

A growth curve analysis of parent training outcomes: examining the influence of child risk factors (inattention, impulsivity, and hyperactivity problems), parental and family risk factors

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Background: Parent training is one of the most effective treatments for young children with conduct problems. However, not every family benefits from this approach and approximately one-third of children remain in the clinical range at follow-up assessments. Little is known about factors affecting treatment outcome for young children. **Method:** Hierarchical linear modeling methods were used to examine the effects of child attentional risk factors (inattention, impulsivity and hyperactivity problems), parental and familial risk factors upon the efficacy of a parent training program to decrease boys' conduct problems. Mothers of 81 boys, four to seven years of age, exhibiting conduct problems attended a parent training program (The Incredible Years) which lasted 22 to 24 weeks. Treatment effectiveness was assessed at one month and one year post treatment by means of independent home observations, parent and teacher reports. **Results:** Results indicated significant decreases in observations of mothers' negative parenting interactions with their children and decreases in their conduct problems according to mother reports and independent observations at home. Boys with elevated ratings of attentional problems in addition to conduct problems showed similar benefits from the parent training program as the boys who did not have attentional problems. **Conclusion:** This study suggests that parent training is equally effective for boys with both conduct problems and attentional problems as it is for boys with conduct problems without these attentional problems. In fact, boys rated in the Borderline or Clinical range for attentional problems evidenced a greater decrease in externalizing behavior problems as rated by their mothers. Surprisingly, the predictor variables of depression, stress, and socioeconomic status were not significant contributors at either initial status or growth over time whether outcomes were measured by child conduct problems or parenting interactions. **Keywords:** ADD/ADHD, aggression, behavior problems, conduct disorder, parent training, parenting, risk factors. **Abbreviations:** ODD: Oppositional Defiant Disorder; CD: Conduct Disorder; PT: Parent Training.

Overall, parent training (PT) interventions for families with children with oppositional defiant disorder (ODD) or conduct disorder (CD) (referred to in this paper as conduct problems) have a long history of demonstrating improvements in children's behavior by strengthening parent skills (Taylor & Biglan, 1998). Recent literature reviews revealed that PT interventions for children with conduct problems have resulted in increased parental skill levels, more positive attitudes and significant decreases in children's conduct problems (e.g., Brestan & Eyberg, 1998; Kazdin & Kendall, 1998; Serketich & Dumas, 1996). These improvements, measured by parent reports and direct observations, have been sustained at one-month to three-year follow-up assessments (Webster-Stratton, 1990b). In addition, indirect benefits from PT interventions have been reported, such as a decrease in family conflicts (Dishion & Andrews, 1995), improvements in non-compliance rates of untreated siblings (Humphreys, Forehand, McMahon, & Roberts, 1978), and

decreases in parent depression and stress (Griest, Forehand, & Wells, 1981; Webster-Stratton & Hammond, 1990).

The ultimate purpose of PT is to reduce children's problem behavior by strengthening parent management skills. The rationale behind PT is rooted in the theory (Patterson, Reid, & Dishion, 1992) that conduct problem behaviors are unintentionally developed and maintained in the home through maladaptive parenting interactions. Underlying the PT perspective is the view that because parents are heavily involved in young children's social environment as primary social agents, parenting practices are critical components in shaping young children's behavior. It is theorized that reducing parents' coercive or negative parenting interactions will decrease children's conduct problems. This has clinical relevance because early onset conduct problems have been shown to be the single most important predictor of later development of delinquency, substance abuse and violence (Snyder, 2001).

Collectively, the research in the area of PT interventions with families of children with conduct problems appears convincing. Nonetheless, research has also documented that PT interventions are not successful with every family, especially in long-term follow-ups (for review, see Serketich & Dumas, 1996; Webster-Stratton & Hooven, 1998). Webster-Stratton, Hollinsworth, and Kolpacoff (1989), for example, indicated that at follow-up assessments approximately one-third of parents still reported their children's behavior to be in the clinical range of functioning with particular problems at school and with peers. The failure of PT programs with some families of children with conduct problems has been associated with several factors. These factors include parental factors, such as parental stress and depression (Griest et al., 1981; Webster-Stratton & Hammond, 1990) and family factors, such as socioeconomic disadvantage (Dumas & Wahler, 1983). Additionally, peer and child factors play a role in PT outcomes. Children with conduct problems frequently experience peer rejection and social isolation from their classmates (Coie, 1990). Their negative reputations can make it difficult for them to try out or maintain their newly learned skills. Research has indicated that children with more severe and pervasive conduct difficulties (home and school settings) have been less likely to make positive behavioral changes which generalize to school settings in response to PT interventions than children with less pervasive conduct difficulties (e.g., apparent in only one setting) (Ruma, Burke, & Thompson, 1996; Webster-Stratton, 1996). Researchers have further demonstrated that a significant portion of children with conduct problems also have attentional problems (defined here as inattention, impulsivity and hyperactivity) (Faraone, Biederman, Mennin, Russell, & Tsuang, 1998; Loeber, 1990; Moffitt, 1993). Evidence from the treatment literature with adolescents has suggested that the combination of conduct disorder and attention deficit hyperactivity disorder (ADHD) represents a particularly virulent condition and presents exceptional treatment problems (Abikoff & Klein, 1992; Dishion, McCord, & Poulin, 1999; Ruma et al., 1996). Adolescents with these combined disorders tend to display conduct problems at an earlier age, exhibit more extreme academic underachievement (see Hinshaw, 1992) and have increased rates of peer rejection (Hinshaw & Melnick, 1995). Furthermore, they are at increased risk for continued and serious antisocial behaviors (Hart, Lahey, Loeber, Applegate, & Frick, 1995; Moffitt, 1990; White et al., 1994). The increased treatment resistance in older probands with conduct disorders and ADHD results in part from these problems becoming embedded over time in a broader array of reinforcement systems including family, school, peer group and community (Lynam et al., 2000). However, despite growing recognition of the importance of early intervention to treat

