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Randomized prevention trial for early conduct problems:
effects on proactive parenting and links to toddler disruptive behavior.

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Author note.
This research was supported by grants MH06291 from the National Institute of Mental Health and DA016110 from the National Institute on Drug Abuse, awarded to the first three authors.

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Abstract

Despite knowledge of early pathways to conduct problems, few preventive interventions are specifically designed to modify disruptive behavior in toddlerhood. One potential prevention target is proactive and positive parenting, which is associated with reduced risk of conduct problems in preschoolers. This randomized trial with 120 low-income two-year-old boys examines whether a brief family-centered intervention that reduces disruptive behavior (Shaw et al., 2006), also leads to increases in proactive and positive parenting. It also explores whether change in parenting predicts change in disruptive behavior. At age 3, proactive and positive parenting skills increased in the intervention group. Change in proactive and positive parenting from age 2-3 correlated with change in child disruptive behavior, although the mediation effect of positive parenting was only of borderline significance. Findings suggest that even within a brief and multifaceted preventive intervention, change in proactive parenting skills contributes modestly but significantly to change in child problem behavior.

Keywords:
conduct problems, disruptive behavior, randomized prevention trial, proactive / positive parenting, positive, early childhood.
Randomized prevention trial for early conduct problems: effects on proactive parenting and links to toddler disruptive behavior.

There is much evidence to show that early-starting disruptive behavior places children at risk for conduct problems, chronic antisocial behavior and drug use (Shaw, Gilliom, Ingoldsby & Nagin, 2003, Moffit & Caspi, 2001). Developmental studies starting in early childhood suggest that family, child and social factors play a part in the genesis of these problems. Of potential causal factors, parenting skill is particularly significant, as it may mediate the effects of social conditions on child outcomes (Patterson, Reid & Dishion, 1992). Moreover, parenting is clearly modifiable (Gardner, Hutchings & Lane, 2004; Webster-Stratton, 2001), and contributes to change in later conduct problems (Campbell, Shaw & Gilliom, 2000; Gardner, Sonuga-Barke & Sayal, 1999).

A promising feature of some early prevention programs is their focus on periods of developmental transition. Transitions can be seen as stages when caregivers are likely to be motivated to address parenting issues, for example during adolescence when children may begin experimenting with risky behaviors. At these times, parents are particularly likely to be receptive to learning skills to deal with emerging challenges elicited by rapid change in development. Prime examples of capitalizing on transitions include Olds’ (2002) Nurse-Family Partnership which engages mothers during the transition to parenthood, in the first pregnancy and infancy, to promote maternal health and quality of parenting. Another is Dishion’s Adolescent Transitions Program, which uses the Family Check-Up (FCU, Dishion & Kavanagh, 2003). The focus of this paper is the transition to toddlerhood (Shaw, Bell & Gilliom, 2000) when the child develops more mobile, willful and unsafe behavior, whilst at the same time lacking skill to regulate emotions, to consider his own safety, or the needs of others. As a result
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this transition can set the stage for increased stress and conflict in the parent-child relationship, as the parent tries to set limits on oppositional behavior.

There is good evidence to show that parents’ skill at managing coercive interactions can influence the development of conduct problems (Shaw et al., 2000). This work has led to interventions for reducing negative and inconsistent parenting, and learning effective discipline (Patterson et al., 1992). However, there is a growing body of research showing the importance of early positive interactions between parent and child (Denham et al., 2000). Early observational work (Gardner, 1987) showed that in 3-4 year olds with early conduct problems, only 20% of the child’s time was spent in conflict with parents. We would expect the quality of positive interactions during the 80% of quieter time to have a preventive effect on conduct problems. This hypothesis has been tested in short-term longitudinal studies across the preschool years, in which early observed positive interactions predicted fewer conduct problems in high risk samples (Gardner, Ward, Burton & Wilson, 2003). It has also been tested in a longer-term study (Pettit, Bates & Dodge, 1997), where positive parenting measured by parent interview at age 5, was found to predict child academic outcomes at age 12, even after accounting for the effects of harsh parenting. Furthermore, positive parenting appeared to buffer the effects of family adversity on child externalizing outcomes. Finally, within intervention trials, positive parenting appears to have at least as powerful an effect on conduct problems as negative parenting (Gardner, Burton & Klimes, 2006; Martinez & Forgatch, 2001).

