

Improvements in Maternal Depression as a Mediator of Intervention Effects
on Early Childhood Problem Behavior

Abstract

Maternal depression has been consistently linked to the development of child problem behavior, particularly in early childhood. Despite this link, interventions typically address either adult depression, or child behavior, as separate foci. The current study examines the possibility that an intervention can address both maternal depression and child behavior problems in unison, using a sample of 731 high risk families receiving services from a national food supplement and nutrition program. Families with toddlers between ages 2 and 3 were screened and then randomized to a brief family intervention, the Family Check Up, which included linked interventions that were tailored and adapted to the families needs. Follow-up intervention services were provided at age 3 and follow-up of child outcomes occurred at ages 3 and 4. Following a previous report showing the intervention to be effective for reducing child externalizing problems, latent growth models also revealed intervention effects for early internalizing problems from 2 to 4, and reductions in maternal depression from ages 2 to 3. More importantly, reductions in maternal depression mediated improvements in both child externalizing and internalizing problem behavior. The results are discussed with respect to possibility of linking psychosocial preventive interventions for adult depression and early childhood adjustment problems within a comprehensive framework.

Several types of parental psychopathology have been associated with increased risk of child psychopathology (Connell & Goodman, 2002; DelBello & Geller, 2001; Goodman & Brumley, 1990; Lapalme, Hodgins, & LaRoche, 1997). One of the most highly researched relationships of this type has been between maternal depression and different forms of child adjustment. This is not surprising as women more often serve as primary caregivers compared to men, and the incidence of depression is quite high among females beginning during adolescence. Moreover, being the primary caregiver of several young children is highly related to depression in western cultures (Strickland, 1992).

The link between maternal depression and childhood problem behavior is unlikely to be incidental. Findings in the extant literature provide substantial evidence for a relation between maternal depression and negative child outcomes across development stages of childhood and adolescence, including both externalizing and internalizing child problem behaviors (for reviews of this literature, see Beardslee, Versage, & Gladstone, 1998; Cummings & Davies, 1994; Gelfand & Teti, 1990). These associations have been found to be particularly robust during early childhood when mothers and children spend more time together than at later ages (Marchand, Hock, & Widaman, 2002; Shaw et al., 1994, 1998). Despite the consistency of associations between maternal depression and child adjustment during early childhood, most intervention programs aimed at reducing child problem behavior have been explicitly focused on changing parenting practices rather than maternal depression per se. More recent versions of parenting programs for young children have included components dedicated to parental well being and social support (Baydar, Reid, & Webster-Stratton, 2003; Olds, 2002); however, the vast majority continue to focus on modifying caregiving practices (Brinkmeyer & Eyberg, 2003; Webster-Stratton & Reid, 2003).

A focus on parenting practices has substantial face and empirical validity, especially during early childhood when children undergo dramatic changes in cognitive and emotional development from infancy to the preschool period (Shaw & Bell, 1993) and elicit many challenges to caregivers (Fagot & Kavanagh, 1993). Related to parenting models, several theorists have noted how maternal depression might compromise a parent's ability to be consistently and actively engaged with children and be attentive and responsive to their socio-emotional needs (Belsky, 1984; Conger, Patterson, & Ge, 1995; Patterson, 1980), yet relatively few studies have directly examined whether child behavior might be improved by reducing maternal depressive symptoms, with the notable exception of research on parent management training among recently divorced families (DeGarmo, Patterson, & Forgatch, 2004; Patterson, DeGarmo, & Forgatch, 2004). The present study sought to address this issue by examining whether a parent-centered intervention to prevent the emergence of early conduct problems also proved successful in improving levels of maternal depressive symptoms, and if so, whether reductions in maternal depression mediated improvements in subsequent levels of child problem behavior.

Maternal Depression and Child Adjustment

The association between maternal depression and poor child outcomes is one of the most robust findings in psychological research (Gross, Shaw, & Moilanen, 2007). Both maternal clinical depression and sub-clinical, elevated levels of depressive symptoms have been found to be related to child maladjustment (Cummings, Keller, & Davies, 2005; Farmer, McGuffin, & Williams, 2002). As a result, the term maternal depression will be used throughout this paper to describe both criteria. Studies of children of depressed mothers across both narrowly-defined developmental periods and broad age spans (Goodman & Gotlib, 1999) have yielded consistent

findings linking maternal depression to disruptions in both socio-emotional and instrumental functioning (Elgar et al., 2004; Gelfand & Teti, 1990; Hay, Pawlby, Angold, Harold, & Sharp, 2003; Leve, Kim, & Pears, 2005; Sinclair & Murray, 1998). These associations have been corroborated most consistently during early childhood, when maternal depression has been linked to fussiness and difficult child temperament (Cutrona & Trouman, 1986; Whiffen & Gotlib, 1989), insecure attachment (Campbell et al., 2004; Field et al., 1988), behavior problems (Marchand, Hock, & Widaman, 2002; Shaw, Keenan, & Vondra, 1994), and reduced mental and motor development (Murray, Fiori-Cowley, Hooper, & Cooper, 1996a; Sharp et al., 1995). Also, there are some data to suggest that elevated rates of maternal depression during the toddler years may be more predictive of later child adjustment problems than when assessed in the preschool period. For example, Shaw and colleagues (2000) found a direct link between maternal depressive symptoms when children were 1.5 and 2 years of age and clinically-elevated reports of school-based conduct problems (CP) when children were age 8 ($d = .73$ at age 1.5), associations that were appreciably stronger than parent reports of CP at ages 1.5 and 2. In addition, the magnitude of effects of maternal depression on age-8 CP decreased with the child's increasing age ($d = .27$ when maternal depression was measured at age 5.5). As evidence links maternal depression during early childhood to subsequent child problem behavior, it follows that targeting changes in maternal depression during the toddler period might lead to reductions in later child problem behavior.