ODD/CD in the early years (Brestan & Eyberg, 1998) and prevent the development of secondary risk factors, very little is known about how attentional problems affect treatment outcome for young children with conduct problems. This knowledge gap results in part from a failure of parent training treatment programs for young children with conduct problems to evaluate child factors related to treatment outcome. It also results from a scarcity of parent training treatment-outcome studies addressing ADHD in the preschool or early school age years (3–7 years). We hypothesized that parent training interventions might be more effective for young children with these problems than with adolescents because these children have not yet experienced the secondary risk factors such as school failure, social rejection and deviant peer groups as a result of their aversive behaviors. However, do young children with attentional problems in addition to conduct problems benefit from parent training as much as children with only conduct problems? In a review of all available peer-reviewed, control group treatment-outcome studies addressing ADHD in young children (7 years or younger) spanning the last three decades, only three studies emerged. These studies provided some preliminary support for this conjecture, indicating improvements following parent training in parent-child interactions (Pisterman et al., 1992) and in compliance in preschoolers with ADHD and in on-task behaviors during structured play (Sonuga-Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001). However, these studies with children with ADHD did not assess the impact of the interventions on development of ODD/CD. In a notable exception to this prevailing pattern, Barkely et al. (2000) recruited kindergartners with high levels of ADHD, ODD and CD behaviors and assigned them to classroom training, parent training, and a combined parent and classroom condition and a control group. In general, results indicated that parent treatment response was poor, although classroom intervention produced improvements in aggression, social skills and self-control. Unfortunately, in the parent training conditions, the null effects were probably attributable to lack of parental attendance as only 25% of the sample attended 4 of the 14 parent training sessions. Although classroom interventions are important, the broader literature on conduct problems suggests that effective interventions must include parental participation.

Webster-Stratton and colleagues, at the University of Washington Parenting Clinic, have provided specialized treatment for families with young children (ages 3–7 years) with conduct problems for the last two decades. In a recent investigation of empirically supported psychosocial interventions for children with conduct problems, Brestan & Eyberg (1998) found, of 82 interventions, that the parent program offered by Webster-Stratton met rigorous

standards that included participant, treatment, and methodological concerns. Studies of this PT program (known as The Incredible Years) have not previously evaluated the impact of child attentional factors on treatment outcome. The purpose of this study, therefore, was to select a previously described study of parents who participated in the PT condition and examine whether child attentional factors including inattention, impulsivity and hyperactive problems made a significant contribution in predicting PT outcomes over time. We hypothesized that when parental and familial factors were analyzed along with these child factors, the children with conduct problems who exhibited more difficulty with attentional problems would be less likely to respond to the PT intervention. We further hypothesized that families evidencing parental and familial factors of depression, stress, low socioeconomic status would also be less likely to respond to the PT intervention.

Method

This investigation represents a subset of families from a previously reported larger study comparing parent training to alternative treatments (child training alone and child training in combination with parent training) and an untreated control condition (Webster-Stratton & Hammond, 1997). In this analysis we included all the families from the study who had been consecutively referred and randomly assigned to the parent training condition (families in the child training condition and control condition were left out). We did not include the girls because the number was too small to permit meaningful analyses based on gender.

Participants

Criteria for study entry at that time were: (a) the child was between four and seven years of age; (b) the child had no debilitating physical impairment, intellectual impairment, or history of psychosis, and was not already receiving psychological treatment; (c) the primary referral problems were for conduct problems such as noncompliance, aggression, and oppositional behavior that continued for more than six months; (d) parents reported a clinically significant number of child behavior problems (more than two SDs above the mean) on the Eyberg Child Behavior Inventory (ECBI) (Robinson, Eyberg, & Ross, 1980); and (e) the child met the criteria for Oppositional Defiant Disorder (ODD) and/or Conduct Disorder (CD) in accordance with the Diagnostic and Statistical Manual, Third Edition, Revised (DSM-III-R) (APA, 1987) that was being used in 1991–1994 when these families were being admitted to this study.

A telephone screen identified children in the clinical range on the ECBI. These families were eligible for a 2–3 hour structured intake interview that was developed by our staff; diagnosis was made according to the DSM-III-R criteria for ODD and/or CD. Four highly trained

therapists conducted the interviews and all were videotaped for review. Random and regular review of approximately 15% of interviews indicated high reliability of the intake interview protocols.

Child participants. The study originally included 83 boys. However, two were dropped from this analysis due to insufficient data. The 81 boys included in the analyses had a mean age of 61.20 months ($SD = 12.91$). The percentage of children who were Caucasian was 88. Parents reported the average age of onset of conduct problems (CP) as 2.63 years ($SD = 1.38$).

Parent participants. Of the 81 mothers included in the study, 77% were partnered. Ninety-eight percent were Caucasian. The mothers' mean age was 34.73 ($SD = 6.33$). To determine mothers' level of education, a scale of 1 to 5 was derived where 1 = graduate school; 2 = 4 years of college; 3 = partial college; 4 = high school; 5 = partial high school. Their mean education level was partial college (2.69, $SD = 1.02$).

Outcome variables

Treatment outcome assessment was multifaceted and included three aspects: (a) mother reports of child conduct problems and independent observations of conduct problems at home; (b) teacher reports of child conduct problems at school; and (c) independent observations of parenting interactions with the child at home.

Conduct problems at home. Child behavior at home was assessed by means of mothers' reports on the widely used parent report form of the CBCL (Achenbach & Edelbrock, 1991). The Externalizing Scale was utilized in this study to reflect oppositional and aggressive behaviors such as arguing, fighting, showing off, irritability, and temper tantrums; intraclass correlations were .98 for parent agreement and .84 for test-retest reliability. In addition to parent reports of conduct problems, independent observations of child conduct problems in the home was obtained using the Dyadic Parent-Child Interactive Coding System-Revised (DPICS-R), a widely researched observational measure developed by Robinson and Eyberg (1981) and revised by Webster-Stratton (Webster-Stratton, 1989). To code the parent-child interactions, the DPICS-R uses 29 categories of parent and child behavior that are recorded every time they occur in a five-minute segment. For this study, the Total Child Deviance summary score was of interest because it represented a variety of conduct problems in young children (sum of the frequency of whine + yell + cry + physical negative behaviors + smart talk, noncompliance + destructive behaviors). Reliability was calculated in two ways: (a) The ratio of percent of disagreements to total number of agreements plus disagreements; and (b), Pearson product-moment correlations between rating for each separate behavior dimension. Interrater agreement ranged from 71% to 89%, and the product-moment correlations calculated between observers ranged from .80 to .95 for the child deviance variables.