While overall positivity might be expected to influence the course of development generally across infancy and early childhood, retaining a positive stance may become a greater challenge during the toddler transition. At this stage, parents’ ability to take active steps to minimize the child’s boredom or exposure to forbidden situations may prevent oppositional
behavior from arising. Parents may achieve this through developing anticipatory awareness of what the child may do next, and employing strategies such as structuring the child’s time carefully, and taking preventive action in troublesome situations, to minimize conflict.

There is growing evidence from experimental and longitudinal studies that parents’ use of ‘proactive’ strategies can prevent problem behavior in the short and longer-term (Denham et al., 2000; Gardner et al., 1999). Holden’s elegant work showed how mothers’ efforts to structure the child’s activities in ‘high-risk’ settings had immediate effects on child misbehavior (Holden & West, 1989). Others have examined effects of proactive parenting over somewhat longer time periods. Gardner et al. (2003) found parents who frequently initiated joint play had fewer child conduct problems one year later, after controlling for other predictors of outcome. In another observational study (Gardner et al., 1999), parents’ use of strategies that were timed so as to potentially ‘pre-empt’ trouble, predicted improvement in immediate compliance, as well as in conduct problems two years later. In both studies, frequency of negative parenting did not predict worsening of conduct problems over time. Furthermore, early proactive parenting may be a precursor to critical later parenting behaviors, such as monitoring. Dishion and McMahon (1998) suggest that planning and scaffolding the young child’s activities, and paying close attention to their needs, will show continuities with later ability to monitor the child’s behavior in the community; this was borne out in an interview study (Pettit, Laird, Dodge, Bates & Criss, 2001).

Given that proactive and positive parenting strategies appear to be important for preventing early conduct problems, it makes sense to teach these skills as part of a broader parenting intervention. If such teaching is successful, we would expect to see changes in proactive and positive parenting following intervention. Furthermore, if these factors are indeed
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important in development and prevention of conduct problems, then we would expect change in child problem behavior over time to be partially accounted for by changes in positive parenting.

We explored these issues in the context of an early family-based prevention trial. Although the focus of the present paper is on proactive and positive parenting, much literature has focused on the longitudinal effects of early harsh parenting on child problem behavior (Patterson et al., 1992; Shaw et al., 2003). Therefore, to test for specificity of effects of positive parenting, we accounted for the effects of negative parenting on later child conduct problems.

The Early Steps trial (Shaw, Dishion, Supplee, Gardner & Arnds, 2006) is a randomized trial of a brief family-centered intervention, aimed at very early prevention of conduct problems through enhancing parenting skills. It focuses on low-income families with toddlers, screened for risk factors for later conduct problems. It draws extensively on developmental knowledge of risk factors for early-starter conduct problems, including continuities between toddler disruptive behavior and later conduct problems (Gardner et al., 1999; Moffit & Caspi, 2001; Shaw et al., 2000, 2003). Engaging high-risk families in preventive interventions poses many challenges, stemming from their multiple problems and from the fact that they have not requested help. Thus an important feature of the intervention, Dishion & Kavanagh’s (2003) Family Check-Up, is the use of Motivational Interviewing (Miller & Rollnick, 2002) techniques to enhance engagement and motivation for change in parenting. Initial findings (Shaw et al., 2006) show intervention effects on age 3 disruptive behavior by parent report (CBCL-Destructive), including stronger effects for those at higher risk for conduct problems.

Given these promising preventive effects on toddler problem behavior, the next step is to examine firstly, whether directly observed proactive and positive parenting change following intervention, and secondly, to explore whether change in proactive and positive parenting
predicts change in disruptive behavior, even within a multifaceted intervention. Where such changes substantially account for the intervention effect, then parenting would qualify as a mediating mechanism (Kraemer, Wilson, Fairburn, & Agras, 2002; Rutter, 2005). On the other hand, within the context of an intervention with broad goals, such as the Family Check-Up, which focuses on parenting but also deals with wider family issues that impinge on parenting (e.g., parent well-being, partner relation, child care), we did not necessarily expect proactive parenting to mediate the association between treatment and child outcomes. However, in line with other longitudinal and intervention studies, we expected changes in proactive and positive parenting to contribute to the prediction of later child conduct problems. This study extends previous work addressing the role of positive parenting in the context of longitudinal studies on toddlers (Denham et al., 2000; Gardner et al., 1999), and intervention studies with older children (Gardner et al., 2006; Martinez & Forgatch, 2001) showing mediation effects of positive parenting. This extension examines low-income, urban boys at high risk for conduct problems beginning at an earlier age than previous studies. Both observed parenting and parent-reported child problem behavior were assessed at age 2 and 3, allowing us to test the following questions:

i) Does a brief parenting-focused intervention in low income toddlers at high risk for conduct problems lead to increases in positive and proactive parenting from age two to three?

ii) Given this intervention leads to decreases in the primary outcome, disruptive behavior (Shaw et al., 2006), to what extent do changes in proactive and positive parenting contribute to change in child disruptive behavior from age two to three, independent of effects of negative parenting?

Method

This paper conforms to CONSORT guidelines for reporting randomized controlled trials.

Ethical approval was granted by the Institutional Review Board at the authors’ institutions.
Participants

Participants (Figure 1) included 120 mother-son dyads recruited in 2001 from Women, Infants and Children (WIC) Nutritional Supplement Program sites in metropolitan Pittsburgh, PA. The decision to include only boys was based on our greater knowledge about their risk factors for early development of conduct problems. Sample size was based on power analyses from previous research showing detectable moderate intervention and mediation effects with 100 high-risk families (Dishion, Nelson & Kavanagh, 2003). Families were invited to participate if they had a son 17 to 27 months old, following a screen to ensure they met study criteria by having socioeconomic, family, and/or child risk for conduct problems. Two or more of the three risk factors were required for inclusion in the sample (see ‘Recruitment’ below). Of 327 mothers approached, 271 (83%) agreed to participate in the initial screen. Of these families, 124 met eligibility requirements and 120 (97%) agreed to participate. Table 1 shows demographic characteristics of the sample, which did not differ by treatment allocation. Over half were single parents, and about half were African-American. Of 120 families who initially participated, 112 (93.3%) were assessed one year later. There were no differences between those retained (n = 112) and those lost to follow up (n = 8) on SES and child behavior measures.

Recruitment. Mothers were approached at eight WIC sites and asked if they would be willing to complete questionnaires about the “Terrible Two’s”. These focused on child disruptive behavior, parenting stress and depression and took 20 minutes to complete. Participants received $10 for their assistance. Due to their participation in WIC, all families would be considered low income; therefore study inclusion was based on meeting additional criteria in 2 of the following 3 areas: socio-demographic, family and child risk. Socio-demographic risk was defined as low maternal education level; family risk as maternal
depression, mother teen pregnancy or substance abuse; and child risk as child externalizing behavior. If risk criterion was attained for only SES and family risk, mothers were also required to rate the child above the normative mean on the Eyberg Behavior Inventory to increase the probability that parents would desire assistance in this area. Families who met these criteria were contacted about participating in a more intensive study, where half would have the opportunity to participate in a home-based intervention (see Figure 1, participant flow chart).

**Procedures**

Families who met eligibility requirements and gave written informed consent participated in a 2.5-hour home visit. The first part consisted of video-recorded observation tasks, described below under ‘Measures’. For the remainder of the visit, mothers completed further questionnaires. They received $100 for participating. Approximately twelve months later, around the third birthday, families in both conditions participated in follow-up visits. These were very similar in structure and measures to the initial home visit.

**Randomization**

The randomization sequence was computer-generated by a staff member not involved with recruitment. No methods were used for restricting randomization. To ensure blindness, the examiner opened a sealed envelope revealing assignment only after all assessments were completed, and shared this information with the family. Families assigned to intervention were then scheduled to meet with a therapist for two or more sessions. Examiners conducting follow-up assessments were unaware of families’ allocation.

**Intervention Protocol: Family Check-Up (FCU)**

Families allocated to control and intervention groups participated in the same research assessments. Those in the control condition received WIC food vouchers but no intervention
from therapists. Families allocated to intervention were offered the FCU following the research assessment at home. The FCU is a brief intervention designed to motivate parents to engage in positive, proactive parenting practices (Dishion & Kavanagh, 2003). The intervention involves the use of Motivational Interviewing, a therapeutic technique that addresses the client’s ambivalence about change (Miller & Rollnick, 2002), modeled after the Drinkers’ Check-Up. Motivation is also addressed by sharing assessment results with parents, and discussing parenting and child behavior relative to norms and parent expectations.