The Toddler Years as a Period of Transition for Children and Parents

The concept of socio-emotional transitions has been a focus for developmental and interventions scientists, as critical periods to understand, and possible opportunities for prevention (Sameroff, 1981; Cicchetti & Toth, 1995). The toddler period is one such

developmentally critical transition for both parents and children. The toddler years represent a time of marked change for children in terms of cognitive, emotional, and physical maturation. Despite growth in all of these areas, children's developing cognitive abilities are not well matched to the challenges afforded by their newfound physical mobility. Their new mobility permits children to ambulate quickly but without the cognitive appreciation to anticipate the consequences of violating other's personal space, understanding the principles of electricity or gravity, or considering the potential hazards of straying too far from caregivers in novel settings (e.g., shopping malls). Thus, toddlers require proactive involvement and monitoring to literally keep them out of harm's way (Gardner, Sonuga-Barke & Sayal, 1999). For parents dealing with this transformation (Shaw, Bell, & Gilliom, 2000), the nature of the parent-child relationship changes from a focus on responsivity and sensitivity to the immobile infant's emotional needs to monitoring a mobile and naive toddler. As a result, parental pleasure in childrearing has been shown to decrease from the first to second years (Fagot & Kavanagh, 1993). Previous research suggests that how caregivers respond to these changes and how involved they are during this period has been shown to have important repercussions for early CP (Gardner et al., 1999; Shaw et al., 2000; 2003), as the course of CP has been shown to be moderated by controlling, uninvolved, and rejecting parenting (Aguilar et al., 2000; Campbell et al., 1996). As noted above, similar associations have been found between maternal depression and subsequent child CP, and several studies have explicitly attempted to address post-partum maternal depression during infancy in the hopes of improving the quality of the parent-child relationship (e.g., Murray, Cooper, Wilson, & Romaniuk, 2003).

It would seem prudent to design interventions that address these unique demands as a preventive strategy to reduce child mental health problems such as CP and internalizing

symptoms. Examples of successful preventive interventions that target early childhood include Olds' (2002) Nurse-Family Partnership for first-time parents with newborns, Webster-Stratton's Incredible Years Program (Baydar et al., 2003) for children approaching formal school entry, and Dishion's Family Check Up (FCU, Shaw et al., 2006), which has also been previously applied to adolescent populations (Dishion & Kavanagh, 2003). To date, few interventions initiated in early childhood have specifically examined whether reductions in maternal depressive symptoms are a potential mechanism underlying improvements in early child problem behavior. Where such changes substantially account for the intervention effect, then maternal depression would qualify as a mediating mechanism (Kraemer, Wilson, Fairburn, & Agras, 2002; Rutter, 2005). To fill this void, the purpose of the current study was to examine the efficacy of a family-centered intervention in improving maternal depression and test whether such changes if found, accounted for reductions in both child externalizing and internalizing problem behaviors. Although the study was designed to specifically target child CP, we also tested the same issues with child internalizing problems to evaluate the generalizability of the intervention's effects. To assess the viability of this approach, we selected 731 families with toddlers participating in Women, Infants and Children Nutritional Supplement Program (WIC) service systems in urban (Pittsburgh, PA), suburban (Eugene, OR), and rural (Charlottesville, VA) locations. Toddlers were screened to be at risk for showing early-starting pathways of CP and those meeting eligibility requirement were subsequently randomly assigned to the intervention condition. Follow-up results on maternal depression and child CP and internalizing problems were available one and two years after initial contact.

Barriers to Family Interventions and the Family Check Up

One of the barriers to implementing family interventions within service settings is parent

motivation (Dishion & Stormshak, 2006). Many of the efficacy and effectiveness trials that form the backbone of our empirical literature are based on high levels of funding for both the research component and the families' participation. For example, Dishion and colleagues developed the Adolescent Transitions Program (ATP), which comprised 12 parent group sessions that emphasized family management practices. Within the context of a clinical trial, the intervention reduced observed coercive parent-adolescent interactions, decreased antisocial behavior and subsequent substance use (Dishion, Andrews, Kavanagh, & Soberman, 1996). However, in implementing the program outside the context of a well funded intervention trial, parent participation was difficult to obtain, and dependence on parent groups as the *exclusive* delivery format deemed impractical. Stormshak and colleagues (2002) also report difficulty relying exclusively on parent groups with a set format and agenda as a barrier to changing parenting practices.

The problem is that many of our family-centered interventions do not explicitly target the parents' motivation to change. Parent resistance to change has been programmatically studied by investigators who study parent management training (e.g., Patterson & Chamberlain, 1994; Patterson & Forgatch, 1985). Forgatch and colleagues (2006) found that training therapists to effectively address families' resistance to change was prognostic of positive intervention outcomes (Forgatch, DeGarmo et al., 2005). In general, therapist training in developing collaborative relationships with parents and working through motivation issues in therapy is a key to the change of parenting practices. This is even true when parents voluntarily come to the treatment settings and request help, such as in the studies of parent management training.

Miller and colleagues have developed the technique of motivational interviewing to encapsulate the therapist-client dynamics that are most likely to result in productive change. For

example, in the field of alcohol misuse, The Drinkers Check Up is a direct application of motivational interviewing designed to promote change in adults who drink heavily (Miller & Rollnick, 2002). Two of the key strategies of the Drinker's Check Up are to use assessment data in a feedback interview to elicit interactions between the client and therapist that influence change, and provide a flexible menu of change strategies for the client to select to achieve reductions in drinking. Several studies reveal that random assignment to the brief Drinkers Check Up was as effective as 28 days of costly inpatient treatment for reducing problem drinking in adults (Miller & Rollnick, 2002).

The Family Check Up (FCU) was directly inspired by the work of Miller and colleagues on motivational interviewing. The FCU is a brief intervention that contains a broad assessment of the family context and parenting practices, an initial get-to-know-you meeting with the family, and a formal feedback session. We see the FCU as the foundation of an ecological approach to child and family interventions, the first step in a menu of empirically-supported child and family interventions that reduce problem behavior and promote emotional well being in children and families. In contrast to the standard clinical model, the ecological approach is seen as a health maintenance model, which explicitly promotes periodic contact with families (at a minimum yearly) over the course of key developmental transitions. The current study focuses primarily on the FCU for families and toddlers at-risk for early CP engaged in the WIC service system.

Previous research with the FCU involved random assignment of young adolescents in public middle schools to a family resource room in contrast to a 'middle school as usual' control condition. The family resource rooms were staffed by trained personnel focused on engaging families in the FCU and a variety of other linked family interventions (see Dishion & Kavanagh, 2003). Using an intention to treat design, the authors found that proactive parent engagement

reduced substance use among high-risk adolescents, and prevented substance use among typically developing youth (Dishion, Kavanagh, Schneiger, Nelson, & Kaufman, 2002). Significant reductions in these problem behaviors resulted from, on average, six direct contact meetings with parents over the course of three years. Complier Average Causal Effect models support the notion that the FCU was the key intervention strategy, and that receipt of the FCU and linked services as needed lead to significant long-term reductions in substance use and antisocial behavior, including decreased substance use diagnoses and fewer arrests by the end of high school (Connell, Dishion, Yasui, & Kavanagh, in press).