Conduct problems at school. Child behavior at school was assessed by means of teacher reports on the Teacher Report Form (TRF; Achenbach, 1991). For this study we were interested in the Externalizing scale because it reflects conduct problems. The TRF includes many of the same items that parents identify on the CBCL and omits CBCL items teachers wouldn't ordinarily be able to identify and includes items identifiable only by teachers (e.g., talks out in class, disrupts, disobeys teacher etc.). This scale has been shown to have good validity, and test-retest reliabilities have ranged from .90 (1 week) to .74 (4 months).

Parenting interactions. Parenting interactions were observed at home using the DPICS-R coding system described above. From the DPICS-R, we were interested in a summary score to represent coercive parenting that consisted of two variables: total mother criticisms and total commands. Prior research has indicated that these behaviors have discriminated between clinic and nonclinic children's mothers and were sensitive to treatment efforts (Webster-Stratton, 1985; Webster-Stratton & Lindsay, 1999). Moreover, this variable was shown in a recent path analysis to provide a strong direct link to children's negative peer relationships (Webster-Stratton & Hammond, 1999). The intraclass correlation coefficient for critical and command variables was .73 to .95.

Predictor variables

Predictor variables consisted of both child and parental/familial variables. The child predictor variable representing attentional symptoms was assessed prior to treatment using two measures: (a) mother reports; and (b) teacher reports.

Mother reports of attentional problems. Mother reports for this variable were obtained from the Attention Problems subscale of the CBCL (Achenbach, 1991). Mothers rated their child's behavior on a 0–2-point scale on each of 11 items (acts too young, can't concentrate, can't sit still, confused, impulsivity, twitches, etc.) on this subscale. The Attention Problems subscale of the CBCL has been shown to correlate with the Conners Impulsivity-Hyperactivity scale ($r = .59$) of the Conners Parent Rating Scale (Conners, 1973 as cited in Achenbach & Edelbrock, 1991). Test-retest at a one-week interval with boys is $r = .88$.

Teacher reports of attentional problems. Teacher reports for this variable were obtained using the Teacher Report Form (TRF; Achenbach, 1991). The TRF parallels the CBCL parent report form and teachers respond to each of 118 items on a 0–2-point scale. For this study the Attention Problems subscale was of interest in this study because of the items related to attentional problems (20 items, including fails to finish work, can't concentrate, can't sit still, fidgets, difficult with directions, acts without thinking, inattentive etc.). The correlation between the Conners Revised Teacher Rating Scale Inattention and Impulsivity Scale with the TRF Attention Problems Scale is .80. Test-retest at a one-week interval with boys is $r = .95$.

Parental and familial variables. Parental and familial factors of stress, depression, and socioeconomic status (SES) were assessed prior to treatment. Mothers' stress and negative life experiences were assessed using the Life Experience Survey (LES; Sarason, Johnson, & Siegel, 1978). This 44-item measure asks about the occurrence of positive and negative life experiences over the previous year. For example, parents are asked about events such as pregnancy, abortion, illness, and change in residence, financial status, and employment as well as in partner relationship (e.g., divorce, marriage) and family composition (e.g., death, son leaving home). Parents are asked to rate the effect of this event on their life on a 4-point scale and to indicate yes or no as to whether the event was good or bad. The Negative Change score (NLES) (bad events) was used in this study because it was shown to be more reliable and the authors report that it has been shown to be a reliable measure of life stress which has negative connotations for parents (Webster-Stratton & Hammond, 1990) and potentially more disruptive to parenting skills than positive life events. It has been found to have adequate test-retest reliability (over 6 weeks ranges from .56 to .88).

The Beck Depression Inventory (BDI; Beck, 1979) was used to obtain information regarding mothers' depressive symptoms. The BDI is a widely used self-report scale containing 21 items. The BDI has shown good split-half reliability with a Spearman-Brown reliability coefficient of .93 and has been shown to significantly correlate with behavioral measures of depression (Williams, Barlow, & Agras, 1972) as well as with clinicians' ratings of depression (Metcalf & Goldman, 1965).

SES was determined before the PT program using Hollingshead and Redlich's (1958) Two-Factor Index based upon parent occupation and education. A social position score was derived from occupation and education. The index yielded a wide range of social class for the sample. (See Table 1.)

Procedures

Assessments. Assessments were multifaceted and consisted of independent home observations of both child and parenting interactions, and teacher and parent reports at baseline (Time 0), post intervention (Time 1), and one-year follow-up (Time 2).

Observation procedures. During home observations, mothers were observed interacting with their children for 30 minutes on two occasions during a 1-week period. During these observations, family members were told to 'do what you would normally do.' Five trained observers who were blind to treatment conditions had 30–45 hours of training with videotapes and live observations over three months using the DPICS-R system (Robinson & Eyberg, 1981; Webster-Stratton, 1988). To become 'reliable,' the observers had to achieve an inter-observer agreement rate of at least 75% with a second observer on two consecutive observations. Reliabilities were collected by sending out two observers on 15% of home observations. These observations were randomly chosen at baseline, post intervention, and follow-up assessments.

Table 1 Descriptive statistics for growth curve analysis variables at initial status

Variable	Mean	(SD)	(Range)	Description
<i>Outcome variables</i>				
Ext. problems T-Score (CBCL) ^a	68.0	(7.0)	(53–85)	62% Borderline, 46% Clinical
Ext. problems T-Score (TRF)	60.6	(11.5)	(39–84)	30% Borderline, 26% Clinical
Child deviant behavior (DPICS-R) ^b	18.9	(15.5)	(7.5–84.5)	66% Clinical
Parent criticals (DPICS-R)	44.7	(28.0)	(9–175.5)	62% Clinical
<i>Predictor variables</i>				
Mother's depression (BDI) ^c	8.8	(6.3)	(0–27)	14% Mild, 4% Moderate
Negative family stress (LES) ^d	4.2	(3.6)	(0–16)	1% Clinical
Hollingshead–Redlich (SES) ^e	2.7	(1.3)	(1–5)	
Atten. problems T-Score (CBCL)	60.2	(6.9)	(50–75)	15% Borderline, 11% Clinical
Atten. problems T-Score (TRF)	54.9	(5.7)	(50–69)	5% Borderline

