohort should clarify questions regarding the intervention's endurance, potential changes in effect sizes, and the benefits of the changes to the child's adaptation to the school environment.

Acknowledgements

This research was supported by Grant 5 R01 DA16110 from the National Institutes of Health to the first and second authors. We gratefully acknowledge Cheryl Mikkola for her support in the preparation of this article, the Early Steps and the Child and Family Center staff for their assistance, and all the families who participated in this project.

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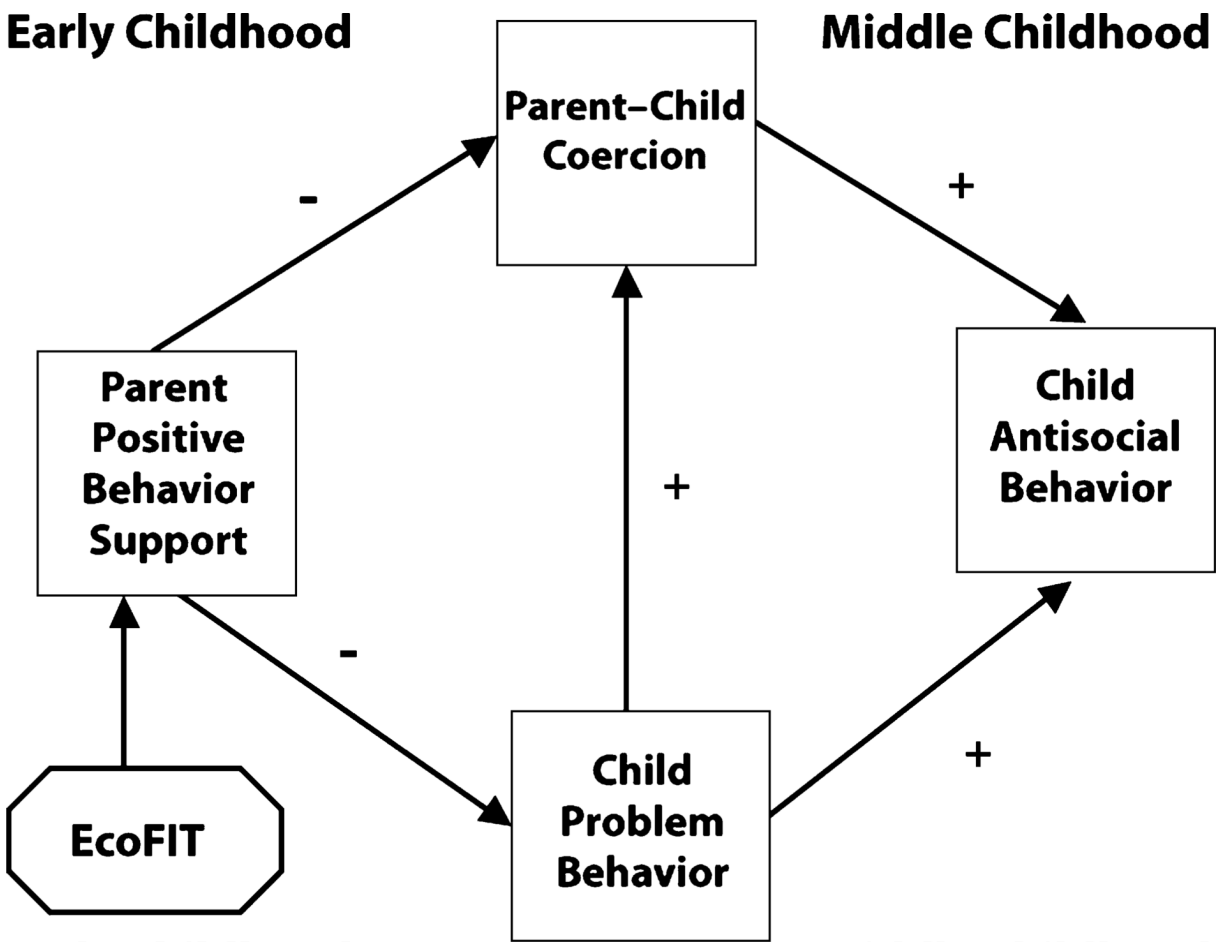

Figure 1.
Theoretical framework for the early steps intervention.