We have previously applied the Family Check Up to high risk families of toddlers involved in WIC, a national program for nutrition support for income eligible families with children ages 0 to 5. Randomly assigning 120 families of toddlers to WIC as usual, versus WIC with a Family Check Up at age 2 was found to result in reductions in problem behavior and improvement in parent involvement at ages 3 and 4, respectively (Shaw et al., 2006). In addition, intervention effects were evident for those families with a risk profile for early-starting CP, including above-average levels of maternal depressive symptoms and child fearlessness. Those families assigned to the intervention group with this risk profile showed a sharp decline on child CP between ages 2 and 4 compared to families in the control group with same risk profile at age 2.

This previous study of the FCU with families of toddlers was limited by a small sample size, the use of only male children recruited from an urban community, and the extent of intervention services offered to the families. The current study, which we refer to as the Early Steps Multisite Study (ESMS), remedies these three limitations and provides a broader perspective on possible mediating mechanisms of change. First, the sample size includes 731 at-risk families, half of whom were randomly assigned to the Eco FIT, versus WIC as usual. The

families were recruited from three geographically and culturally unique regions, including metropolitan Pittsburgh, Pennsylvania suburban Eugene, Oregon, and rural Charlottesville, Virginia. The sample also reflects cultural diversity, including African American, European American, and Latino families. In addition, we utilized the entire Eco FIT model, in that families were provided additional services following the Family Check Up, consistent with an adaptive, tailored approach to intervention. Extending an earlier report on the ESMS that demonstrated the FCU to be associated with improvements in child CP and positive parenting (Dishion et al., 2007), the current study tests whether the intervention was also successful in reducing levels of maternal depressive symptoms and child internalizing problems, and whether changes in maternal depression mediated reductions in child CP and internalizing symptoms.

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, Oregon, and within and outside the town of Charlottesville, VA (Dishion et al., 2007). Families were approached at WIC sites and invited to participate if they had a son or daughter between 2 years 0 months and 2 years 11 months of age, 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 one standard deviation above normative averages on several screening measures within the following three domains: (a) child behavior (conduct problems, high-conflict relationships with adults), (b) family problems (maternal depression, daily parenting challenges, substance use problems, teen parent status), and (c) socio-demographic risk (low education achievement and low family income using WIC criterion). Two

or more of the three risk factors were required for inclusion in the sample.

As can be seen in Figure 1 and partitioned by site in Table 1, of the 1666 parents who were approached at WIC sites across the three study sites and had children in the appropriate age range, 879 families met the eligibility requirements (52% in Pittsburgh, 57% in Eugene, 49% in Charlottesville) and 731 (83.2%) agreed to participate (88% in Pittsburgh, 84% in Eugene, 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 site, and 188 (26%) in Charlottesville. More participants were recruited in Pittsburgh and Eugene because of the larger population of eligible families in these regions relative to Charlottesville. Across sites, the children were reported to belong to the following racial groups: 27.9% African American (AA), 50.1% European American (EA), 13.0% biracial, and 8.9% other races (e.g. American Indian, Native Hawaiian). In terms of ethnicity, 13.4% of the sample reported being Hispanic American (HA). During the period of screening from 2002 to 2003, 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 GED equivalency, and an additional 32% had one to two years of post-high school training.

Retention: Of the 731 families who initially participated, 659 (89.9%) were available at the one-year follow-up and 619 (84.7%) participated at the two-year follow-up when children were between 4 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 ages 3 ($n = 40$ and $n = 32$, respectively) and 4 ($n = 58$ and $n = 53$, respectively).

Measures

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

Center for Epidemiological Studies on Depression Scale (CES-D). The CES-D (Radloff, 1977) is a well-established and widely used 20-item measure of depressive symptomatology that was administered to mothers at the age 2 and 3 home assessments. Participants report how frequently they have experienced a list of depressive symptoms during the past week on a scale ranging from 0 (less than a 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 age 2 and 3 assessments.

Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). The CBCL for Ages 1.5-5 is a 99-item questionnaire that assesses behavioral problems in young children. Mothers completed the CBCL at the ages 2, 3, and 4 visits. The CBCL has two broad-band factors, Internalizing and Externalizing that were used to evaluate the frequency of problem behavior during the study period, for which intervention effects of the Externalizing factor have been previously been reported elsewhere (Dishion et al., 2007). Internal consistencies for Externalizing were .86, .89, and .86 at ages 2, 3, and 4, respectively. For Internalizing, internal consistencies were .82, .86, and .91 at ages 2, 3, and 4, respectively.

Eyberg Child Behavior Inventory. This 36-item behavior checklist also was administered at

the ages 2, 3, and 4 assessments (Robinson et al., 1980). The Eyberg includes two factors that focus on the perceived intensity and degree the behavior is a problem for caregivers. As the Intensity factor is similar in content and structure to the CBCL Externalizing factor, for the current study we focused on the Problem factor, which asks caregivers to report on the extent the behavior is a problem for the parent using a seven-point scale. 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 show high test-retest reliability (.86) and internal consistency (.98) (Webster-Stratton, 1985). In the current study, internal consistencies for the Problem factor were .84, .90, and .94 at ages 2, 3, and 4, respectively.

Assessment Protocol. Parents (i.e., mothers and, if available, alternative caregivers such as fathers or grandmothers) who agreed to participate in the study were then scheduled for a 2.5-hour home visit. Each assessment began by introducing children to an assortment of age-appropriate toys and having them play for 15 minutes while the mothers completed questionnaires. After the free play (15 minutes), which began with the child being approached by an adult stranger (i.e., undergraduate filmer), each primary caregiver and child participated in a clean-up task (5 minutes), followed by a delay of gratification task (5 minutes), four teaching tasks (3 minutes each with the last task being completed by alternate caregiver and child), a second free play (4 minutes), a second clean-up task (4 minutes), the presentation of two inhibition-inducing toys (2 minutes each), and a meal preparation and lunch task (20 minutes). The exact home visit and observation protocol was repeated at ages 3 and 4 for both the control and intervention group.

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 for their time. The randomization sequence was computer-generated by a member of staff who was not involved with recruitment. Randomization was balanced on gender to assure an equal number of males and females in the control and intervention sub-sample. To ensure blindness, 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 the family's assigned condition.

For purposes of the present study, only maternal reports of child problem behavior were used from the age 3 and 4 assessments, with maternal reports of depression being used from the age 3 assessment.

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 purposes of research studies only, the sequence of contacts was an assessment (baseline), randomization, an initial interview, a Feedback session, and possibly follow-up sessions. Families were given a gift certificate of \$25 for completing the FCU at the end of the feedback session, which could be used at local supermarkets or video stores.