$N = 81$. ^aChild Behavior Checklist (CBCL) T-Score range of greater than or equal to 67 is considered in the Borderline range and the T-Score range above 70 is considered in the Clinical range. The Teacher Report Form (TRF) T-Score scale range descriptors are identical to the CBCL. Attentional Problems is abbreviated Atten. Problems. ^bDeviant Interactions Parent Child Scale (DPICS-R) Clinical levels for child deviance are above 10/30 minutes. For parents, only critical comments were used to determine the clinical range, although the measure is a combination of both critical and command behavior. ^cBeck Depression Inventory (BDI) cut-scores are 0–13 minimal depression, 14–19 mild depression, 20–28 moderate depression, and 29–63 severe depression. ^dLife Experience Survey Negative Family Stress in clinic samples is 16. ^eHollingshead–Redlich socio-economic status categories are 1 – major professional (24% of this sample), 2 – minor professional (17% of this sample), 3 – skilled laborer (29% of this sample), 4 – semiskilled laborer (22% of this sample), and 5 – unskilled laborer (7% of this sample).

Intervention. After baseline assessments were completed, parents were divided into groups of 10–12 and met weekly with a therapist for approximately 22 to 24 weeks. Each weekly session lasted for 2 hours. Seventeen videotaped programs were viewed in a therapist-led group discussion format. The programs covered the BASIC parenting program (play skills, praise, rewards, limit setting, and handling misbehavior) as well as the ADVANCE program (interpersonal communication, anger management and problem-solving skills). A therapist presented the video vignettes and then led a discussion focused upon the issue covered in the vignette. In this supportive and relational environment, parents identify their own target behaviors, and are encouraged to share their ideas and to problem-solve appropriate strategies given their knowledge of the specific temperament of their child. More details about the parenting program can be found elsewhere (Webster-Stratton & Hancock, 1998).

Statistical analysis

Hierarchical linear modeling (HLM) growth curve analysis was used in this study because it offers several contributions not found in other statistical analyses of growth over time. First, HLM analysis shows growth over time by fitting the slope at the individual level. The unit of measurement for HLM is each subject's initial y -intercept and slope. In contrast, repeated measures analysis of variance tests the interaction of repeated measurements with subjects' performance (Bryke & Raudenbush, 1992). In HLM, the individual students' slopes over measurement intervals are fitted to the group's average slope using the empirical Bayes statistic. In comparison, repeated measures one-way analysis of variance (ANOVA) uses the interaction between subjects and repeated measurement as the error term. The F -test in a one-way repeated measures ANOVA is the mean square of repeated measures divided by the mean square of the individual differences about the repeated measures (see Tabachnick & Fidell,

1996). Therefore, the repeated measures one-way ANOVA tests for the amount of variance explained by systematic repeated measurement, which does not capture individual growth, but instead, the variance explained by the mean square of the subject by measurement interaction, whereas HLM uses each subject's slope as the unit of analysis.

Results

Descriptive statistics for the initial status of the outcome variables and the predictor variables in the growth curve analyses are shown in Table 1. A description of the percentage of children and parents in the range of scores on the different variables indicates the level of problem behavior on the various measures at the beginning of the study before the participants received treatment, as well as the variability on SES and negative family stress. The average initial score of parental functioning on the DPICS-R was 44.67 ($SD = 27.98$) and indicates the average number of parental commands and criticisms given during the observations, that is, more than one a minute.

Hierarchical linear modeling growth curve analyses (HLM)

Raw scores from the CBCL and TRF, rather than t -scores, were used in the following HLM analyses. This method is often used in HLM analysis since raw scores provide an indicator as to how much change occurred in the rating of behaviors over time. Standard scores, in this case t -scores, have been transformed to the normative sample used in the standardization of the instrument. Therefore, using t -scores would compare the subjects' relative position to the standardized sample, which is not

indicative of the subjects' true change over time (see Stoolmiller & Bank, 1995, for a complete discussion on this topic). Using HLM growth curve analyses, we investigated the change over time for each outcome variable by the predictor variables simultaneously. Table 2 presents the model growth estimates at the initial status prior to the parent training intervention for the three models examined, Externalizing Problem Behaviors by parent report (CBCL), Externalizing Problem Behavior by teacher report (TRF), Externalizing behavior by observation (DIPCS-R Child Deviant Behavior), and Parenting interactions (DIPCS-R Mother Interactions). Results showed that the children's problem behaviors prior to parent training were significantly elevated above zero as measured by mothers' rating on the CBCL, teachers' ratings on the TRF, and on independent home observations measured by the DIPCS-R. In addition, mother interactions using coercive behavior were also significantly elevated above zero on the DIPCS-R. The only predictor significantly related to children's initial externalizing problem behavior prior to treatment was mothers' rating of their attention problems on the CBCL. The independent predictor SES was statistically associated with coercive parent-child interactions (DIPCS-R Mother Interactions). In summary of the initial status HLM growth curve analyses, prior to the parent training intervention, showed mothers' elevated ratings of attentional problems correlated with children's externalizing behavior problems as rated by their mothers. In addition, lower levels of SES were associated with initial coercive mother-child interactions.

Table 3 shows the results of the HLM growth curve analysis depicting the slope estimates or the deceleration of externalizing problem behaviors across the three measurement points on mothers' ratings of Externalizing Behavior Problems (CBCL), teachers' ratings of Externalizing Behavior Problems (TRF), independent observations of children's problem behavior (DIPCS-R), as well as independent observations of coercive behavior interactions between parent and child (DIPCS-R). A statistically significant decreasing slope from the children's initial status was found in mothers' ratings of externalizing problem behavior and in the independent observations of the children's problem behavior, as well as in independent observations of parent-child coercive interactions. The only statistically significant predictor associated with the deceleration of externalizing problem behavior was mothers' initial ratings of children's Attention Problems (CBCL) and the deceleration of mothers' ratings of Externalizing Behavior Problems (CBCL). In summary of the slope estimates in the HLM growth curve analyses, results showed across parent training treatment to follow-up that children's externalizing problem behaviors decreased significantly from their initial status as evidenced by mothers' ratings and independent

Table 2 Effects of attention problems^{ab}, depression^c, stress^d, and SES^e, on three measures of conduct problems and parent interactions at initial status