In the present study, the initial meeting was a home assessment conducted by research staff, as described above, which included observation tasks and questionnaires. Although information from this session fed into the therapy, it did not count as one of the intervention sessions. The second session was a “get-to-know-you” (GTKY) meeting, the first one with the therapist, to explore parent concerns relevant to child well-being. The third meeting was a feedback session, where the therapist systematically summarized the results of the baseline assessment, using Motivational Interviewing strategies. At the feedback, parents were offered a maximum of six follow-up sessions focused on parenting practices and other contextual issues (e.g., child care, marital adjustment, housing). Families were paid $25 for completing the feedback session, but were not paid for other intervention sessions.

Two Master’s-level therapists were trained and supervised weekly by the second and third authors. Videotaped sessions were used for supervision, both face-to-face and by video-conference. Therapists followed a written manual, and used Dishion and Patterson’s (1996) book to guide parenting support. Of families assigned to the treatment condition, 55 of 60 (92%) participated in the GTKY and feedback session. Of those who met with a therapist, mean number of sessions face-to-face sessions per family was 3.26 (range 2-8; $SD = 2.3$, including
GTKY and feedback as two of those sessions but not including initial assessment. Eleven families attended three sessions. The number, spacing and delivery mode (e.g. home visits, phone calls) of therapy sessions was guided by parent preference, and ranged from weekly face-to-face, to monthly by phone. Sessions typically lasted one hour for in vivo meetings and 20-30 minutes for phone calls.

Measures

Demographics. This mother-reported measure asked about family structure, parental education, income, criminality and stressors.

Parent-child interaction at home. This was video-recorded for 50 minutes during six structured settings: free-play while mother fills in questionnaires (20 minutes), clean-up (5 minutes), delayed gratification (6 minutes), two inhibition-inducing toys (4 minutes), meal preparation, and lunch (10 minutes each). Settings were designed to be semi-natural, and to sample different everyday home situations (Gardner, 2000). All settings allow parents to use skills they may have learned for preventing and dealing with child behavior. Some settings bring the potential for mild conflict to arise (meal-time, clean-up), including tasks when mother is busy and the child may become bored (meal preparation, free play, delay of gratification). The 30 minutes of ‘mother busy’ tasks are an important feature of the observational method, as they allow assessment of proactive strategies mothers use to structure the child’s time when he might otherwise be bored, including making suggestions to the child about activities he can do (Gardner et al., 1999, 2003).

Observations were coded from videotape onto paper coding sheets according to a manualized coding system measuring parent-child interactions, validated in earlier cross-sectional (Gardner, 1987; 1994), short-term longitudinal (Gardner et al., 1999, 2003) and
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intervention (Gardner et al., 2006) studies with similar samples of parents of young children at risk for conduct problems. These studies all showed predictions from positive parenting to child conduct problems. Proactive and positive, as well as negative parenting strategies were assessed using a range of event-coded categories. To avoid multiple comparisons, molecular event codes were collapsed into two macro-codes, proactive / positive and negative strategies, by summing the frequencies of negatively- and positively-themed event codes across all tasks.

**Positive and proactive parenting.** This macro-code included suggesting constructive activities to the child; use of positive discipline strategies (including bargain, reward, playful strategies); pre-emptive use of these strategies (defined as using strategies prior to any child misbehavior; Gardner et al., 1999); and praise.

**Negative parenting.** This macro-code included criticize, threaten, sarcasm, and yelling. Hitting was too rare for inclusion.

Reliability checks were conducted on 25% of families, at age 2 and 3, by trained, independent observers, blind to treatment allocation and behavior scores. Intra-class correlations calculated between observers were $r = .84$ for the macro-code proactive/ positive parenting; $r = .95$ for the macro-code negative parenting. Coders were two graduate research assistants, unconnected with the intervention team and with many years experience of observation coding.