Thus, the initial meeting was an assessment conducted with research staff, as described

above, where 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. During this home assessment, staff also completed ratings of parent involvement and supervision. The second session was a "get-to-know-you" (GTKY) meeting with the parent consultant, during which time she 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, where the parent consultant summarized the results of the assessment using motivational interviewing strategies. Caregivers were provided with feedback on their own adjustment, the marriage (if married), the child's behavior, and their parenting practices. Norms are integral to the feedback process, with strengths defined as contextual and/or parenting practices in the normative range, and family issues that 'need attention' being scores that were statistically in the clinical range. For example, a CES-D score of 16 and above (Radloff 1977), would suggest that the parent's level of depressed mood was clinically significant, and could require attention.

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. At the Feedback, the parent was offered follow-up sessions that were focused on parenting practices, other family management issues (e.g., co-parenting), 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 with previous experience in carrying out family-based interventions, but at the study's outset modest experience in using the

FCU. Parent consultants were initially trained for 2.5-3 months using a combination of strategies, including didactic instruction, and role-playing, followed up 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 in turn were certified by Dr. Dishion. Certification was established by reviewing videotapes of feedback and follow-up intervention sessions to evaluate whether parent consultants were competent in all critical components of the intervention as described below. This process is repeated yearly to reduce drift from the intervention model following the methods of Forgatch, Patterson et al. (2005), in which it was found that direct observations of therapist fidelity to parent management training predicted change in parenting practices and child behavior. In addition, cross-site case conferences were convened on a weekly basis using videoconferencing to further enhance fidelity. Finally, annual Parent Consultant meetings were held to update training, discuss possible changes in the intervention model, and to address special intervention issues reflected by the needs of families across sites.

Of the families assigned to the intervention condition, 77.9% participated in the GTKY and feedback sessions at age 2, 65.4% at age 3, and 65.3% at age 4 (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 ($SD = 2.84$) at age 2 and 2.83 ($SD = 2.70$) at age 3, including the GTKY and Feedback as two of those sessions. We also tested whether the number of sessions parents had with parent consultants was related to CBCL Externalizing and Internalizing or Eyberg Problem factor scores at ages 3 or 4, examining correlations between number of sessions at age 2 in reference to maternal reports of problem behavior at age 3, and number of sessions at age 3 in relation to reports of problem behaviors at age 4. In previous research using the FCU with

toddlers, no associations between intervention sessions and later problem behavior were found (Shaw et al., 2006). In the current analyses, initial correlations revealed a pattern of modest *positive* associations between number of sessions and later problem behavior. At age 3, correlations with all three child outcomes were nonsignificant trends (all three $r_s = .10, p < .10$). In relation to the number of sessions at age 3, correlations with age 4 child behavior also were positive, ranging from $r = .086$ (*ns*) for CBCL Externalizing, $r = .093$ ($p < .10$) for Eyberg Problem, and $r = .126$ ($p < .05$) for CBCL Internalizing. However, when initial levels of child problem behavior were accounted for using partial correlations, none of the six correlations remained statistically reliable (i.e., all with p -levels $> .10$, except for age 4 Internalizing, for which $p < .10$), consistent with the notion that number of sessions was related to levels of initial parent concern about child behavior. For all analyses below, we use an intention to treat design, including the 22.1% of families in the intervention group who did not take part in the FCU.

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 Eyberg Problem factors, mean scores were approximately one standard deviation above normative scores at age 2, with CBCL Internalizing scores approximately .6 standard deviations above the normative average. Using the borderline clinical cutoff of the 90th percentile for the CBCL, 48.6 and 38.6% of children were reported to have clinically-elevated scores on the Externalizing and Internalizing factors at age 2. In both cases, this percentage was reduced over time to 23-24% at

age 4. At age 2, 41.5% of mothers reported clinically meaningful levels of depressive symptoms using the cutoff score of 16.

Correlations for all variables from age 2 to 4 are shown in Table 3. Importantly, no significant associations were found between intervention group and child gender or ethnicity, or 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 between maternal depression and factors of child problem behavior concurrently and over time, and among different factors of child problem behavior.

The central analyses in this paper examined three major issues. The first involved testing whether intervention effects were evident in the growth of internalizing symptoms. We also report on previously reported intervention effects for growth in child externalizing symptoms and externalizing problems being a problem for mothers (see Dishion et al., 2007) to be used in later new analyses involving maternal depression as a potential mediator of intervention effects. A second goal was to examine whether random assignment to the FCU was associated with reductions in maternal depressive symptoms from ages 2 to 3. A third and final goal was to explore whether reductions in different factors of child problem behavior from ages 2 to 4 were mediated by reductions in maternal depressive symptoms from ages 2 to 3. Using M-Plus, all analyses used full information maximum likelihood estimation (Muthen & Muthen, 2004), which provides a method for accommodating missing data by estimating each parameter using all available data for that specific parameter. After initial models were computed, each was recomputed to see whether model fit was improved by adding child gender or ethnicity.

Intervention Effects on Child Problem Behavior

Our first goal was to examine whether the intervention was successful in reducing child

problem behavior between the ages of 2 and 4. As reported previously (Dishion et al., 2007), model for the CBCL Externalizing provided excellent fit to the data (χ^2 [df = 3] = 6.01, $p = .11$; CFI = .99; RMSEA = .04; 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; $\beta = -.12$). The results indicated that relative to children in the control group, children in the intervention group showed a significantly sharper decrease in Externalizing symptoms from ages 2 to 4.

The model for CBCL Internalizing also provided an excellent fit to the data (χ^2 [df = 3] = 1.42, $p = .70$; CFI = 1.00; RMSEA = .00; SRMR = .01). The model yielded significant intercept (estimate = 12.45, SE = .24) and slope values (estimate = -.57, SE = .18), as well as significant residual variance in the intercept (estimate = 35.28, SE = 2.14) and slope parameters (estimate = 7.10, SE = 1.35). The effect of intervention on the rate of change in problem behavior was significant (estimate = -.58, SE = .24; $\beta = -.11$). Similar to the pattern found for Externalizing, children in the intervention group were reported to demonstrate a significantly higher rate of decline than control children from ages 2 to 4.

The model for the Eyberg Problem also provided an excellent fit to the data (χ^2 [df = 3] = .52, $p = .91$; CFI = 1.00; RMSEA = .00; SRMR = .001). As reported elsewhere (Dishion et al., 2007), the model yielded significant intercept (estimate = 14.22, SE = .24) and slope values (estimate = .49, SE = .24), as well as significant residual variance in the intercept (estimate = 23.70, SE = 3.33) and slope parameters (estimate = 12.75, SE = 1.93). The effect of intervention on the rate of change in problem behavior was significant (estimate = -.71, SE = .32; $\beta = -.10$).

The results mirrored those found for the two CBCL factors, with perceptions of problem behavior remaining stable for those in the intervention group, but problem behavior increasing for mothers in the control group.