Variables	Mothers' ratings on externalizing problems (CBCL)			Teachers' ratings on externalizing problems (TRF)			Independent observations on child deviant behavior (DIPCS-R)			Independent observations on mother criticals (DIPCS-R)		
	Coeff.	SE	t-ratio	Coeff.	SE	t-ratio	Coeff.	SE	t-ratio	Coeff.	SE	t-ratio
Initial status	24.12	.87	27.75***	18.73	1.74	10.78***	17.84	1.52	11.76***	14.69	42.64	2.09***
Attention problems (CBCL)	1.46	.31	4.66***	—	—	—	-.84	.55	-.88	.50	1.05	.48
Attention problems (TRF)	—	—	—	.49	.63	.78	—	—	—	—	—	—
Depression (BDI)	.28	.16	1.76	-.26	.32	-.81	-.07	.28	-.25	.17	.53	.31
Negative family stress (LES)	-.07	.29	-.26	-.04	.57	-.08	-.13	.50	-.27	-.10	.95	-.10
Hollingshead-Redlich (SES)	-.25	.71	-.35	.01	1.41	.01	-.80	1.23	-.65	4.82	2.36	2.04*

^{ab}Attention problems = Mothers' ratings on CBCL Attention Problems Scale and Teachers' rating on the TRF Attention Problems Scale; ^cDepression = Mother's self-report on the Beck Depression Inventory; ^dStress = Mother's reported negative family stress on the Life Experience Survey; ^eSES = family socioeconomic status on the Hollingshead-Redlich Scale. **p* < .05; ****p* < .001.

Table 3 Effects of attention problems^a, depression^c, stress^d, and SES^e, on three measures of conduct problems and parenting functioning on slope

Variables	Mothers' ratings on externalizing problems (CBCL)			Teachers' ratings on externalizing problems (TRF)			Independent observations on child deviant behavior (DPICS-R)			Independent observations on other criticals (DPICS-R)		
	Coeff.	SE	t-ratio	Coeff.	SE	t-ratio	Coeff.	SE	t-ratio	Coeff.	SE	t-ratio
Slope	-4.38	.49	-8.98***	-.09	.90	-.10	-4.39	.85	-5.15***	-5.28	1.21	4.38***
Attention problems (CBCL)	-.40	.18	-2.27*	-.25	.32	-.78	.18	.31	.59	-.62	.43	-1.42
Attention problems (TRF)	-.02	.09	-.30	.17	.16	1.02	-.02	.16	.15	.03	.22	.14
Depression (BDI)	.01	.16	.05	-.21	.30	-.73	.03	.28	.12	-.07	.40	-.18
Negative family stress (LES)	.42	.40	1.16	.43	.73	.60	.43	.70	.62	-1.71	.98	1.73
Hollingshead-Redlich (SES)												

^aAttention problems = Mothers' ratings on CBCL Attention Problems Scale and Teachers' rating on the TRF Attention Problems Scale, ^bDepression = Mother's self-report on the Beck Depression Inventory; ^cStress = Mother's reported negative family stress on the Life Experience Survey; ^eSES = family socioeconomic status on the Hollingshead-Redlich Scale. **p* < .05; ****p* < .001.

observations of children's problem behavior and parent-child coercive interactions. However, externalizing problem behaviors as rated by teachers did not significantly decrease from initial ratings. Mothers' ratings of attention problems were the only statistically significant predictor of a decrease in children's externalizing problem behavior as rated by their mothers.

For each growth curve analysis reported above, the error variance component was allowed to randomly vary. A chi-square statistical test was provided for each equation that determined whether there was significant individual variation about the average fixed estimated growth curve in the initial status and slope estimates. All of the results of the HLM growth curves showed that there were significant individual differences about the fixed group effect at *p* < .0001. This indicates that although the average fixed effects hold true for the sample under investigation there was a great deal of individual variation about the average intercept and slope. Therefore, further analyses were conducted to better determine the individual children's change from Time 0 to Time 3.

Follow-up analysis of variance using individual growth curves

A follow-up analysis of variance was conducted with children's individual growth curve estimates taken from mothers' ratings of Externalizing Problem Behaviors (CBCL) as the dependent measure and mothers' ratings of Attention Problems (CBCL) as the independent measure. Children rated in the Borderline or Clinical range on Attention Problems were compared to children rated below this cut-score. The results of this analysis showed that children with elevated Attentional Problems (*n* = 19) decreased in Externalizing Problem Behaviors (CBCL) more than did children with no Attentional Problems, *n* = 63, *F* (1, 80) = 6.3, *p* = .01. Mothers' ratings of Externalizing Problem Behaviors decreased from a mean T-score of 71 (*SD* = 6) at Time 0 to 62 (*SD* = 9) at Time 1 to 57 (*SD* = 11) at Time 2 for children rated in the Borderline or the Clinical range on Attention Problems whereas mothers' ratings of Externalizing Problem Behaviors decreased from a mean T-score of 67 (*SD* = 7) at Time 0 to 59 (*SD* = 10) at Time 1 to 59 (*SD* = 10) at Time 2 for children rated below the Borderline range on Attention Problems. In summary, the results showed that children whose mothers rated them at or above the Borderline range in Attention Problems also rated them as decreasing more in their Externalizing Problem Behavior than children rated below the Borderline range on Attention Problems. Figure 1 shows the T-scores for the children with and without attentional problems across the three measurement times.