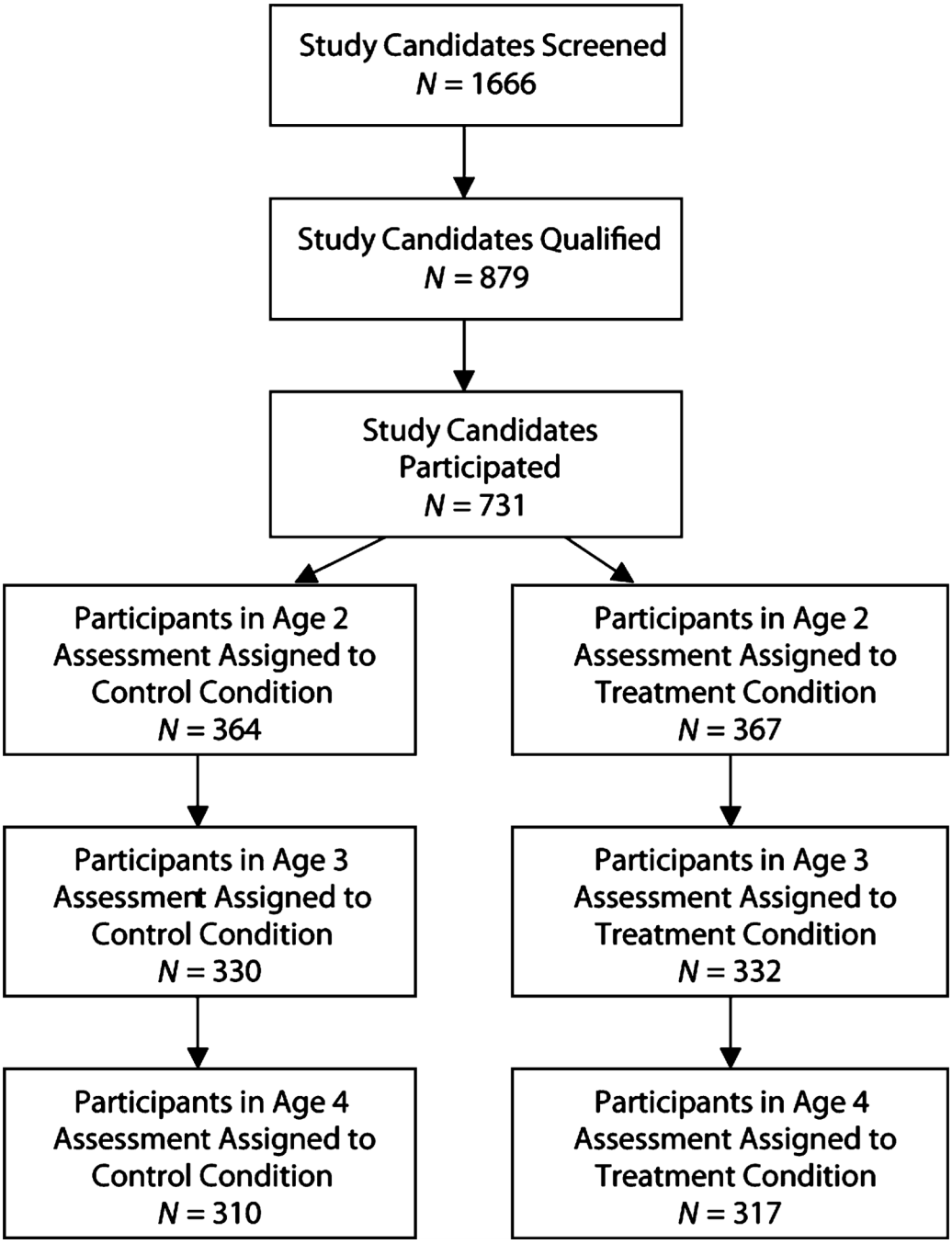

Figure 2.
An overview of the recruitment, assessment, and randomization protocol.