**Child Behavior Checklist 2/3 (CBCL; Achenbach, 1992).** The CBCL 2-3 was the primary outcome measure for the trial, reported elsewhere (Shaw et al., 2006). This 100-item parent questionnaire assesses behavioral problems, using two broad-band factors, Internalizing and Externalizing, and narrow-band factors, including Destructive and Aggressive behavior. As we were interested in examining whether specific types of externalizing clusters were amenable to intervention, we focused on the two narrow-band factors from the 2/3 version: Destructive
and Aggression. As only destructive behavior changed following treatment, we analyze mediation in relation to this outcome.

**Analysis strategy**

Intervention and control groups were compared on a conservative Intention-to-Treat basis, using \( t \)-tests on pre-post change scores, from age 2 to 3. This meant that all available families were included in analysis of change, irrespective of level of uptake of intervention, including those who received no sessions (Altman et al., 2001). Using change scores ensures that baseline levels of parenting and child outcome variables are controlled for in the analysis. All change scores were calculated by simple subtraction, such that a higher change score represents greater improvement in the desired therapeutic direction. Pearson’s correlations were used for initial exploration of relationships between change in positive and negative parenting and change in child outcome. Multiple linear regression was used to investigate contribution of positive and negative parenting to child destructive behavior, described below. Two-tailed tests were used in the regression analyses; however, given the specific, theoretically-derived directional hypotheses about proactive and positive parenting, one-tailed \( t \)-tests were used for the initial group comparisons.

**Results**

*Change in parenting and child behavior following intervention*

Table 2 shows proactive / positive and negative parenting variables by group allocation, pre- and post-intervention. As would be expected following randomization, treatment and control groups were broadly similar at baseline on these variables, with no significant
differences by group. However, given some minor variation in parenting by group at baseline, it was appropriate to analyze data by change scores, to account for baseline differences.

The developmental trend across time was for maternal proactive / positive and negative strategies to increase between age 2 and 3. However, t-tests showed that the intervention group gained more in proactive and positive parenting between 2 and 3, compared to the control group ($p = .037$). Observed negative parenting did not change as a result of the intervention.

*Predicting change in child behavior from change in parenting (Figure 2)*

Bivariate correlations showed that increases in proactive and positive parenting strategies from age 2 to 3 predicted improvement in CBCL Destructive scale scores across the same period ($r = .21, p = .015$). Change in negative parenting did not predict change in child Destructive ($r = .06, p = .57$). Next we explored whether the contribution of proactive and positive parenting to change in child behavior is specifically associated with treatment, or whether it is simply a general predictor, irrespective of treatment status. We first examined intercorrelations between proactive parenting, child destructive behavior and intervention status. Figure 2 shows that all three variables are intercorrelated; treatment status is related to change in proactive parenting ($r = .18, p = .037$) and change in CBCL Destructive ($r = .26, p = .004$); change in proactive parenting is related to improvement in CBCL Destructive ($r = .21, p = .015$). Secondly, multiple linear regression was employed, with change in CBCL Destructive score serving as the DV. IVs were entered as follows: Step 1, treatment status (i.e. intervention vs. control group), Step 2, change in proactive parenting. In Step 3, change in negative parenting was also entered as a further test for any possible contribution of negative parenting. Table 3 shows that in Step 1 a treatment effect was found on destructive behavior, and, in Step 2, that this treatment effect was somewhat attenuated when proactive and positive parenting was
introduced as a potential mediating variable. Negative parenting in Step 3 did not contribute to
the overall prediction of child outcome. We tested the strength of the mediation effect of
proactive / positive parenting using MacKinnon, Fritz, Williams & Lockwood’s (2006)
PRODCLIN, a test recommended for small samples. This showed that proactive parenting did
not significantly mediate treatment effects, although there was a suggestion of a trend in that
direction ($p = .07$). Instead, it appears that change in proactive and positive parenting is
associated with change in child outcome in both intervention and control groups. In order to
investigate further the issue of direction of influence, which was hypothesized to be primarily
from parent to child, we examined associations over time in the reverse direction, namely from
child behavior at 2 to parenting at 3. There was no association between child destructive
behavior at 2, and negative or positive parenting at 3, providing no evidence for a simple child
effects model.