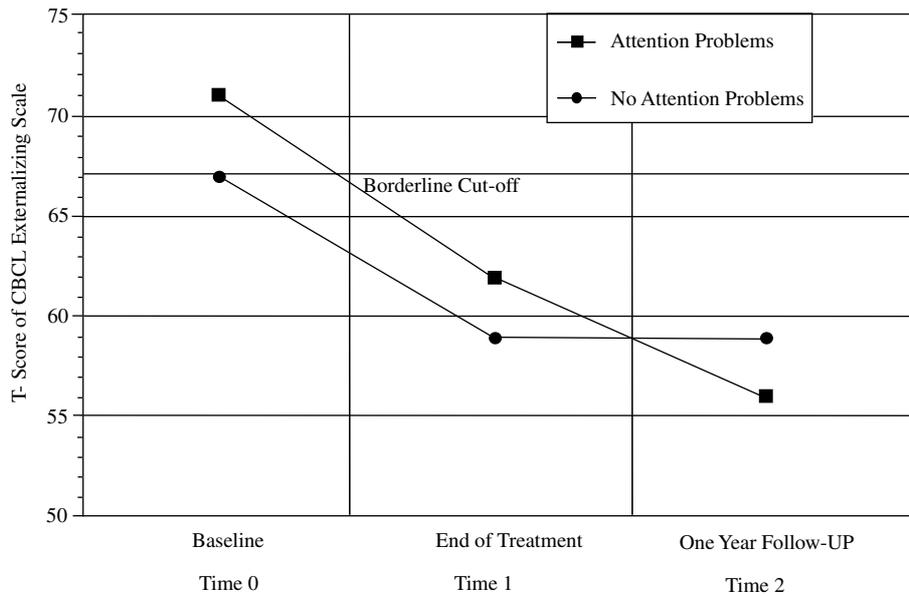


Figure 1 Mean T-Scores of maternal ratings on the CBCL Externalizing Scale by initial maternal rating of maternal ratings of CBCL Attentional Problems across treatment phases

Discussion

In this investigation, we hypothesized that, when parental and familial factors were accounted for, children with conduct problems who also exhibited more serious behavior difficulties in the areas of inattention, impulsivity, and hyperactivity would be less likely to respond to PT interventions than children showing less serious behavior difficulties. Multiple measures based upon mother report and independent observations of conduct problems, teacher reports of conduct problems (Externalizing behavior by teacher report), and independent observations of parenting interactions were used to determine whether the PT treatment was effective.

Despite increased reports of parental ratings of attentional problems in children with elevated conduct problems, we found that our hypothesis was not supported. Children with attentional problems showed improvement in conduct problems when measured with these outcome scales. In addition, negative parenting behaviors also decreased over time. These outcomes are not supported by the research literature. Past research suggests that, due to the severity and comorbidity of children’s conduct problem and attentional behaviors and the early age at which they appear to begin, their behavior is refractory and, therefore, less likely to respond to PT treatment (e.g., Hinshaw & Melnick, 1995; Loeber, 1990; Lynam, 1996; Moffitt, 1993). One explanation for the positive results could be the young age at which these children received treatment, whereas the majority of psychosocial studies with children with both ADHD and ODD/CD have been with children over age 7. In this light, the children studied in this investigation had less experience and less time repeating and learning negative behaviors within the

coercive behavior cycle. Thus, their behaviors could have been less entrenched and more amenable to change. In this vein, these data suggest that early identification and intervention with young children who exhibit both CP and increased levels of attentional problems could prevent more serious CP behaviors as the children grow older.

However, when the outcome measure of teacher reports of conduct problems was used, growth over time was not statistically significant. The difference between the result obtained with the teacher outcome measure and the other outcome measures based on parent reports and home observations of parent-child interactions is consistent with prior research. Previous research has indicated inconsistent evidence showing that improvements gained in the home generalizes to the school setting (e.g., Taylor & Biglan, 1998). However, the maladaptive behaviors at school of the children in this sample were generally not as severe as those experienced at home. Only 30% of the children had problems that were pervasive across settings. Thus our sample size was likely too small to detect changes at school. The mean CP behavior *t*-score (TRF) according to teacher reports prior to the PT intervention was 60.60 (*SD* = 11.49), a score that fell well below the clinical maladaptive range. In the home, however, the mean CP behavior *t*-score prior to the PT intervention was 67.98 (*SD* = 7.31), a score that falls in the clinical range of functioning. These findings are supported by research literature indicating that not every child showing CP behaviors at home will show CP behaviors at school. In fact, Webster-Stratton (1990b) found in a study of 101 young children with conduct problems (according to parent reports and observations at home) that only 40% of the teachers reported conduct problems at school. Chi-square showed a

statistically significant difference in the proportion of children rated in the Borderline and above range on Externalizing Behavior on the CBCL and TRF, $\chi^2(1, N = 81) = 6.74, p = .008$. Twenty-five percent of the children were rated in the Borderline or above range on both scales. Thus, a significant portion of the children in this present study did not exhibit severe CP behaviors in the classroom setting, creating a 'floor effect' and making it difficult to discern improvements at school according to teacher reports. Thirty percent were above or equal to Borderline on the TRF and 62% on the CBCL.

Nonetheless, when parent report of conduct problems was used as an outcome measure, the parent report of attentional problems contributed significantly to the model both at initial status and growth over time. From the parents' perspective, children with CP who also evidenced more severe attentional problems benefited from PT training. In fact, the present results suggest that, on average, the children with CP who have the added attentional difficulties, as perceived by their parents, not only benefited from the PT training, but their rated maladaptive behaviors tended to decrease at a faster rate than children rated with CP behaviors only. Moreover, children rated at or above the Borderline or Clinical range on Attention Problems decreased faster in their parent-rated CP behaviors than those children rated below this range. Again, these results indicated that young children exhibiting both CP and attentional problems can benefit from PT. Results shown in Figure 1 demonstrate the average decrease in CP behaviors with attentional and without attentional problems.

One possible explanation for the differences between the results obtained in this study and those generally found in the literature might revolve around the issue of assessment of change. In this study, a parent rating scale was used to determine not only CP behaviors, but also attentional problems. A parent rating scale has been shown to be biased (Patterson, 1977). Maternal rating of CP behaviors might have been influenced over time by negative interactions between mother and child where some parental ratings might mirror a parent's feelings and attitudes towards a child rather than providing objective evidence of the child's behavior. For example, a mother having difficulty managing her child's behavior might also be prone to rate her child's behavior as inattentive to her commands or impulsive or overly active since she feels ineffective in influencing her child's behavior.

While parental rating scales such as the scale used in this study can be colored by parental attitudes, parental perception can also change. It is important to note that this parent intervention program targeted parental cognitions regarding themselves as well as their perceptions of their children. For example, parents explored negative and irrational thinking regarding their child, learned problem-sol-

ving strategies, self-management, and self-care and were helped to understand the special parenting needs of children with attentional and learning problems (Webster-Stratton, 1990a). The PT program used vignettes of parents competently working with children with different temperaments and also making mistakes to encourage critical thinking regarding the issues involved in effective and ineffective strategies. Role-plays of children who were inattentive, resistive and non-responsive to commands and reinforcement were part of the group process. Thus, the results obtained could, in part, reflect an initial step towards child behavior improvement: a change in parental perception and attitudes.