All models were re-computed including child gender (0 = female, 1 = male) and ethnicity (0 = Caucasian, 1 = ethnic minority) as control variables. The intervention effect remained significant in all analyses, and excellent model fit was retained.

Intervention Effects on Maternal Depression

Our second goal was to test whether the intervention was associated with a reduction in levels of maternal depressive symptoms for mothers in the intervention group relative to controls between ages 2 and 3, controlling for age 2 depressive symptoms. A two-wave autoregressive model was computed to examine the effect of intervention on age 3 maternal depressive symptoms, controlling for age 2 symptoms. This model provided excellent fit to the data (χ^2 [df = 1] = .23, $p = .63$; CFI = 1.00; RMSEA = .00; SRMR = .01). Age 3 maternal depressive symptoms were significantly predicted by intervention (estimate = -1.95, SE = .78; $\beta = -.09$), and by age 2 maternal symptoms (estimate = .44, SE = .04; $\beta = .42$). Mothers in the intervention group reported a significantly greater decrease in depressive symptoms than control mothers. Results were unchanged adding child gender and ethnicity as covariates.

Mediation Effects of Maternal Depression

Mediator analyses examined the indirect effect of intervention on the rate of change in problem behaviors through the effect of intervention on maternal symptoms at age 3. For ease of interpretation, these results are shown in Figures 2, 3, and 4. In all models, the slope of problem behaviors was regressed on age 3 maternal depressive symptoms and intervention status, while maternal symptoms at age 3 were regressed on intervention status and maternal symptoms at age

2. Thus, this model tests whether intervention is related to the change in maternal symptoms from age 2 to 3, and whether this change in maternal symptoms, in turn, predicts the rate of change in child behavior problems from age 2 to 4, controlling for the direct effect of intervention. A statistical test of the significance of the indirect effect (i.e., the mediation effect) from intervention to the change in maternal symptoms to the rate of change in problem behavior was examined. Standard errors for indirect effects were calculated using the Delta method described by MacKinnon and colleagues (2002, 2004).

As shown in Figure 2, the model for CBCL Externalizing provided reasonable fit to the data by most indices of model fit (χ^2 [df = 10] = 39.48, $p < .05$; CFI = .97; RMSEA = .06; SRMR = .04), and the non-significant 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 symptoms included in the model, indication that maternal depression mediated the effect of intervention on CBCL Externalizing. Intervention significantly predicted reductions in maternal symptoms from age 2 to 3. Higher maternal depressive symptoms predicted greater growth in problem behavior (conversely, lower symptoms were related to less growth in problem behavior). The mediation effect from intervention to reduced maternal symptoms to lower growth in problem behavior was statistically significant, although small in magnitude.

Similar results were obtained for the CBCL Internalizing (see Figure 3). The model for Internalizing provided reasonable fit to the data by most indices of model fit (χ^2 [df = 10] = 39.13, $p < .05$; CFI = .98; RMSEA = .06; SRMR = .03). In this model, the direct effect of intervention on the internalizing slope was not significant with maternal symptoms included in the model, indication that maternal depression mediated the effect of intervention on CBCL Internalizing. Intervention significantly predicted reductions in maternal symptoms from age 2 to

3. Higher maternal depressive symptoms predicted greater growth in internalizing problems (and lower symptoms were related to less growth in internalizing problems). The mediation effect from intervention to reduced maternal symptoms to lower growth in internalizing problems was statistically significant, although small in magnitude.

The model for the Eyberg Problem scale (see Figure 4) provided reasonable fit to the data by most indices of model fit (χ^2 [df = 10] = 43.26, $p < .05$; CFI = .95; RMSEA = .07; SRMR = .03). The non-significant chi-square may be related to the large sample size, as chi-square is sensitive to sample size. In this model, the direct effect of intervention on the problem behavior slope was not significant with maternal symptoms included in the model, again indication that maternal depression mediated the effect of intervention on the Eyberg Problem scale.

Intervention did significantly predict greater reductions in maternal symptoms from age 2 to 3. Higher maternal depressive symptoms predicted greater growth in problem behavior (conversely, lower symptoms were related to less growth in problem behavior). The mediation effect from intervention to reduced maternal symptoms to lower growth in problem behavior was statistically significant, although small in magnitude.

Discussion

Three major issues were addressed in the current paper. The first involved corroborating that intervention effects were evident in the reduced growth of child CP *and* internalizing symptoms as a result of random assignment to the FCU, as well as perceptions of externalizing problems being a problem for mothers. Corroborating and extending the recent findings of Dishion and colleagues (2007), we found that the FCU was related to reduced growth in child internalizing symptoms in addition to the previously found reduction in child CP and perception of CP being a problem. A second goal was to examine whether random assignment to the FCU

was associated with reductions in maternal depressive symptoms from ages 2 to 3. In line with predictions, mothers who received intervention reported reductions in depression across ages 2 to 3, relative to mothers in the control group. A third and final goal was to examine whether reductions in child CP and internalizing problems from ages 2 to 4 were mediated by reductions in maternal depressive symptoms from ages 2 to 3. In fact, for all three child problem behaviors, including CP and internalizing symptoms as well as perceptions of CP being a problem, direct effects between intervention status and child problem behavior from ages 2 to 4 were mediated by changes in maternal depression from ages 2 to 3.

The current findings corroborate and expand upon results from the broader literature on the effectiveness of preventive interventions aimed at reducing child CP in early childhood (Baydar, Reid, & Webster-Stratton, 2003, Olds, 2002), demonstrating that the intervention is also effective in reducing maternal perceptions of internalizing symptoms. The findings also provide additional support for the effectiveness of the FCU in general (Connell et al., in press; Connell, Dishion, & Deater-Deckard, 2006) and its application to high-risk families during the toddler period in particular. Previously, we had found that that one dose of the FCU was successful in reducing subsequent child CP and improving positive parenting and parental involvement with a smaller sample of toddler-age boys from an urban community (Gardner et al., in press; Shaw et al., 2006). However, no between-group differences were found with respect to maternal depressive symptoms in the earlier study, suggesting that repeated contact with families at age 3 might have facilitated this new change. In addition, the previous application of the FCU found no intervention effects for child internalizing symptoms, also suggesting the potential benefit of repeated, albeit relatively brief, contact with families.

