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Health and Disability

Parent training for young Norwegian children with ODD and CD problems: Predictors and mediators of treatment outcome

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Participants were 121 children, aged 4–8 years referred for conduct problems, and their mothers. A parent training intervention was implemented in two outpatient clinics in Norway. Treatment responders were defined as children scoring below a cut-off on the Eyberg Child Behavior Inventory, a score below an optimal cut-off for children in day-care and school as reported by teachers, in addition to a 30% reduction or greater in observed negative parenting. Self-reported parenting practices were explored as potential mediators. The results of logistic regression analyses showed that high levels of maternal stress, clinical levels of ADHD, and being a girl predicted a poorer outcome in conduct problems at home, while pretreatment clinical levels of ADHD predicted a poorer outcome as perceived by the teachers. Harsh and inconsistent parental disciplining emerged as significant partial mediators of changes in conduct problems, highlighting the importance of altering parenting practices to modify young children's conduct problems.

Key words: Conduct problems, predictors, mediators, parent training.

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INTRODUCTION

Disruptive behavior disorders including oppositional defiant disorder (ODD) and conduct disorder (CD) are among the most common reasons for referring children and adolescents to outpatient treatment in child and adolescent psychiatric clinics in Norway (Anderson, Halsteinli, Kalseth, Pedersen & Waagan, 2002). Children with ODD or CD are at risk of developing a variety of problems such as peer rejection, school failure, psychopathology, substance abuse and criminality (Burke, Loeber & Birmaher, 2002). Because of the stability of child aggressive behaviors, disruptive behavior disorders constitute a major health problem (Simonoff, Elander, Holmshaw, Pickels, Murray & Rutter, 2004).

While several effective interventions have been developed for children and adolescents (Fonagy & Kurtz, 2002), parent training seems to be the treatment of choice for young children (Brestan & Eyberg, 1998; Fossum, Handegård, Martinussen & Mørch, 2008).

The main focus of parent training is to help parents alter their child's behavior by teaching them to use more appropriate and positive parenting practices. Introducing an evidence-based parent training intervention in Norway, the Incredible Years program (IY; Webster-Stratton & Reid, 2003a), predictors and mediators related to outcome are of particular interest in evaluation of treatment effects.

Mediation effects refer to the feasible underlying processes of change in treatment, or mechanisms of action. Weersing and Weisz (2002) noted a lack of studies exploring mechanisms of change in studies applying parent training interventions. Changes in parenting practices may serve as mediators in parent training and cause changes in child conduct problems. Some studies of the IY program have explored mediating effects of parenting practices. In the US, Beauchaine, Webster-Stratton and Reid (2005) reported that reductions in inconsistent and harsh child disciplining mediated treatment outcome in a study pooling data from six independent clinical trials. In a replication of the IY in the UK, Gardner, Burton and Klimes (2006) further noticed that changes in positive parenting skills significantly mediated changes in child conduct problems.

In a recent meta-analysis of predictors in parent training, low family income resulted in a large standardized effect size, while variables such as low educational level/occupation, maternal psychopathology and severe pretreatment child behavior problems produced moderate effect sizes (Reyno & McGrath, 2006). These findings indicate that such variables influence treatment outcome negatively. Maternal age has also been identified as a significant predictor of treatment outcome in IY in the sense that children with mothers with median age above 35 experienced less reduction in conduct problems compared to children with younger mothers (Beauchaine *et al*., 2005).

In addition to the variables identified in meta-analyses the following are important: ODD and CD comorbidity with other diagnoses, and the co-occurrence of ODD/CD with Attention Deficit Hyperactivity Disorder (ADHD), anxiety or depression is particularly high (Angold, Costello & Erkanli, 1999). ADHD

in children with ODD is a plausible marker for early onset of CD (Loeber, Burke, Lahey, Winters & Zera, 2000). In general, parents and teachers perceive children with comorbid ODD and ADHD as more disruptive compared to those only fulfilling diagnostic criteria for ODD (Gadow & Nolan, 2002). ADHD is therefore an important potential predictor of child behavior problems both at home and in day-care.

Further, aggressive behavior in children is related to parental distress (Kashdan, Jacob, Pelham *et al*., 2004) identified to influence treatment response negatively (Kazdin, 1995). In a study focusing on sex differences in young children with ODD, similarities between behaviors and competences among boys and girls' as perceived by the parents were more striking than differences, yet parental levels of stress were significantly higher among the parents of girls (Fossum, Mørch, Handegård & Drugli, 2007). Consequently, parental stress and sex of the child should be addressed as potential predictors of treatment outcome.