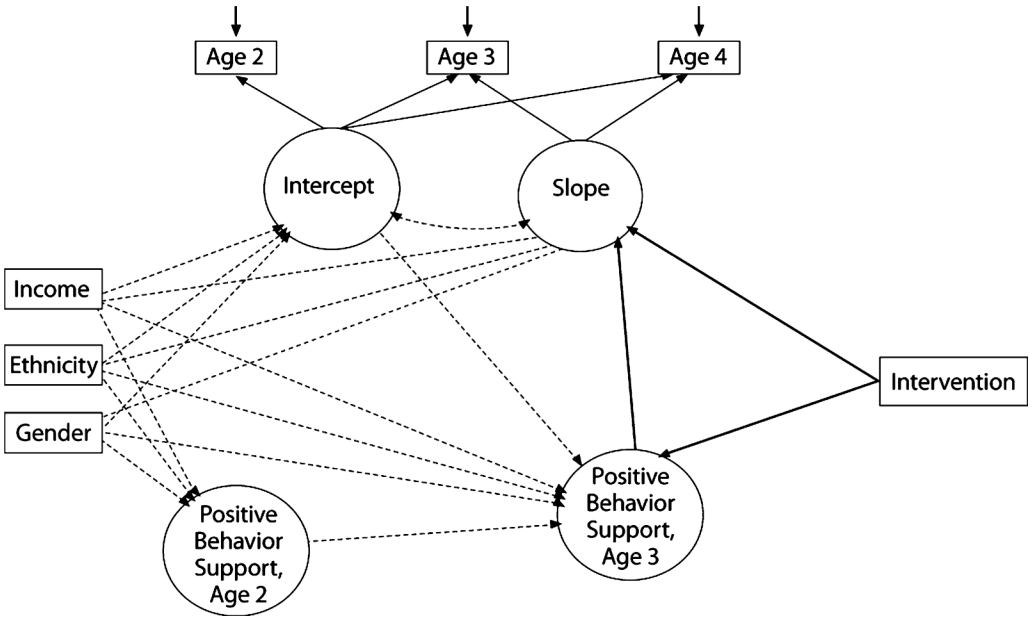

Figure 3.
Mediation model overview: Test of indirect path from treatment to age 3 positive behavior support to slope of problem behavior.

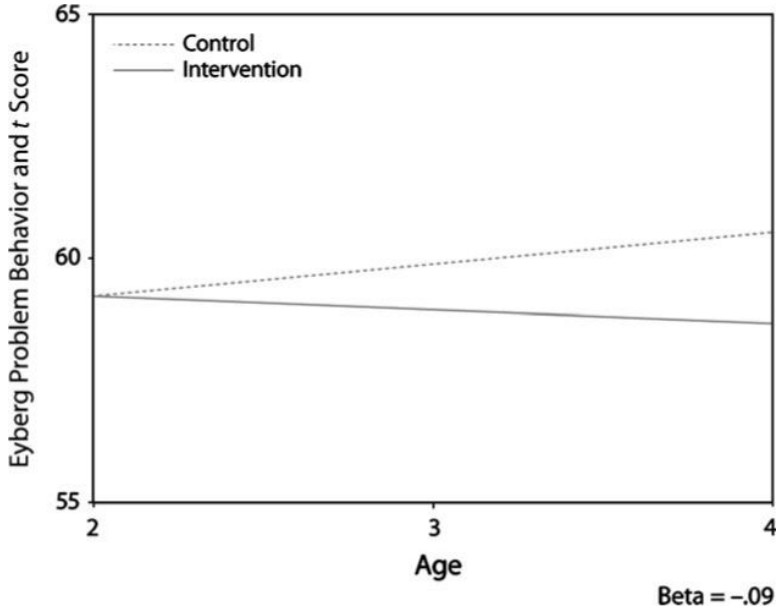

Figure 4.
Change from ages 2 through 4 years on the Eyberg measure of child problem behavior (ITT).