Accounting for Change in Maternal Depression

One of the most interesting findings of the study was that the FCU was associated with improvements in maternal depressive symptoms even though for most families maternal depression was not listed as a primary goal by parents or a topic that was explicitly addressed by parent consultants. The finding of a relatively brief intervention focusing on motivation to change having significant effects is consistent with the general literature on motivational interviewing (Miller & Rollnick, 2003). Caregivers were given feedback on their levels of depression, and goals related to improving depression were labeled as ‘self care’. It was rare, however, that parent consultants provided direct treatment for depression. An analysis of the first 235 of 360 intervention families revealed that the broad category of ‘parent self care’ was the sixth most endorsed goal (24.3%), falling behind others such as child problem behavior (50.2%), discipline strategies (31.9%), and family self sufficiency (30.2%, Schlatter et al., 2005). In addition to including maternal depression, parent self care also included issues such as ‘finding time for me to relax’ and ‘doing more things as my own;’ thus, it is likely that those interested in working on improving depressive symptoms were considerably less than 24% of mothers. Despite the fact that relatively few mothers’ depressive symptoms were treated directly, there are at least three possible explanations to account for how reductions in symptoms of maternal depression occurred.

One possible explanation is that changes in depression were attributable to changes parents made in caregiving practices, specifically positive parenting. In fact, DeGarmo and colleagues (2004) found results consistent with the notion that improvements in parenting skills preceded improvements in child antisocial behavior, which in turn preceded later reductions in maternal depressive symptoms. Using the current sample, we found that improvements in child CP from 2 to 4 were accounted for by improvements in positive parenting in the intervention

group (Dishion et al, 2007). However, follow-up analyses revealed that positive parenting and maternal depression were only modestly correlated at ages 2 and 3, although intervention predicted changes in each domain from age 2 to 3. Further, positive parenting and maternal depression each made independent contributions to the slope of problem behavior from ages 2 to 4. The low correlation between positive parenting and depression at age 2 and 3 and the extent that changes in both contributed to changes in child behavior suggests heterogeneity in family risk profiles, with a significant number of caregivers with parenting skills but stressful lives that exacerbate depression. Perhaps some depressed mothers were empowered by positive feedback and support on their parenting strengths, which buttressed their motivation to continue parenting and improved their mood. Future analyses will focus on exploring heterogeneity and the possibility of feedback loops between maternal depression and growth in parenting practices as children mature, especially for children that demand more active and attentive parenting (Shaw et al., 2004).

A second possible explanation is that changes in maternal depression were related to more nonspecific factors within the parent-parent consultant relationship, including such factors as trust, having a confidant to talk to (even if this contact does not occur often), and access to an expert to discuss the challenges of raising a toddler. For example, in the re-analysis of the NIMH depression trial it was found that therapeutic content (e.g., interpersonal versus cognitive behavioral) accounted for a miniscule amount of variation in outcome. However, nonspecific therapist factors accounted for substantial (12%) amount of variation in the outcomes (Wampold, 2001). Cumulatively these nonspecific therapist factors may have resulted in improving maternal depressed mood. In addition, parent consultants were available to provide assistance to mothers who suffered short-term crises (e.g., a fire burning down their residence, lack of food, no money

to pay for electricity), or long-term challenges in living (e.g., recent immigrants' familiarity with English and American culture, moving out of project neighborhoods, isolation for rural families, spousal abuse). As families were screened on the basis of multiple socioeconomic, family, and child risk during a development period known to be challenging even for parents with greater economic and family resources (Fagot & Kavanagh, 1993), it seems probable that having repeated contact with someone in the community to help navigate these challenges may have lessened initial levels of depression, which at baseline averaged above the clinical cutoff on the CES-D for both control and intervention families. In this sense, the parent consultant is seen as a support influence that would minimize the experience of stress and concomitant depression.

The fact that an intervention targeting parenting results in changes in depression is not surprising. There is large body of evidence demonstrating associations between maternal depression and multiple forms of child problem behavior (Cummings et al., 2005, Farmer et al., 2002; Gelfand & Teti, 2002; Leve et al., 2005). However, few intervention studies have documented that modifying maternal depressive symptoms accounts for intervention effects on child problem behavior (Patterson et al., 2004). We see this finding as supportive of an ecological approach to family intervention and treatment (Dishion & Stormshak, 2007), in that change of context can address multiple family mental health problems that tend to be etiologically linked and clustered (e.g., maternal depression, child problem behavior). Thus a family centered intervention may benefit multiple family members in very different ways. In this sense, it may be better to take a family-centered approach to the treatment of common adult mental health problems, especially when factors such as depression are embedded within a relationship and/or family context.

These findings also suggest the need to more explicitly focus on factors such as caregiver

mood and affect within the context of interventions designed to reduce problem behavior, or prevent future problem behavior. The current results suggest that developers of early intervention programs may want to explicitly focus on maternal depression as a target of change, particularly procedures with a proven track record of success in reducing depressive symptomatology (e.g., cognitive behavior therapy, interpersonal therapy).

Limitations

The study has a few methodological limitations that merit consideration. First and foremost is the issue of potential reporter bias. There is consistent evidence in the literature that mothers with elevated levels of depressive symptoms show a tendency to report higher levels of children's problem behavior (Fergusson, Lynskey, & Horwood, 1993). As mothers reported on both depressive symptoms and children's CP and internalizing problem behavior, reductions in maternal depressive symptoms that appeared to be a function of randomization to the intervention group may have also amplified group differences in problem behavior and maternal perceptions of the severity of CP (i.e., Eyberg Problem factor). On the one hand, it is possible that group differences are partially responsible for perceived changes in child problem behavior. However, Dishion and colleagues (2007) recently found that observed parenting behaviors predicted improvements in mother-rated behavior problems in this sample, supporting the notion that mother reported problems relate to independently observed parenting behavior in the predicted manner in this study. In addition, the results are consistent with previous research indicating that elevated levels of depressive symptoms during the toddler period are related to *teacher* reports of low-income children's CP during middle childhood (Shaw et al., 2000), suggesting that the modification of maternal depression may be related to reduced CP at school during middle childhood. Future planned assessments that include teacher and after-care

provider reports will shed light on whether improvements in problem behavior are limited to maternal perceptions and the home environment, as well as time.

Second, although we presented evidence to suggest that the FCU is associated with improvements in child problem behavior and maternal depressive symptoms, effect sizes, albeit meaningful from a public health perspective, were relatively modest (d 's ranged from .14 to .19). Further refinement of the FCU will be needed to increase its efficacy for more families.

Implications and Future Directions

The current findings corroborate previous evidence that longitudinal changes in child disruptive behavior can be achieved with a brief family-based intervention for toddlers, and that such change appeared to be mediated by improving positive parenting practices. This was achieved using an existing, nationally-available, service delivery setting with 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 (Haines et al., 2002). Future follow-up of the present cohort should clarify issues regarding the intervention's endurance and generalizability to other contexts.

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Table 1: Recruitment descriptives by project site.