The children and families in this study participated in a Norwegian replication study of the IY parent training and child therapy programs. The IY has shown promising treatment effects in randomized controlled trials in the US (see for instance, Webster-Stratton & Hammond, 1997; Webster-Stratton, Reid & Hammond, 2004), and in independent replications conducted both in the UK (Gardner *et al*., 2006; Scott, Spender, Doolan, Jacobs & Aspland, 2001) and in Canada (Taylor, Schmidt, Pepler & Hodgins, 1998). The IY has recently shown positive results in an uncontrolled Swedish (Axberg, Hansson & Broberg, 2007) and a Norwegian RCT replication study (Larsson, Fossum, Clifford, Drugli, Handegård & Mørch, in press). In the Norwegian study (Larsson *et al*., in press) effect sizes showed moderate reductions (d = 0.42 – 0.75.) in mother reported child disruptive and aggressive behaviors. Alterations in parenting skills were positive, ranging from moderate to large effect sizes, i.e. mothers were less harsh in their disciplining, less inconsistent in their disciplining, and more positive in their parenting practices after parent training. The differences between the two treatment conditions, i.e. parent training alone or in combination with child training were small and non-significant (Larsson *et al*., in press) indicating that potential additional treatment effects of child training were small. This finding is equivalent to the finding of Webster-Stratton and Hammond (1997), making it appropriate to merge data from these two treatment conditions for the purpose of exploring mediators and predictors of worsened treatment outcome. Such an approach was adopted by the originator of the treatment program to identify predictors (Hartman, Stage & Webster-Stratton, 2003) and to explore predictors, moderators and mediators of parent training (Beauchaine *et al*., 2005).

Objectives

The aims of the study were first to explore if alterations in parenting practices, e.g. changes in positive parenting, harsh and inconsistent disciplining, mediate the relationship between treatment and changes in children's conduct problems. When introducing IY in Norway, it is of particular interest to explore the role of parenting practices as potential mediators of change in conduct problems. Secondly, we determined whether pre-treatment scores in child and family variables were factors predicting treatment outcomes, both as experienced by mothers at home and in changes in observed negative maternal parenting practices. To consider treatment outcome at home, we were interested in predictors of positive relation to treatment responsiveness in normative levels of functioning. To that end, we used as outcome criteria a standardized parent rating scale to assess child aggressive and oppositional behaviors, the Eyberg Child Behavior Inventory (ECBI) (Reedtz, Bertilsen, Lurie, Handegård, Clifford & Mørch, 2008). This measure provides excellent normative data for Norwegian children and permits evaluation of the extent to which treatment places a child within the "normal" range of functioning. Applying a clinical cut-off like this is frequently made us of in research on parent training (see for instance Kazdin, 1995; Webster-Stratton & Hammond, 1997; Webster-Stratton, Reid & Hammond, 2004). Due to the possible importance of parenting practices in parent training, factors potentially explaining less alteration in negative parenting practices are of particular interest. The originator of the treatment program used this outcome as an indication of clinical significant outcome (Webster-Stratton & Hammond, 1997). Finally, we address if clinical levels of ADHD predict treatment outcomes as experienced by the teachers in the child's day-care and school settings. The inclusion of potential explaining factors is based on previous reviews of treatment outcome in parent training.

METHOD

In this study, we included children treated with parent training or parent training combined with child training in analyses of predictors of treatment outcome, while also a waiting-list condition was included in analyses of mechanisms related to parent training – altogether a sample of 121 children (Larsson *et al*., in press).

Subjects

The child characteristics for inclusion in the study were: (a) age of 4–8 years; (b) the primary referral reason was misconduct at home as experienced by parents (e.g. non-compliance, aggressive or oppositional behaviors); (c) the child had no debilitating physical impairment; (d) the child's behavior was within clinical range (above the 90th percentile and a score above 119 for girls and 126 for boys) on the ECBI based on Norwegian norms (Reedtz *et al*., 2008), and (e) the child met diagnostic criteria for ODD and/or CD according to the Diagnostic and Statistical Manual for Mental Disorders 4th edition (DSM-IV, American Psychiatric Association, 1994) or sub-clinical diagnostic criteria for ODD or CD. Following the recommendations by Angold and Costello (1996) regarding sub-clinical diagnosis, children who scored one criterion less than the four criteria required for a formal DSM-IV ODD diagnosis, or the three required for a formal CD diagnosis, while also displaying diminished functioning, were included. The participants were randomly assigned to parent training (n = 47) or parent training combined with child training (n = 52) or waiting-list condition (n = 28).