Discussion

The findings suggest that the Family Check-Up intervention in early childhood resulted
in increases in proactive and positive parenting in low-income families with toddlers at risk for
conduct problems. This is in addition to reductions in child destructive behavior shown by Shaw
et al. (2006). Using an intention-to-treat analysis, we found improvements from age 2-3 in
proactive and positive parenting, which, although modest, were significantly greater in those
families randomized to intervention compared to control. Moreover, from age 2-3 across the
whole sample, change in parenting predicted change in child destructive behavior.

Firstly, the findings show promising changes in proactive and positive parenting skills,
following a brief family-centered intervention. Few intervention trials have examined effects on
these aspects of parenting. Importantly, parenting measures were based on direct observations of
behavior in the home, and validated in earlier naturalistic longitudinal studies. This impact on positive parenting occurred despite the intervention’s brevity, and although many parents chose to work on parenting, proactive and positive parenting was only part of the intervention’s focus.

Secondly, the finding that positive parenting predicts child destructive behavior, independent of the predictive effects of negative parenting, is important for advancing understanding of the very early development of problem behavior in toddlers. It extends the findings of earlier longitudinal and intervention studies (Denham et al., 2000; Gardner et al., 1999; 2003; 2006) to a younger and carefully defined risk group in the context of a prevention trial. However, as there was only a trend towards positive parenting mediating the treatment effect, it appears most likely that the current finding represents a general effect of positive parenting on the development of problem behavior, rather than a specific treatment effect. In other words and as found in other non-intervention studies (Gardner et al., 1999; 2003), this association appeared not to result entirely from intervention status, but to indicate a process operating in both treatment and control groups. It is important of course, to be cautious about imputing causality in a multifaceted experimental intervention study. Although the study design involved experimental manipulation of a brief parenting intervention, proactive parenting per se was not the independent variable. However, the fact that proactive parenting predicted outcome over time, independent of negative parenting, and that prediction in the reverse direction did not hold, implies a possible causal role for parenting. Although in reality, some of the influence must be bi-directional, these data suggest that the pathway from parent to child is the stronger one.

Although proactive parenting did not fully account for the connection between intervention and outcome, this is not entirely surprising given the multifaceted nature of the
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intervention, which is significantly shaped by parent need and preference. This means that many parents chose to work on issues other than parenting, to learn about different aspects of parenting, or chose only very brief engagement, making it harder to detect treatment mediating mechanisms common to the group. Thus it may be that other, more individually-specific mechanisms also contributed to the treatment changes seen. Interestingly, there was no association between number of treatment sessions and child outcome, a finding that is consistent with the tenets of motivational interviewing which place responsibility for change upon the client’s motivation for modifying their own behavior (Miller & Rollnick, 2002). Alternatively, it is also possible that the modest sample size may have precluded detection of a mediation effect, an issue we are currently investigating in a larger trial of the Family Check Up.

The lack of change in negative parenting, and the fact that it made no independent contribution to outcome, indicates that it could not account for change in child behavior outcomes. It suggests that positive parenting exerts effects that are independent of negative parenting, something that others have argued is vital to test. Otherwise it might simply be that high levels of positive parenting reflect mere absence of negative parenting (Patterson et al., 1992; Pettit et al., 1997). Although this is not the main purpose of the paper, it is worth exploring possible reasons why negative parenting did not change. First, we know from the work of Tremblay et al. (1999), and others, that aggressive toddler behavior decreases with maturity, presumably as a function of socialization. Thus negative exchanges may be more normative at two, and only come to reflect more entrenched, damaging cycles of coercive interaction when the child is older. A second factor that might explain lack of change in negative parenting is the modest dose of intervention received by the families. It is plausible that negative interaction patterns are more enduring, driven by negative emotion, and therefore,
require structured and persistent interventions to change. Future research should test this hypothesis by providing more structured follow-up interventions that focus on reducing negative parenting.