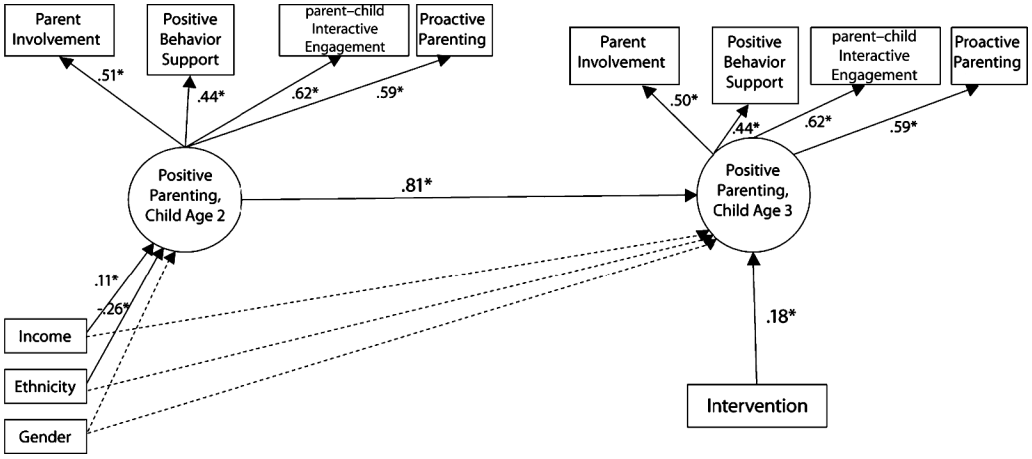

Figure 5.
Positive behavior support: Stability and intervention effect.
Note. P–C = parent-child.
*$p < .05$.