In the two active treatment conditions, the children's mean age was 6.6 years (*SD* = 1.3). Twenty-eight children (28.3%) lived in one-parent families, and a step-parent was involved in 18 (18.2%) families. A total of six children (6.1%) were living in foster care, of which two (2%) were in kinship foster care. Of the families, two (2%) were not native-speaking Norwegians. None of the demographic variables indicated significant difference between the three conditions (for detailed information, see Larsson *et al*., in press).

Procedures

All children were referred for disruptive behaviors to two child and adolescence outpatient clinics at two university sites in Norway in the period of August 2001 to January 2003. Information about treatment was provided to referral agencies such as teachers, physicians and child welfare workers throughout the project period. Informed consent was obtained from the parents on the basis of verbal and written information. Before inclusion, each parent completed the ECBI and a diagnostic interview, the Kiddie-SADS (KSADS, see below) was conducted with the parents as informants. Children not meeting the diagnostic intake criteria and a score above the 90th percentile on the ECBI in either mother or father reports were excluded. Assessment was performed before and after treatment. Of the potential participants fulfilling the inclusion criteria, two families refused to participate. The teachers received questionnaires by mail after parents had given their consent, resulting in a participation rate of 86 teachers pre- and post-treatment.

Few measures were discarded due to missing data. Only maternal ratings are reported in this study because the participating mothers outnumbered the fathers and to reduce number of statistical tests.

Treatment

The IY intervention program developed by Professor Carolyn Webster-Stratton at the parenting clinic, University of Washington, is a manualized and video-based training program for young children with conduct problems. Parents assigned to the BASIC parent training condition (Webster-Stratton & Reid, 2003a) were divided into groups of 10–12 parents, approximately parents of 6 children in each group. The parents met weekly for 12–14 weeks for 2 hours with two accredited therapists. During the sessions, parents watched 250 video vignettes showing examples of everyday life parent–child interactions. The therapists led discussions regarding central aspects of parenting on the basis of the video vignettes. The aims of the parent program are to strengthen families and promote parent competencies by increasing their positive and self-confidence in parenting, reduce negative parenting practices, improve parents' problem-solving skills and anger management, and improve school involvement. Parents received home tasks and each session started with the parents describing their experience of these exercises. On average, parents attended 92% of the scheduled meetings (*M* = 11.2, *SD* = 1.6).

In parent training combined with child training, the parents and their children met simultaneously at the clinic, but the child and parent sessions were held separately. In child training (the "Dinosaur school"), approximately 6 children met for 2 hours weekly for 18–20 weeks with two therapists. Child training is a video-based program that comprises more than 100 video vignettes depicting children in a variety of everyday life situations and settings (e.g. at home with parents, in the classroom and on the playground). In addition to the videotapes and related discussions, the training program involves fantasy play with life-size puppets, including a boy, a girl and various animals. The puppets present their ongoing interpersonal problems in the group, exposing interpersonal skills, e.g. how to make new friends, being a friend, and so forth. Exercises were sent home with the child every week. The child training is described in detail elsewhere (Webster-Stratton & Reid, 2003b). Attendance in child therapy was high with an average of 91% of the planned sessions (*M* = 15.6, *SD* = 1.9).

Attrition

A total of two families (2%) dropped out of treatment, both children were boys and from PT.

Therapists and treatment integrity

A total of 15 therapists administered the parent training program and 9 therapists administered child training at the two sites. Each of the therapists had a Bachelor's or Master's degree in mental health related fields and was experienced in clinical work. The therapists in parent training were trained according to certification procedures established by the IY program and they were certified by the program developer. The therapists received continuous supervision through observations, role play, and video reviews from the second author (WTM), a professor of psychology and certified trainer in the IY program. In order to ensure treatment integrity, the therapists followed a treatment manual, completed standard check-lists, and tracked group activities (number of vignettes showed, role-plays, home-tasks etc.) throughout treatment sessions. All sessions were videotaped for evaluation by the trainer and weekly peer and self-evaluation meetings.

Outcome variables

Three criteria for clinically significant outcomes were chosen: The first criterion pertains to child functioning at home, the second criteria is related to independent observation of negative parenting, and the third criterion pertains to child behaviors in day-care or at school.