The study has a number of strengths. The Early Steps trial is novel in attempting to carry out a brief home-based preventive intervention with 2-year-olds at high-risk for conduct problems. The intervention is theory-driven, developmentally sensitive, and attempts to address some of the challenges in engaging diverse, low-income families who may be understandably suspicious about services, or who lack optimism about change. The Family Check-Up addresses this by home visiting, by focusing directly on parents’ motivation to change, and by tailoring intervention goals, content and delivery to match parents’ needs, using a menu-based approach. The study used a carefully defined high-risk group, based on best current knowledge from longitudinal research on early-starter pathways (Shaw et al., 2000). Detailed observations of parenting were employed for measuring parenting outcomes and their relationship to child behavior. However, to avoid method overlap (Rutter, 2005), parent-report measures were used to assess outcome, bringing the advantage that these are entirely independent from the observational measures of parenting. Innovative settings for observation at home were employed, which allow measurement of proactive strategies, yet are sufficiently natural to have good ecological validity. Coding was carried out by trained observers who were blind to treatment status and other information about families. Sample retention was good, and those lost to follow up did not differ from those retained.

Limitations of the study are that the follow-up is relatively brief to date; we were only able to code parenting at age 2 and 3. Ideally there would be data from three time points, in order to draw stronger conclusions about direction of change. The size of the sample, the
variance in destructive behavior accounted for by the intervention and by positive parenting, although modest, are promising for a prevention trial with very hard-to-reach families, many of whom opted to take part only in a very brief intervention, which did not allow detailed coverage of many aspects of parenting. Although WIC services cover every US state and serve a high proportion of low-income families, it is not known if the findings are generalizable to other contexts, such as non-WIC families, or to girls. However, these limitations are being addressed in a larger multi-site trial which includes girls, and greater regional and ethnic diversity.

The findings have two main sets of implications. Firstly, they suggest that a brief, theory-driven intervention can help to improve proactive parenting skill and reduce problem behavior, in families of toddlers at risk for emerging conduct problems. In addition to teaching evidence-based parenting strategies, we suggest that a number of other factors central to the Family Check-Up model make a brief preventive intervention with multi-problem families likely to be successful. These include careful attention to parent motivation, and family-centered assessment and feedback, coupled with parent choice of intervention mode and content, and home-based location of therapy. In terms of parenting strategies learned during therapy, we would cautiously suggest that it is useful to include a specific focus on proactive strategies as part of a broader parenting intervention. Given that the findings are based on observational measures in the natural home environment, it is relatively straightforward to identify and provide feedback to parents on the strategies that appear to be effective in promoting child behavior change. Clearly for this modest trial to have policy implications, it requires replication.

However, given that the Early Steps intervention model is empirically supported, embedding the intervention in the context of the WIC service setting bodes well for future dissemination. The model fits within an ecological approach to mental health intervention
(Dishion & Stormshak, in press), whereby interventions are designed to fit within service settings that serve large numbers of families, especially those defined as high-risk. For example, schools are an excellent site for prevention programs because access to high-risk families is guaranteed, and the setting is one in which high-risk children are easily identified. Similarly, in the US, WIC sites are a nationally important service setting where dissemination of the Early Steps model could potentially reduce risk in a large population of high-risk families, and therefore, have a public health impact.

Secondly, the Early Steps trial provides opportunities to understand developmental and intervention mechanisms and test theory about origins of conduct problems. These findings present a picture consistent with predictions derived from longitudinal research. Thus, several observational studies show that, particularly in the early years, proactive and positive parenting is a significant, independent predictor of child problem behavior outcome (Gardner et al., 1999, 2003; Denham et al., 2000). The present findings, although modest in effect size, together with those from other intervention trials (Gardner et al., 2006) complement these studies of natural developmental change (Rutter, 2005). In combination they provide evidence that proactive and positive parenting may be an important mechanism in the genesis of conduct problems.
References


Table 1.

Participant characteristics at baseline, by treatment allocation

<table>
<thead>
<tr>
<th>Child, parent or family characteristic</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child age, months (SD)</td>
<td>23.7 (2.8)</td>
<td>23.5 (2.8)</td>
</tr>
<tr>
<td>Mother age, years (SD)</td>
<td>26.2 (5.8)</td>
<td>28.2 (6.4)</td>
</tr>
<tr>
<td>Annual family income, $000, (SD)</td>
<td>15.7 (9.9)</td>
<td>15.0 (7.6)</td>
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<tr>
<td>Mother Beck depression score</td>
<td>12.2 (10.6)</td>
<td>11.8 (7.8)</td>
</tr>
</tbody>
</table>

Child ethnicity (%)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>European-American</td>
<td>33</td>
<td>49</td>
</tr>
<tr>
<td>African-American</td>
<td>54</td>
<td>40</td>
</tr>
<tr>
<td>Mixed race</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Mother married or living with partner (%)</td>
<td>46</td>
<td>46</td>
</tr>
</tbody>
</table>

All group differences are non-significant.
Table 2.