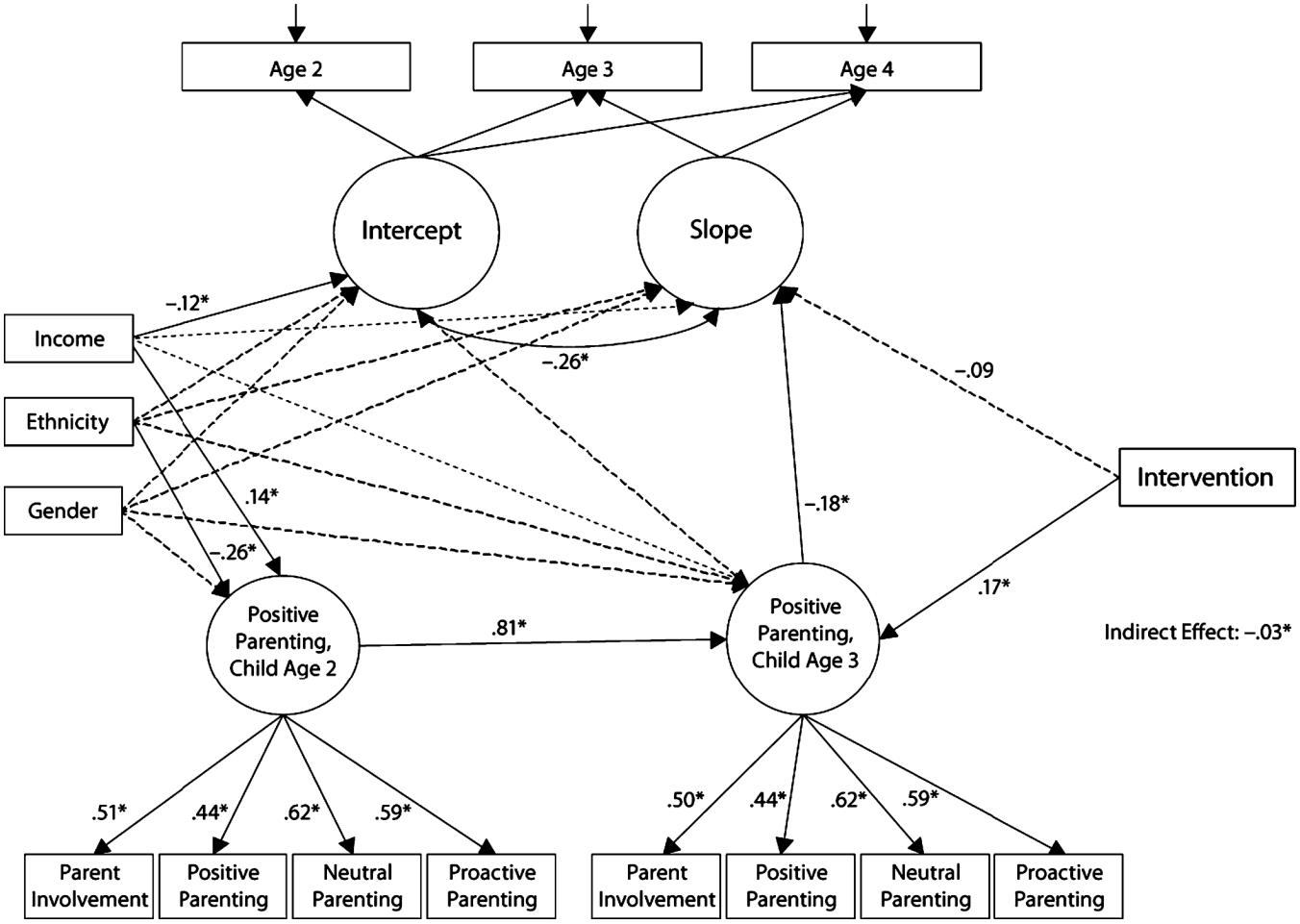

Figure 6.
Mediation model: Child Behavior Checklist Externalizing.
*$p < .05$.