Although the results obtained could, in part, reflect parental bias, results of the independent observations of parent-child behaviors at home corroborated the parent reports. The convergence of evidence indicates that CP behaviors did, in fact, decrease. Another surprising finding was that the predictor variables of depression, stress, and SES were not better predictors of change in this study. In fact, mother's depression and stress were not significant contributors at either initial status or growth over time when outcomes were measured by child conduct problems and mother interactions. Past literature has repeatedly noted the importance of maternal depression and family stress as important predictors of child maladjustment (e.g., Webster-Stratton, 1990c). One of the reasons for these present findings could be the relatively low levels of maternal depression and stress found within the sample. Finally, SES predicted initial status only when parenting interactions was used as an outcome measure. This result is generally consistent with the PT literature. For example, Webster-Stratton and Hammond (1990) found that single mothers with low SES were more likely to be critical and show physically negative behaviors towards their children. This present result suggests that as mothers are given opportunities to acquire further positive parenting skills, levels of economic disadvantage become less important in predicting treatment success or failure when reducing coercive parenting interactions is used as an outcome measure.

There were several important limitations to this investigation. First, the results of this study are limited to a population of primarily Caucasian boys (ages 4–7 years) with diagnosed oppositional defiant disorder and/or conduct disorder (generically termed conduct problems) who have received The Incredible Years parenting program. Thus generalization to girls, other ethnic groups or other parent training programs cannot be made. Secondly, the initial study was not designed to evaluate comorbidity with ADHD so initial DSM diagnoses of ADHD were not available. Instead we had to rely on symptoms related to inattention, impulsivity, and hyperactivity according to parent and teacher reports.

More research is needed with this parenting program and other programs and with different populations representing diverse groups to determine the role that diagnoses of child ADHD may have in determining treatment outcome. Altogether, however, the results from this study show preliminary support for using The Incredible Years PT program with young boys who exhibit both attentional problems alongside conduct problems.

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References

- Abikoff, H., & Klein, R.G. (1992). Attention-deficit hyperactivity and conduct disorder: Comorbidity and implications for treatment. *Journal of Consulting and Clinical Psychology, 60*, 881–892.
- Achenbach, T.M. (1991). *Manual for the Teacher's Report Form and teacher version of the Child Behavior Profile*. Burlington, VT: University of Vermont, Department of Psychiatry.
- Achenbach, T.M., & Edelbrock, C.S. (1991). *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. Burlington, VT: University Associates in Psychiatry.
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd edn rev.). Washington, DC: Author.
- Barkely, R.A., Shelton, T.L., Crosswait, C., Moorehouse, M., Fletcher, K., Barrett, S., Jenkins, L., & Metevia, L. (2000). Multi-method psycho-educational intervention for preschool children with disruptive behavior: Preliminary results at post-treatment. *Journal of Child Psychology and Psychiatry, 41*, 319–332.
- Beck, A.T. (1979). *Cognitive therapy and emotional disorders*. New York: New American Library.
- Brestan, E.V., & Eyberg, S.M. (1998). Effective psychosocial treatments of conduct-disordered children and adolescents: 29 years, 82 studies, and 5,272 kids. *Journal of Clinical Child Psychology, 27*, 180–189.
- Bryke, A.S., & Raudenbush, S.W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park: Sage.
- Coie, J.D. (1990). Toward a theory of peer rejection. In S.R. Asher & J.D. Coie (Eds.), *Peer rejection in childhood* (pp. 367–398). Cambridge: Cambridge University Press.
- Dishion, T.J., & Andrews, D.W. (1995). Preventing escalation in problem behaviors with high-risk young adolescents: Immediate and 1-year outcomes. *Journal of Consulting and Clinical Psychology, 63*, 538–548.
- Dishion, T.J., McCord, J., & Poulin, F. (1999). When interventions harm: Peer groups and problem behavior. *American Psychologist, 54*, 755–764.
- Dumas, J.E., & Wahler, R.G. (1983). Predictors of treatment outcome in parent training: Mother insularity and socioeconomic disadvantage. *Behavioral Assessment, 5*, 301–313.
- Faraone, S.V., Biederman, J., Mennin, D., Russell, R., & Tsuang, M.T. (1998). Familial subtypes of attention deficit hyperactivity disorder: A 4-year follow-up study of children from antisocial-ADHD families. *Journal of Child Psychology and Psychiatry, 39*, 1045–1053.
- Griest, D.L., Forehand, R., & Wells, K.C. (1981). Follow-up assessment of parent training: An analysis of who will participate. *Child Study Journal, 11*, 221–229.
- Hart, E.L., Lahey, B.B., Loeber, R., Applegate, B., & Frick, P.J. (1995). Developmental change in attention-deficit hyperactivity disorder in boys: A four-year longitudinal study. *Journal of Abnormal Psychology, 23*, 83–93.
- Hinshaw, S.P. (1992). Externalizing behavior problems and academic underachievement in childhood and adolescence: Causal relationships and underlying mechanisms. *Psychological Bulletin, 111*, 127–155.
- Hinshaw, S.P., & Melnick, S.M. (1995). Peer relationships in boys with attention-deficit hyperactivity disorder with and without comorbid aggression. *Development and Psychopathology, 7*, 267–647.
- Hollingshead, A.G., & Redlich, F.C. (1958). *Social class and mental illness*. New York: John Wiley & Sons.
- Humphreys, L., Forehand, R., McMahan, R., & Roberts, M. (1978). Parent behavioral training to modify child noncompliance: Effects on untreated siblings. *Journal of Behavior Therapy and Experimental Psychiatry, 9*, 235–238.
- Kazdin, A.E., & Kendall, P.C. (1998). Current progress and future plans for developing effective treatments: Comments and perspectives. *Journal of Clinical Child Psychology, 27*, 217–226.
- Loeber, R. (1990). Development and risk factors of juvenile antisocial behavior and delinquency. *Clinical Psychology Review, 10*, 1–41.
- Lynam, D.R. (1996). Early identification of chronic offenders: Who is the fledgling psychopath? *Psychological Bulletin, 120*, 209–234.
- Lynam, D.R., Caspi, A., Moffitt, T.E., Wikstrom, P.H., Loeber, R., & Novak, S. (2000). The interaction between impulsivity and neighborhood context on offending: The effects of impulsivity are stronger in poorer neighborhoods. *Journal of Abnormal Child Psychology, 109*, 563–574.
- Metcalfe, M., & Goldman, E. (1965). Validation of an inventory for measuring depression. *Archives of General Psychiatry, 27*, 330–333.
- Moffitt, T.E. (1990). Juvenile delinquency and attention deficit disorder: Boys' developmental trajectories from age 3 to age 15. *Child Development, 61*, 893–910.