Conduct problems at home. The ECBI is a 36-item inventory for parental ratings of conduct problem behaviors among children aged 2–16 years (Robinson, Eyberg & Ross, 1980). On each item of the intensity scale, the parent is asked to respond on a seven-point Likert scale ranging from 1 = "Never" to 7 = "Always", as an indicator of intensity of specific child problem behaviors. The Cronbach alpha (α) was 0.84. The Norwegian norms of the ECBI (Reedtz *et al*., 2008) permit evaluations of the extent to which parents perceive the child as being within normative range. Children scoring above one SD of the normative mean on the ECBI (an ECBI intensity score greater than 114.6) at post-treatment were defined as non-responders, while children scoring below this cut-off score were defined as responders.

Observations of negative parenting in the clinic. The Dyadic Parent-Child Interaction Coding System-Revised (DPICS-R; Eyberg & Robinson, 1981) was used to score parental behaviors. The DPICS-R is an observational measure developed specifically to record conduct problems among children and their parents, consisting of 35 categories. Mothers showing a reduction equal to or greater than 30% in negative (negative + critical command) parenting practices from pre- to post-treatment were considered as responders, while mothers showing reductions less than 30% or an increase in negative parenting were considered non-responders. The sequences of parent-child dyads lasted for 15 minutes for each parent-child dyad which was videotaped.

Ten trained observers scored the video tapes. They were blind to assigned treatment condition of the participants. Before scoring the video tapes, the observers were trained for 80 hours and had to maintain a reliability of 0.80 on practice tapes between the observers. In order to maintain accuracy in their coding, observers met regularly for training sessions. In order to maintain consistency between the two sites, observers coded videotaped interactions across sites for inter-rater reliability and met for discussion via TV conferences.

Conduct problems in day-care/at school. The Preschool Behavior Questionnaire (PBQ) consists of 30 items addressing conduct problems and is completed by day-care teachers for children aged 4–6 years (Behar, 1977). In this study, seven items scored on a 0–2 scale in the aggression ($\alpha = 0.80$) subscale were used. On the Teacher Report Form (TRF; Achenbach, 1991) teachers were asked to rate schoolchildren's academic performance, four general adaptive characteristics, and 112 emotional and behavioral problems scored on a 0–2 scale. In this study, the aggression subscale, consisting of 25 items ($\alpha = 0.94$) was used. Responders in day-care and school settings were children scoring below the 80th percentile on the PBQ for children in day-care, and the 88th percentile on the TRF for children in school. Children scoring above these cut-off scores were considered non-responders. These cut-off scores have been established in comparisons between the present clinical sample and Norwegian normative data for the PBQ/TRF measures (Drugli, Larsson, Clifford & Fossum, 2007).

Predictors of treatment outcome

Information was gathered from the KSADS, a semi-structured diagnostic interview, in which episodes of psychopathology in the children according to DSM-IV are assessed (American Psychiatric Association, 1994; Kaufman, Birmaher, Brent *et al*., 1997). A modified version of the KSADS was used and diagnoses most relevant for 4–8 year-old children were assessed. Three trained interviewers conducted the interviews. All interviews were recorded and a random selection of 10% of the interviews showed a high percentage of inter-rater agreement, in all cases above 90%. Clinical levels of ADHD imply diminished functioning (six symptoms of attention problems, hyperactivity or a combination of the two) or sub-clinical (one symptom less than formal DSM-criteria) levels of ADHD. An anxiety disorder, that is generalized, as well as various specific anxieties such as phobias, imply a score above cut-off and diminished functioning indicated by the DSM-IV.

Parental stress. The Parent Stress Index (PSI) was used to assess parents' perceived stress related to both child behaviors and parenting ($\alpha = 0.94$). A total score was calculated on 101 items rated on a 1–5 scale (Abidin, 1995) and ranged from 101 to 505. Parents who score at or above 260 on total stress score should be offered referral for professional consultation according to Abidin (1995). (Due to a protocol error, some parents in the first wave of assessment did not fill out the PSI, resulting in a lower number of subjects for the PSI than for other measures).

Symptoms of parental depression. The Beck Depression Inventory (BDI) a widely used measure of depressive symptoms, (Beck, Steer & Garbin, 1988) was administered to parents. The BDI measures 21 attitudes and symptoms on a scale ranging from 0 to 3 ($\alpha = 0.89$). Total scores range from 0 to 63.

Potential predictors in kindergarten/at school. Clinical levels of ADHD as reported by the parents (see description above) were used as a potential predictor of disruptive behaviors in day-care or in school.