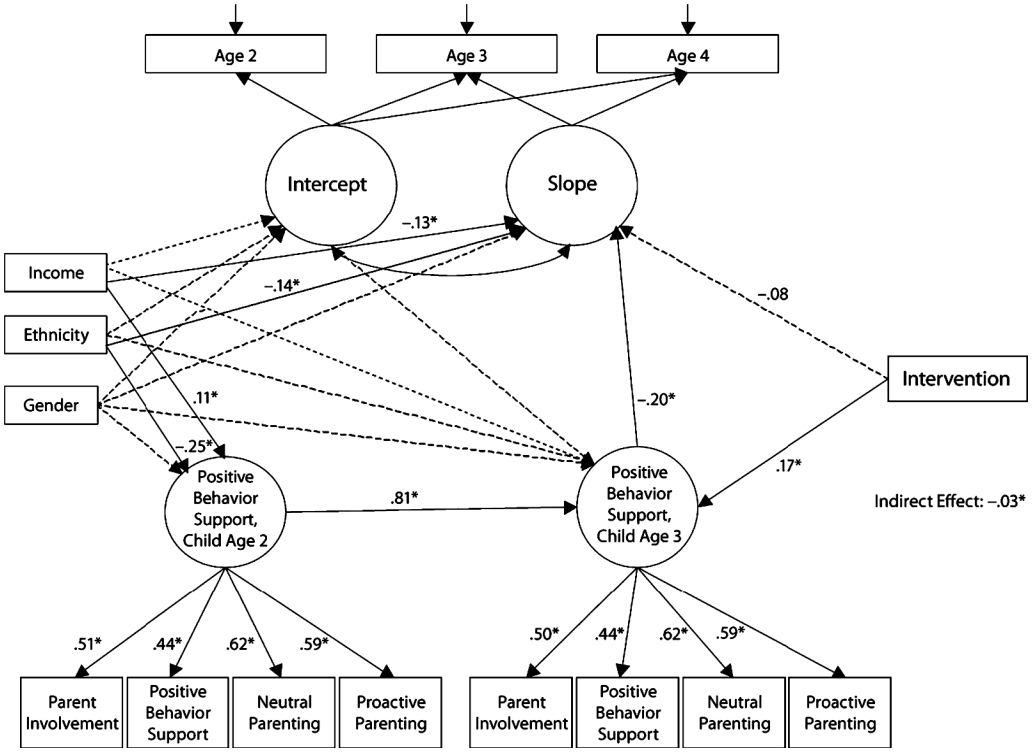

Figure 7.
Mediation model: Eyberg Child Behavior Inventory.
*$p < .05$.

Table 1

Recruitment Descriptives by Project Site

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

Table 2

Descriptive Statistics

	M	SD	Total N	N (%) in clinical range
Eyberg Problem Behavior (*t* score), age 2	59.18	8.46	729	323 (44.2)
Eyberg Problem Behavior (*t* score), age 3	59.61	10.36	642	321 (43.9)
Eyberg Problem Behavior (*t* score), age 4	59.63	11.01	616	302 (41.3)
CBCL Externalizing behavior (*t* score), age 2	59.49	8.21	730	355 (48.6)
CBCL Externalizing behavior (*t* score), age 3	55.97	9.39	651	224 (30.6)
CBCL Externalizing behavior (*t* score), age 4	53.66	10.47	619	175 (23.9)
CBCL Internalizing behavior (*t* score), age 2	56.32	8.53	730	282 (38.6)
CBCL Internalizing behavior (*t* score), age 3	54.30	9.61	651	203 (27.8)
CBCL Internalizing behavior (*t* score), age 4	53.25	10.09	619	170 (23.3)

Note. CBCL = Child Behavior Checklist.

Table 3

Correlations for Problem Behavior Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ent group	—																	
ender	.00	—																
thnicity	.00	−.05	—															
y family	.00	−.02	−.16*	—														
Problem age 2	.00	.00	.03	−.01	—													
Problem age 3	−.04	.07	−.04	−.09*	.43*	—												
Problem age 4	−.09*	.05	−.04	−.14*	.35*	.65*	—											
zing age 2	.02	.06	−.03	−.11*	.38*	.44*	.38*	—										
zing age 3	−.02	.08*	−.04	−.14*	.29*	.67*	.53*	.60*	—									
zing age 4	−.06	.07	−.07	−.02	.24*	.51*	.67*	.51*	.70*	—								
E Parent ent age 2	−.05	−.06	−.13*	.13*	−.08*	−.03	−.06	−.03	−.04	−.03	—							
Positive age 2	.00	.03	−.06	.04	.05	.02	−.08	−.04	−.05	−.14*	.11*	—						
Parent ge 2	−.06	.01	−.19*	.08*	−.02	−.02	−.05	−.08	−.07	−.06	.30*	.31*	—					
IP age 2	.02	−.03	−.17*	.08	−.06	−.10*	−.09	−.19*	−.17*	−.15*	.26*	.28*	.39*	—				
E Parent ent age 3	.02	.00	−.13*	.06	−.09*	−.05	−.10*	−.07	−.12*	−.11*	.22*	.17*	.26*	.29*	—			
Positive age 2	.09*	−.06	−.15*	.09*	.03	−.09*	−.16*	−.05	−.12*	−.11*	.12*	.24*	.24*	.22*	.25*	—		
Parent ge 2	.08*	.04	−.16*	.04	.05	−.03	−.03	−.04	−.06	−.07	.24*	.26*	.46*	.24*	.34*	.24*	—	
IP age 2	14*	.01	−.20*	.17*	−.01	−.11*	−.13*	−.10*	−.17*	−.16*	.22*	.24*	.30*	.49*	.32*	.27*	.33*	—

CBCL = Child Behavior Checklist; HOME = Home Observation for Measurement of the Environment Inventory; RPC = Relationship Process code; COIMP = Coder Impressions.

* $p < .05$.