**Intervention effects on observed positive and negative parenting, age 2-3**

<table>
<thead>
<tr>
<th>Observed Parentinga</th>
<th>Treatment Allocation</th>
<th>Age 2 Mean (SD)c</th>
<th>Age 3 Mean (SD)c</th>
<th>Mean change score, 2-3 (SD)</th>
<th>Difference between group means (SE) in change scoreb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proactive/Positive</td>
<td>Treatment</td>
<td>5.4 (4.2)</td>
<td>9.7 (7.3)</td>
<td>4.2 (7.0)</td>
<td>2.4 (1.3)</td>
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<tr>
<td></td>
<td>Control</td>
<td>6.0 (4.8)</td>
<td>8.0 (5.9)</td>
<td>1.8 (6.5)</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>Treatment</td>
<td>2.0 (2.8)</td>
<td>5.1 (5.6)</td>
<td>-3.2 (6.1)</td>
<td>-.97 (1.1)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>1.6 (2.2)</td>
<td>3.9 (5.6)</td>
<td>-2.2 (5.2)</td>
<td></td>
</tr>
</tbody>
</table>

| a N for observational analysis = 54 treatment; 52 control. |
| b p-value, 1-tailed t-test |
| c frequency range 0-37 for positive, 0-28 for negative parenting |
Table 3. *Regression predicting age 2-3 change in destructive behavior from treatment status and change in proactive / positive parenting.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>$F$ change</th>
<th>$B$</th>
<th>$SE B$</th>
<th>Beta</th>
<th>$t$, $p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2-tailed)</td>
</tr>
<tr>
<td>Step 1</td>
<td>.07</td>
<td>.07</td>
<td>7.4, $p = .008$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment vs control</td>
<td></td>
<td></td>
<td></td>
<td>1.8</td>
<td>.64</td>
<td>.26</td>
<td>2.7, $p = .008$</td>
</tr>
<tr>
<td>Step 2</td>
<td>.10</td>
<td>.03</td>
<td>3.4, $p = .07$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment vs control</td>
<td></td>
<td></td>
<td></td>
<td>1.6</td>
<td>.64</td>
<td>.24</td>
<td>2.4, $p = .016$</td>
</tr>
<tr>
<td>Change in proactive parenting</td>
<td></td>
<td></td>
<td></td>
<td>.09</td>
<td>.05</td>
<td>.18</td>
<td>1.8, $p = .07$</td>
</tr>
<tr>
<td>Step 3</td>
<td>.11</td>
<td>.01</td>
<td>1.1, $p = .29$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment vs control</td>
<td></td>
<td></td>
<td></td>
<td>1.6</td>
<td>.64</td>
<td>.24</td>
<td>2.5, $p = .015$</td>
</tr>
<tr>
<td>Change in proactive parenting</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
<td>.05</td>
<td>.20</td>
<td>2.0, $p = .046$</td>
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<tr>
<td>Change in negative parenting</td>
<td></td>
<td></td>
<td></td>
<td>.06</td>
<td>.06</td>
<td>.11</td>
<td>1.1, $p = .29$</td>
</tr>
</tbody>
</table>

Dependent Variable = change in CBCL Destructive behavior from age 2 - age 3
Figure captions

Figure 1. Participant flow chart

Figure 2. Associations between proactive parenting, child destructive behavior and treatment.
Early prevention of conduct problems

Toddlers Screened
(N=271)

Qualified
(N=124)

Randomized age 2
(N=120)

Control group
(N=60)

Treatment group
(N=60)

Completed treatment (N=55)
Non-completers (N=5)

Control group assessed at age 3 (N=55)
Complete observational data (N=52)

Treatment group assessed at age 3 (N=57)
Complete observational data (N=54)
Early prevention of conduct problems

Treatment vs control group

\[ r = .26, \ p = .004 \]
\[ n = 109 \]

Change in child destructive behavior

\[ r = .21, \ p = .015 \]
\[ n = 106 \]

Change in proactive / positive parenting

\[ r = .18, \ p = .037 \]
\[ n = 106 \]