	Project Site			
	Pittsburgh	Eugene	Charlottesville	Total Sample
Recruitment				
Screened	n = 596	n = 565	n = 505	N = 1666
Qualified	n = 309	n = 323	n = 247	N = 879
Participated	n = 272	n = 271	n = 188	N = 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 = 28.3 (<i>SD</i> = 3.49)	M = 28.5 (<i>SD</i> = 2.91)	M = 27.7 (<i>SD</i> = 3.43)	M = 28.2 (<i>SD</i> = 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 = 4.4 (<i>SD</i> = 1.55)	M = 4.5 (<i>SD</i> = 1.67)	M = 4.6 (<i>SD</i> = 1.66)	M = 4.5 (<i>SD</i> = 1.63)
Education				
High school diploma	42.5%	39.5%	40.0%	41.0%
1 to 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

	Mean	Std. Deviation	Total N	N (%) in clinical range
Maternal depressive symptoms, Age 2	16.75	10.66	729	303 (41.5%)
Maternal depressive symptoms, Age 3	15.43	10.98	651	257 (35.2%)
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%)
Externalizing behavior (T-score), Age 2	59.49	8.21	730	355 (48.6%)
Externalizing behavior (T-score), Age 3	55.97	9.39	651	224 (30.6%)
Externalizing behavior (T-score), Age 4	53.66	10.47	619	175 (23.9%)
Internalizing behavior (T-score), Age 2	56.32	8.53	730	282 (38.6%)
Internalizing behavior (T-score), Age 3	54.30	9.61	651	203 (27.8%)
Internalizing behavior (T-score), Age 4	53.25	10.09	619	170 (23.3%)

Table 3: Correlations among study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Treatment group	--												
2. Child Gender	-.01	--											
3. Child Ethnicity	.01	-.05	--										
4. Maternal CES-D, Age 2	.02	.04	.01	--									
5. Maternal CES-D, Age 3	-.08	-.06	-.01	.42*	--								
6. Eyberg Problem, Age 2	-.01	.00	.03	.13*	.12*	--							
7. Eyberg Problem, Age 3	-.04	.07	-.04	.20*	.37*	.43*	--						
8. Eyberg Problem, Age 4	-.09*	.05	-.04	.17*	.28*	.35*	.65*	--					
9. Externalizing Age 2	.02	.06	-.03	.16*	.23*	.37*	.43*	.37*	--				
10. Externalizing Age 3	-.02	.08*	-.03	.26*	.40*	.29*	.66*	.53*	.59*	--			
11. Externalizing Age 4	-.10*	.09*	-.02	.20*	.33*	.24*	.51*	.69*	.49*	.69*	--		
12. Internalizing Age 2	.03	-.04	.12*	.25*	.24*	.18*	.22*	.18*	.52*	.37*	.29*	--	
13. Internalizing Age 3	-.01	-.06	.08	.29*	.40*	.14*	.39*	.34*	.34*	.59*	.47*	.63*	--
14. Internalizing Age 4	-.08*	-.02	.06	.21*	.33*	.10*	.30*	.47*	.29*	.44*	.65*	.50*	.67*