Mediators of treatment outcome

Parenting practices. The Parenting Practices Interview (PPI) was adapted from the Oregon Social Learning Center's Discipline Questionnaire (Webster-Stratton, Reid & Hammond, 2001). Parents reported the probability and frequency with which they used harsh child discipline techniques, consisting of 14 items on a 7-point scale ($\alpha = 0.80$); inconsistent discipline, consisting of 8 items on a 7-point scale ($\alpha = 0.69$); and positive parenting, consisting of 15 items on a 7-point scale ($\alpha = 0.65$). The mean values of the scales on the PPI were applied.

Table 1 presents detailed information of pretreatment characteristics for outcome variables, potential predictors and mediators.

Statistical procedures

Predictors. Bivariate logistic regression analysis was performed in order to test for three outcomes of clinical significance. First, we wanted to determine if mother reports in child and family variables at pretest served as predictors of treatment outcome using a score below/above normative range on the first dependent variable (ECBI). In this analysis, pretreatment ECBI score was used as the control variable. Second, we wanted to assess the associations between treatment outcome in parenting (as defined as a 30% reduction in negative parenting) and child and family variables as independent variables. Finally, the relationships between treatment outcome in day-care and school settings were assessed, using a composite PBQ/TRF score as dependent variable, and diagnostic status and clinical levels of ADHD as independent variables.

Mediators. To establish whether a variable was a mediator, three regression models were analyzed as described by Preacher and Hayes (2004). In Model 1 the relationship between change in conduct problems and treatment were assessed. In Model 2 the association between change in conduct problems and change in parenting controlling for treatment were addressed. And finally in Model 3, the relationship between change in parenting and treatment were calculated. If the calculations show that there are significant associations in all three models, the change in parenting variable may be considered to be a mediator. The mediation path model is presented in Fig. 1.

To test whether the amount of mediation was significantly different from zero, the Aroian test was calculated using an interactive calculator provided by Preacher and Leonardelli's (2008) website.

RESULTS

Predictors of treatment outcome

Mothers scored 37 (39.8%) of the children as responders and 56 (60.2%) as non-responders at post-treatment, when considering the children's conduct problems as measured by the ECBI in the two treatment conditions. Mother reports on the ECBI showed that the mean score for responders was 90.7 ($SD = 16.4$), while non-responders had a mean score of 138.3 ($SD = 20.8$). Mean change from pre- to post-treatment on the ECBI for responders was 56.3 points ($SD = 22.6$) while the mean change for non-responders was 24.6 ($SD = 23.4$), a significant difference, $F_{(1, 92)} = 42.0$, $p < 0.001$. For observed negative parenting, 88 mother-child dyads were observed pre- and post-treatment. In all, 30 mothers (34.1%) achieved 30% or greater reduction of observed negative parenting at post-treatment, while 58 (65.9%) were non-responders. Mean reduction in observed negative parenting for responders was 7.5 ($SD = 7.3$), while the non-responders increase in negative parenting was 2.0 ($SD = 3.1$), a significant difference $F_{(1, 87)} = 60.9$, $p < 0.001$. According to teachers, 68 (79.1%) children scored above the optimal cut-off before treatment, while 58 (67.4%) children were still above this cut-off at post-treatment and 28 (32.6%) children scored below. Mean change in z-score for responders was −1.3 ($SD = 1.5$) and for non-responders the change in z-score was −0.7 ($SD = 2.4$), a non-significant difference $F_{(1, 67)} = 1.6$, ns.

Table 1. *Pretreatment characteristics for outcome variables, potential predictors and mediators (pretreatment scores of parenting,* SD *and mean change scores and belonging* SD*)*

	Scores		
	Mean (*SD*)	Range	Characteristic
Outcome variables (*N* = 93)			
Conduct problems (ECBI intensity score)[a]	156.6 (22.8)	111–220	98.9% children above cut-off, 1.1% child below cut-off
Negative parenting (DPICS-R)	5.0 (6.1)	0–34	–
Teacher reports (TRF/PBQ *z*-value)[b]	3.8 (2.6)	−0.3–9.4	79.1% children above cut-off
Predictors (*N* = 93)			
Sex of the child (%girls/%boys)	20.2/79.8	–	–
ADHD[c]	*n* = 56	–	21.2% sub-clinical, 35.4% in clinical range
Anxiety	*n* = 10	–	9.7% specific anxiety, 1.1% post traumatic stress disorder
Maternal age	33.3 (5.6)	24–59	–
Marital status	–	–	59.1% married/co-habitats
Maternal education[d]	2.2 (1.0)	1–4	
Maternal stress (PSI total stress)[e]	265.1 (39.3)	179–342	10.8% > 99th–%, 23.1% > 95th–98.9th%, 20% > 85th–94.9th%
Symptoms of depression (BDI)[f]	6.6 (6.6)	0–34	7.4% mild, 4.2% moderate, 1.1% clinical
	Mean (*SD*)	Range	Mean change[g] (*SD*)
Mediators (*n* = 121)			
Parent reports of harsh discipline (PPI)	2.3 (0.5)	1.2–4.1	0.4 (0.5)
Parent reports of inconsistent discipline (PPI)	3.2 (0.7)	1.8–5.8	0.4 (0.7)
Parent reports of positive parenting (PPI)	4.3 (0.6)	2.8–5.9	−0.6 (0.7)