- Moffitt, T.E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, *100*, 674–701.
- Patterson, G., Reid, J., & Dishion, T. (1992). *Antisocial boys: A social interactional approach* (vol. 4). Eugene, OR: Castalia Publishing.
- Patterson, G.R. (1977). Naturalistic observation in clinical assessment. *Journal of Abnormal Child Psychology*, *5*, 309–322.
- Pisterman, S., Firestone, P., McGrath, P., Goodman, J.T., Webster, I., Mallory, R., & Goffin, B. (1992). The role of parent training in treatment of preschoolers with ADHD. *American Journal of Orthopsychiatry*, *62*, 397–408.
- Robinson, E.A., & Eyberg, S.M. (1981). The Dyadic Parent-Child Interaction Coding System: Standardization and validation. *Journal of Consulting and Clinical Psychology*, *49*, 245–250.
- Robinson, E.A., Eyberg, S.M., & Ross, A.W. (1980). The standardization of an inventory of child conduct problem behaviors. *Journal of Clinical Child Psychology*, *9*, 22–28.
- Ruma, P.R., Burke, R.V., & Thompson, R.W. (1996). Group parent training: Is it effective for all children of all ages? *Behavior Therapy*, *27*, 159–169.
- Sarason, I.G., Johnson, J.H., & Siegel, J.M. (1978). Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology*, *46*, 932–946.
- Serketich, W.J., & Dumas, J.E. (1996). The effectiveness of behavioral parent training to modify antisocial behavior in children: A meta-analysis. *Behavior Therapy*, *27*, 171–186.
- Snyder, H. (2001). Epidemiology of official offending. In R. Loeber, and D.P. Farrington (Eds.), *Child delinquents: Development, intervention and service needs* (pp. 25–46). Thousand Oaks, CA: Sage.
- Sonuga-Barke, E.J.S., Daley, D., Thompson, M., Laver-Bradbury, C., & Weeks, A. (2001). Parent-based therapies for preschool attention-deficit/hyperactivity disorder: A randomized, controlled trial with a community sample. *Journal of American Academy of Child Psychiatry*, *40*, 402–408.
- Stoolmiller, M., & Bank, L. (1995). Autoregressive effects in structural equation models: We see some problems. In J.M. Gottman (Ed.), *The analysis of change* (pp. 261–276). Hillsdale, NJ: Erlbaum.
- Tabachnick, B.G., & Fidell, L.S. (1996). *Using multivariate statistics* (3rd edn). New York: Harper Collins College Publishers.
- Taylor, T.K., & Biglan, A. (1998). Behavioral family interventions for improving child-rearing: A review for clinicians and policy makers. *Clinical Child and Family Psychology Review*, *1*, 41–60.
- Webster-Stratton, C. (1985). Mother perceptions and mother-child interactions: Comparison of a clinic-referred and a non-clinic group. *Journal of Clinical Child Psychology*, *14*, 334–339.
- Webster-Stratton, C. (1988). *Dyadic Parent-Child Interaction Coding System - Revised coding manual*. Unpublished manuscript, University of Washington.
- Webster-Stratton, C. (1989). *Dyadic Parent-Child Interaction Coding System-Revised*. Unpublished manuscript, University of Washington.
- Webster-Stratton, C. (1990a). *The Incredible Years parent training program manual: Effective communication, anger management and problem-solving (ADVANCE)*. Seattle, WA 98119: 1411 8th Avenue West.
- Webster-Stratton, C. (1990b). Long-term follow-up of families with young conduct problem children: From preschool to grade school. *Journal of Clinical Child Psychology*, *19*, 144–149.
- Webster-Stratton, C. (1990c). Stress: A potential disruptor of parent perceptions and family interactions. *Journal of Clinical Child Psychology*, *19*, 302–312.
- Webster-Stratton, C. (1996). Early onset conduct problems: Does gender make a difference? *Journal of Consulting and Clinical Psychology*, *64*, 540–551.
- Webster-Stratton, C., & Hammond, M. (1990). Predictors of treatment outcome in parent training for families with conduct problem children. *Behavior Therapy*, *21*, 319–337.
- Webster-Stratton, C., & Hammond, M. (1997). Treating children with early-onset conduct problems: A comparison of child and parent training interventions. *Journal of Consulting and Clinical Psychology*, *65*, 93–109.
- Webster-Stratton, C., & Hammond, M. (1999). Marital conflict management skills, parenting style and early-onset conduct problems: Processes and pathways. *Journal of Child Psychology and Psychiatry*, *40*, 917–927.
- Webster-Stratton, C., & Hancock, L. (1998). Parent training: Content, methods and processes. In E. Schaefer (Ed.), *Handbook of parent training* (2nd edn, pp. 98–152). New York: Wiley and Sons.
- Webster-Stratton, C., Hollinsworth, T., & Kolpacoff, M. (1989). The long-term effectiveness and clinical significance of three cost-effective training programs for families with conduct-problem children. *Journal of Consulting and Clinical Psychology*, *57*, 550–553.
- Webster-Stratton, C., & Hooven, C. (1998). Parent training for child conduct problems. In T. Ollendick (Ed.), *Comprehensive clinical psychology* (pp. 186–219). Oxford, England: Elsevier Science.
- Webster-Stratton, C., & Lindsay, D.W. (1999). Social competence and early-onset conduct problems: Issues in assessment. *Journal of Child Clinical Psychology*, *28*, 25–93.
- White, J.L., Moffitt, T.E., Caspi, A., Bartusch, D., Jørglum, B.D., Needles, & Southamer-Loeber, M. (1994). Measuring impulsivity and examining its relationship to delinquency. *Journal of Abnormal Psychology*, *103*, 192–205.
- Williams, J.G., Barlow, D.H., & Agras, W.S. (1972). Behavioral measurement of severe depression. *Archives of General Psychiatry*, *27*, 330–333.