* $p < .05$

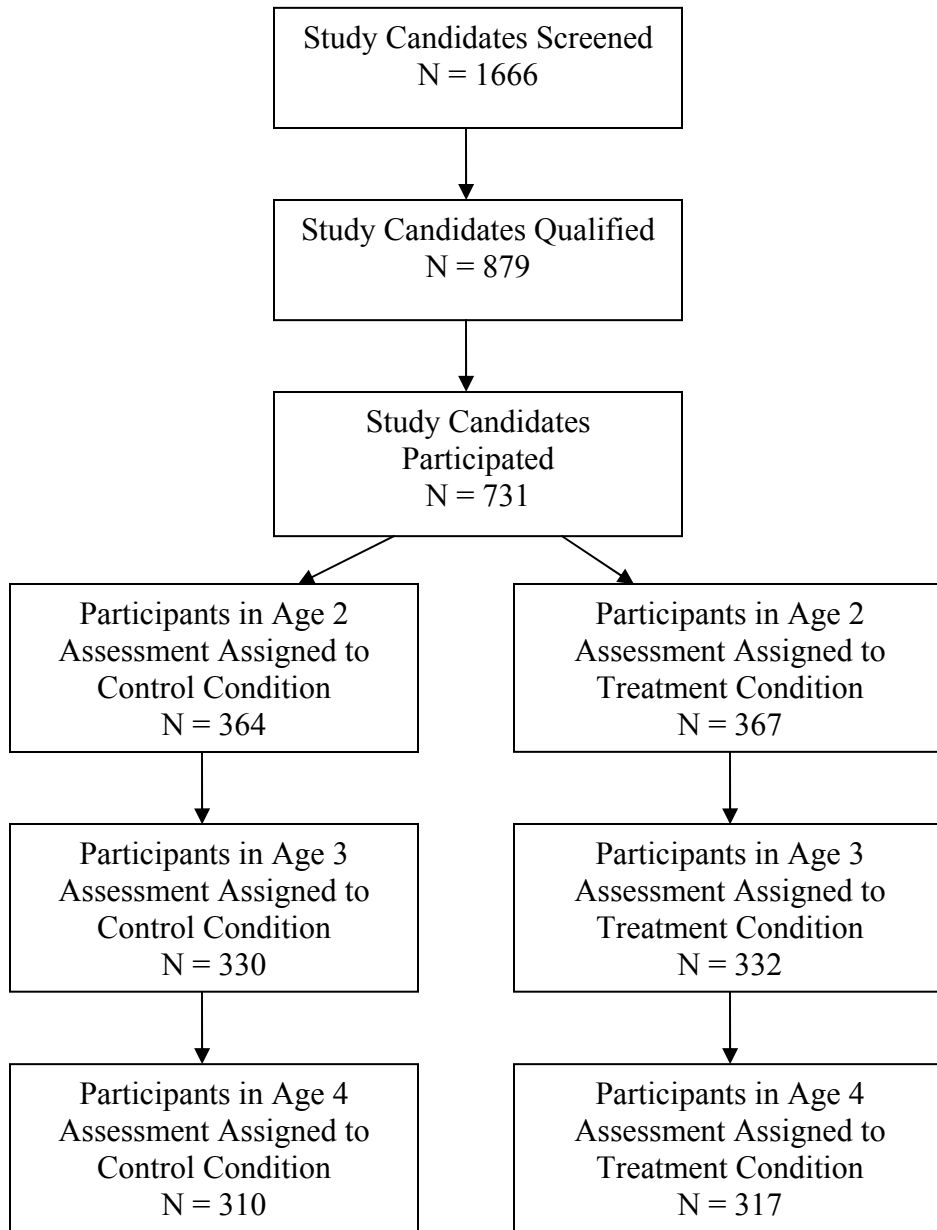
Figures

Figure 1: Participant Flow Chart

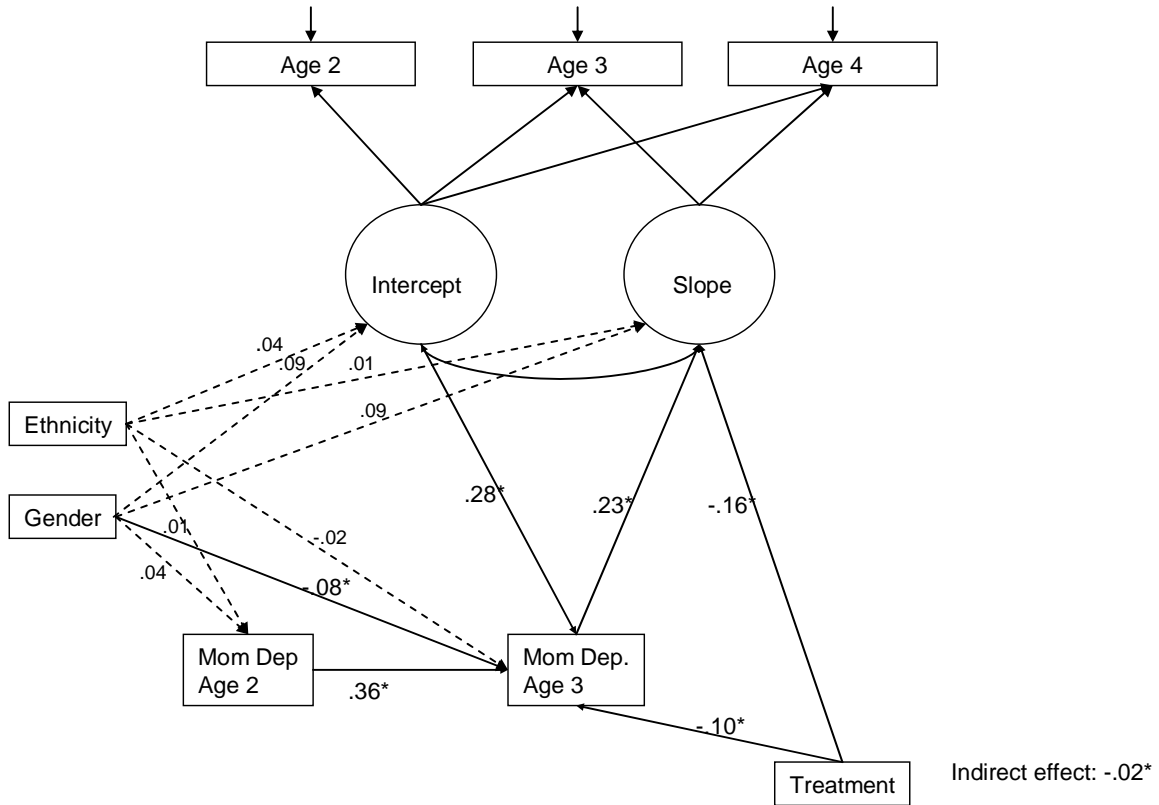
Figure 2: Mediation model for externalizing

Figure 3: Mediation model for internalizing

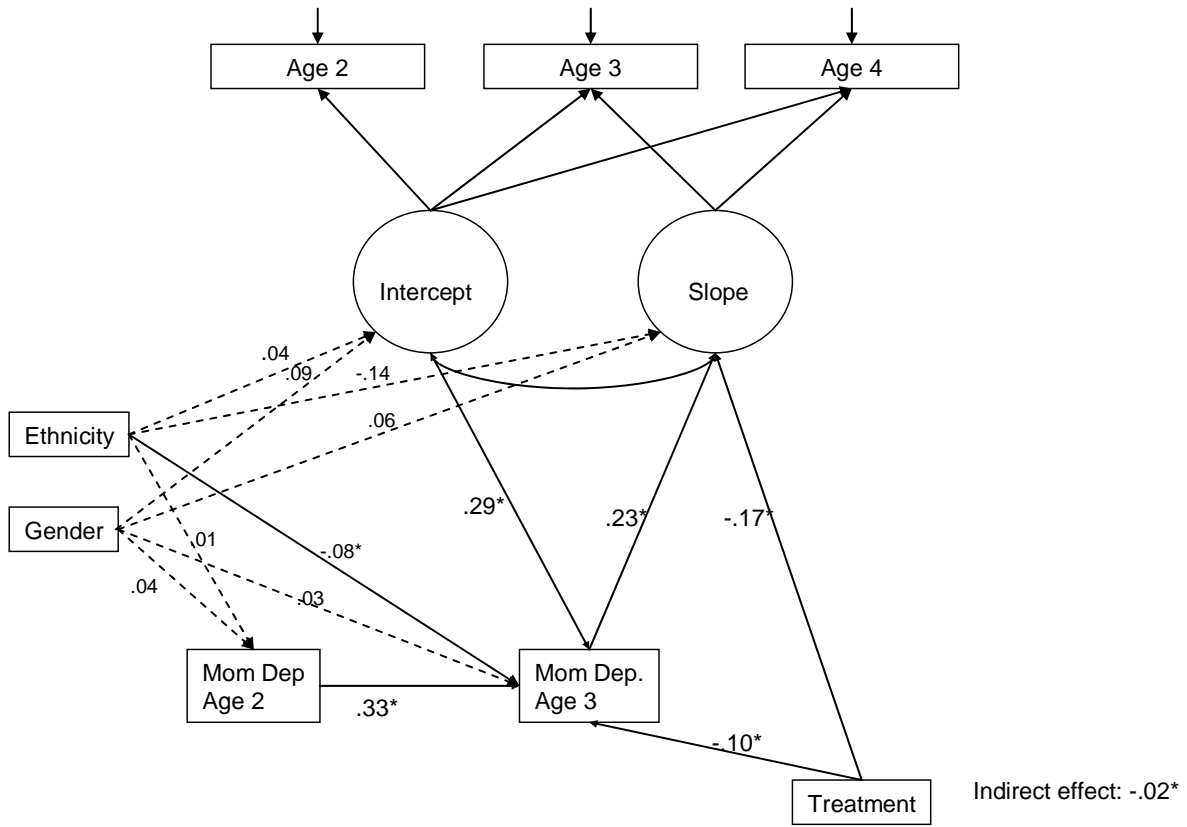
Figure 4: Mediation model for Eyberg Problem Behavior



Mediation Model: CBCL Externalizing



Mediation Model: CBCL Internalizing



Mediation Model: Eyberg Problem Behavior