Notes: PPI = Parenting Practices Interview, DPICS = Dyadic Parent Child Interaction Coding System.
[a] ECBI = Eyberg Child Behavior Inventory a score equal or above 119 for girls and 126 for boys are scores above the 90th percentile.
[b] TRF = Teacher Report Form and a score of 6 equals the 88th percentile and on the Preschool Behavior Questionnaire (PBQ) a score of 9 equals the 80th percentile.
[c] ADHD = Attention Deficit Hyperactivity Disorder, sub-clinical = one criteria less than required in a formal DSM-IV and clinical levels = criteria in DSM-IV.
[d] Parental education levels: 1 = not completed high school, 2 = completed high school, 3 = higher education, 4 = completed higher education.
[e] Parent Stress Index (PSI) score of 258 equals the 85 percentile, 294 equals the 95th percentile and 320 equals the 99th percentile.
[f] Beck Depression Inventory (BDI) cut-scores are 0–13 minimal depression, 14–19 mild depression, 20–28 moderate depression, 29–63 severe depression.
[g] Mean change = mean change from pre- to post-treatment and the corresponding *SD*.

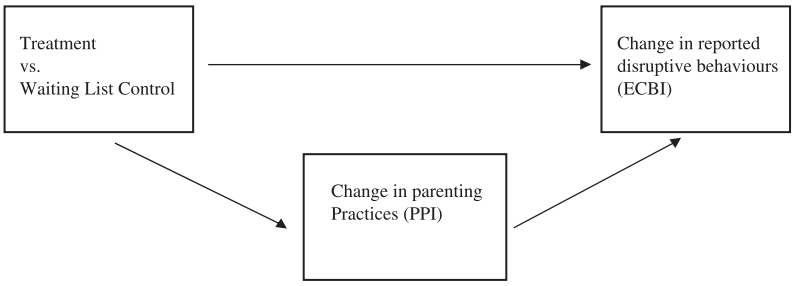

Fig. 1. Path diagram for the mediation model.
Note: PPI = Parent Practices Interview, ECBI = Eyberg Child Behavior Inventory.

Results of logistic regression analyses showed that the independent variables' clinical levels of ADHD, being a girl, and maternal stress predicted a worse treatment outcome in maternal reports on the ECBI. None of the child and family variables did significantly explain unfavorably outcomes in observations of negative parenting. Clinical levels of ADHD, as perceived by the parents, predicted poorer child functioning in day-care and school settings at post-treatment as reported by the teachers on

Table 2. *Results of factors potentially predicting a worse treatment outcome after parent training*

	Mother reports on the ECBI (n = 93)				30% reduction in observed parental criticism (DPICS) (n = 88)			
			95% CI				95% CI	
	Wald	OR	Lower	Upper	Wald	OR	Lower	Upper
Child factors:								
Sex	6.56*	8.04	1.63	39.60	0.38	1.57	0.38	6.61
Clinical levels of ADHD	5.83*	3.11	1.24	7.89	0.01	0.96	0.32	2.86
Anxiety disorder	0.06	0.86	0.25	2.94	2.65	40.52	0.74	27.70
Family factors:								
Maternal age in years	0.04	1.01	0.94	1.08	2.23	1.08	0.98	1.19
Marital status	3.61^{+}	2.91	0.97	8.50	0.34	1.44	0.42	4.91
Education	3.66				0.72			
Parent Stress Index total score	3.95*	1.02	1.00	1.03	0.76	1.01	0.99	1.03
Beck Depression Inventory	2.94^{+}	1.08	0.99	1.18	0.00	1.00	0.93	1.08
	Teacher reports on PBQ/TRF (n = 86)							
			95% CI					
	Wald	OR	Lower	Upper				
Functioning in day-care/school:								
Clinical levels of ADHD	3.98*	3.26	1.02	10.39	–	–	–	–

Notes: ECBI = Eyberg Child Behavior Inventory, DPICS = Dyadic Parent Child Interaction Coding System, PBQ = Preschool Behavior Questionnaire, TRF = Teacher Report Form, ADHD = Attention Deficit Hyperactivity disorder, $^{+}$ $p < 0.10$, * $p < 0.05$.

the dependent variable PBQ/TRF. For more detailed information of treatment predictors in parent training, see Table 2.

Mediators of change in parent training

We further tested whether parental reports of harsh and inconsistent disciplining and positive parenting were mediators of the relationship between treatment and changes in child conduct problems as measured by the ECBI. Changes in positive parenting were not significantly associated with outcome when controlling for treatment condition, thus positive parenting was not found to be a mediator. Table 3 presents the results of the regression analysis for Model 1, 2, and 3, and gives the tests on whether the requirements for being mediator candidates are fulfilled for the variables change in harsh discipline and change in inconsistent discipline (see Preacher & Hayes, 2004).

When including change in harsh discipline in the mediation model, the regression coefficient reduced from 0.22 to 0.12 (see Table 3), which was significant according to the Aroian test ($z = 2.46$, $p < 0.05$). This suggested that change in harsh discipline was partially mediating the relationship between treatment and change in conduct problems. Considering change in inconsistent discipline, the regression coefficient decreased from 0.22 to 0.14 (see Table 3), which was significant applying the Aroian test ($z = 2.41$, $p < 0.05$). This indicated that change in inconsistent discipline was partially mediating the relationship between treatment and change in conduct problems.

Table 3. *Regressions for the mediator analysis*

	Beta	*t*-value	*p*-value
PPI harsh disciplining:			
Model 1			
Treatment vs WLC	0.22	2.37	$p = 0.02$
Model 2			
Treatment vs WLC	0.12	1.34	n.s.
Change in self-reported harsh disciplining	0.36	3.93	$p < 0.001$
Model 3			
Treatment vs WLC	0.34	3.02	$p = 0.003$
PPI inconsistent disciplining:			
Model 1			
Treatment vs WLC	0.22	2.37	$p = 0.02$
Model 2			
Treatment vs WLC	0.14	1.52	n.s.
Change in self-reported inconsistent disciplining	0.26	2.76	$p = 0.007$
Model 3			
Treatment vs WLC	0.50	3.56	$p < 0.001$

Notes: PPI = Parenting Practices Interview, WLC = Waiting List Condition.

DISCUSSION

The main purpose of this study was to explore child and family factors as predictors of short-term treatment outcome in clinically referred Norwegian children with severe oppositional or aggressive

behavior problems. Another aim was to explore if changes in parenting behaviors mediated changes in child conduct problems after IY parent training. A relatively large proportion of the children, almost 40%, did function within the normative range on the ECBI after participation in IY and mothers of children scoring within normative range reported significantly larger reductions on the ECBI as compared to children scoring above normative range. However, changes in child behavior problems generalized to day-care and school settings were small as reflected by teacher reports. Similarly, alterations in observed negative parenting were small in that 30% of the mothers were observed using 30% or greater reductions in negative parenting, although the differences in observed negative parenting were significant.

Mother reports of changes in harsh and inconsistent child disciplining were large in the Norwegian replication of the IY (Larsson *et al*., in press). We further reported that change in both harsh and inconsistent disciplining were significant partial mediators of changes in the children's conduct problems. This highlights the importance of focusing on changing parenting practices as an indirect way to change severe conduct problems in young children. Both inconsistent and harsh disciplining parental behaviors were found to be significant partial mediators of conduct problems in children in the US (Beauchaine *et al*., 2005). Contrary to the findings in the study by Gardner *et al.* (2006), positive parenting emerged as a non-significant mediator in our study. Nevertheless, changes in the application of positive parenting were substantial in the present Norwegian replication study (Larsson, *et al*., in press). Improving the use of positive parenting in parent training is clinically fundamental, both as a means to strengthen parent–child bonding initially in treatment and to maintain positive parent–child relationships.

Taking predictors of treatment outcome into consideration, clinical levels of ADHD predicted poorer outcome after parent training, both as experienced by the mothers at home and by the teachers in day-care and school settings. It seems that comorbid ODD and ADHD produce a worse treatment outcome, possibly due to comorbid ODD and ADHD constituting a more severe form of child conduct problems. It should be noted that a large proportion of the children in this study displayed pervasive conduct problems, i.e. conduct problems exhibited both at home and in day-care and at school (see Drugli *et al*., 2007). To optimize outcomes for children with severe and pervasive conduct problems, interventions should therefore address such problems in each setting where they occur. Beauchaine *et al.* (2005) noted that in particular children with elevated attention problems benefited from an intervention focusing specifically on increasing teacher adaptive and effective classroom management (IY Teacher Training Programs, Webster-Stratton & Reid, 2003a). Hartman *et al.* (2003) noted that boys with attention problems benefited more from the IY program as compared to those without attention problems. Whether the differing findings in the study by Hartman *et al*. (2003) and our study is an effect of varying methodology in identifying attention problems is unclear.

The levels of stress were high among several mothers participating in parent training in this study and this factor also predicted an unfavorable treatment outcome in children's conduct problems. Higher levels of mother depressive symptoms tended to influence treatment outcome in the same manner. These findings emphasize the importance of taking stress and depressive symptoms among mothers into consideration when offering parent training to parents having a child with severe conduct problems. In the Swedish replication of the IY, poorer perceived psychological health also predicted a poorer treatment outcome (Axberg *et al*., 2007). Webster-Stratton and colleagues have developed the ADVANCE intervention program addressing parental communication, personal self-control, problem-solving skills, and strengthening social support and self-care (Webster-Stratton & Reid, 2003a). This intervention has shown to increase treatment effects favorably (Webster-Stratton, 1994).

Although many of the participants in the present study experienced favorable treatment outcome, treatment effects were somewhat lower as compared to studies conducted by the originator of the IY program (Webster-Stratton & Hammond, 1997; Webster-Stratton *et al*., 2004). It should be noted that most often replication studies produce smaller treatment effects when comparing them to outcomes of studies conducted by originators of various treatment programs (Fossum *et al*., 2008).

While fewer girls than boys scored below the cut-off on the ECBI at post-treatment, this finding should be interpreted cautiously due to the small number of girls included in the study. Nor Beauchaine *et al*. (2005) or Axberg *et al.* (2007) reported sex differences in responsiveness to IY. It is likely that the elevated levels of stress in the families of girls (Fossum *et al*., 2007) may have contributed to this finding. Neither marital status, nor maternal age or levels of education predicted treatment outcome in this sample, both in the intensity of the children's disruptive behaviors and in the observations of negative parenting practices. In fact, there was a tendency for children living in single parent households to score below the cut-off more often compared to those living in two-parent households. This may suggest favorable treatment outcomes also for children living in families with additional psychosocial risk factors. These findings could be due to social conditions in Norway making the sample relatively homogeneous with respect to socio-demographic variables but also in regard to mother age.

Limitations of the study

Relatively few children met diagnostic criteria for anxiety disorder and the assessment of clinical levels of ADHD did not meet the formal criteria of a diagnosis. As a consequence, these results should be interpreted cautiously. Further, parental psychopathology, except symptoms of parental depression that might have influenced treatment outcome negatively, was not controlled for. Third, the use and implications of a 30% reduction in observed negative parenting are unclear. Initially we observed low levels of negative parenting as compared to

studies in the US (see for instance Hartman *et al*., 2003). As a consequence, a mother using negative parenting three times at pretreatment and twice at post-treatment will show a clinical reduction of more than 30% in observed negative parenting in our study. Still, the reductions in negative parenting were significantly larger among the responders as compared to the non-responders. Nevertheless, perhaps the most important lesson learned from our observational procedures, are that in a Norwegian setting parents are more neutral in their interaction when being observed compared to parents in the US. Whether this indicates a true difference in parenting practices between the US and Norway is unknown.

Conclusion

Many of the participating children experienced clinically meaningful improvement and the significance of reducing negative and inconsistent disciplining in treatment were highlighted since these factors both were significant mechanisms of change in parent training in Norway. After treatment, two-thirds of the sample scored within norms on conduct problems (Larsson *et al*., in press), overall results in line with previous studies of the IY (Scott *et al.*, 2001; Webster-Stratton & Hammond, 1997). It is noteworthy that no child or family variables predicted unfavorable outcomes in parenting practices. This is especially important when considering improvement of parenting practices as a means to reduce children's conduct problems. Nevertheless, factors such as being a girl, a diagnosis of ADHD and high levels of maternal levels of stress were predictors of less improvement in parent training and these factors are of importance to allow for when applying parent training in clinical practice.

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