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# A Randomized Controlled Effectiveness Trial of Parent Management Training With Varying Degrees of Therapist Support

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**This study examined the effectiveness of a Swedish parent management training (PMT) intervention for parents of children aged 3 to 10 within the context of regular social service. Self-referred parents of 159 children (aged 3 to 10) with conduct problems were randomly assigned to either 11 practitioner-assisted group sessions (PMT-P), or a single instructional workshop followed by self-administration of the training material (PMT-S), or a waitlist control group. Intent-to-treat analyses showed that both PMT-P and PMT-S improved parent competence and reduced child conduct problems compared to the waitlist at posttest. Both training conditions showed further significant improvements at the 6-month follow-up. In direct comparison, PMT-P was superior to PMT-S on measures of child conduct problems at both posttest and follow-up. Improvement in child conduct was mediated by improvement in parent competencies and homework fidelity. The findings in this study have implications for large-scale dissemination of parent management training through different means of delivery.**

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DISRUPTIVE AND AGGRESSIVE BEHAVIOR at an early age is one of the most important risk factors for deviant development later in life, such as school dropout, delinquency, and substance abuse (Conduct Problems Prevention Research Group, 1999; Kazdin, 1998; Moffit & Caspi, 2001). Consequently, it is important for society to provide effective help to families in need. The most theoretical and empirical well-founded method for early prevention of conduct problems is Parent Management Training (PMT; Eyberg, Nelson, & Boggs, 2008; Kazdin, 2005; Nock, 2003). Several standardized PMT programs—for instance, the Incredible Years (Webster-Stratton & Reid, 2003), Parent Management Training (Patterson, 1976), and Parent-Child Interaction Therapy (Eyberg, 2003)—have been developed over the last few decades. However, only a few children with conduct problems receive effective help due to lack of parental awareness of and accessibility to evidence-based interventions (Dodge, 2009; Sanders & Turner 2005). Furthermore, only a few intervention studies have investigated the effectiveness of PMT in routine care (Costin & Chambers, 2007; Ogden, Forgatch, Askeland, Patterson, & Bullok,

2005; Van den Hoofdakker et al., 2007). The need for such studies is pressing since many implementation efforts of evidence-based programs in routine care are less successful compared to results found in controlled efficacy studies (Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005). For example, in a recent effectiveness study of PMT, only small effect sizes were found on externalizing child behavior (Ogden & Amlund Hagen, 2008). Different means of intervention delivery also have to be investigated to enable large-scale dissemination, which was highlighted in a recent special issue of the *Journal of Consulting and Clinical Psychology* (e.g., La Greca, Silverman, & Lochman, 2009). To summarize, most families in need of help do not have access to PMT, and if they do, the effectiveness of the intervention is uncertain.

Another way of disseminating PMT at a larger scale, apart from training practitioners in routine care, is to limit the amount of therapist support. There are several studies that have evaluated the Triple-P parenting program in which each participating parent only was provided 100 to 200 minutes of telephone support (Hahlweg, Heinrichs, Kuschel, & Feldmann, 2008; Markie-Dadds & Sanders, 2006; Morawska & Sanders, 2006; Turner & Sanders, 2006). Limited therapist assistance has been shown to enhance intervention effects and improve acceptability of the intervention in comparison to self-administration of the intervention without support (Markie-Dadds & Sanders, 2006; Morawska & Sanders, 2006).

This study evaluates PMT disseminated in routine care by means of two different formats: 11 weekly sessions of practitioner-assisted group training (PMT-P) and a single instructional workshop followed by 11 weeks of self-administered training (PMT-S). The two training conditions were also compared to a waitlist control group. It was hypothesized that intervention effects in PMT-P would be superior to PMT-S. The reasoning behind this hypothesis was that continuous therapist and group support would lead to more effective implementation of the program compared to mainly self-administration. It was also hypothesized that both training conditions would be superior to the waitlist.

## Method

### PARTICIPANTS

The sample consisted of 159 families with one targeted child each (60% boys and 40% girls) with a mean age of 6.0 years ($SD = 2.3$). Most of the children lived with both parents (72%). The mothers were between 19 and 57 years old ($M = 37$, $SD = 5.5$) and the fathers were between 27 and 65 years old ($M = 39$, $SD = 7.0$). A lesser part of the parents in the sample (37%) had at least three years of education post senior high school. A minority was born abroad and had arrived as immigrants to Sweden (22%). None of the demographic variables differed significantly across study condition (Table 1).

### DESIGN

Families were assigned randomly to one of three conditions: (a) PMT delivered as 11 weekly sessions practitioner-assisted group training (PMT-P); (b) a single instructional workshop followed by 11 weeks of self-administration of the training material (PMT-S); and (c) a waiting-list control group (WL). The intervention groups were oversampled; the probability of assignment to PMT-P and PMT-S was 37.5% for each group versus 25% for the waiting list. Because age has been shown to affect treatment outcomes (e.g., Ogden & Amlund Hagen, 2008), the participants were divided into two age groups before randomization (3 to 5 years and 6 to 10 years) to prevent an uneven age distribution between conditions. Data were collected at

Table 1
Demographic Variables of the Sample ($N = 159$)

| Variable | PMT-P | PMT-S | WL | |
|---|---|---|---|---|
| Child's age *M* (*SD*) | 6.0 (2.4) | 6.1 (2.3) | 6.2 (2.2) | $F(2,156) = 0.1$ |
| Girls (%) | 43 | 39 | 33 | $\chi^2$ (2) = 2.0 |
| Single parent home [a] (%) | 24 | 25 | 38 | $\chi^2$ (2) = 2.5 |
| Mother's age *M* (*SD*) | 37 (5.2) | 38 (5.2) | 38 (6.2) | $F(2,156) = 0.6$ |
| Father's age *M* (*SD*) | 39 (6.9) | 39 (6.9) | 41 (5.9) | $F(2,156) = 1.4$ |
| Immigrant parents [b] (%) | 22 | 23 | 21 | $\chi^2$ (2) = 0.2 |
| Mothers with higher education [c] (%) | 35 | 41 | 43 | $\chi^2$ (2) = 0.6 |
| Fathers with higher education [c] (%) | 29 | 38 | 40 | $\chi^2$ (2) = 1.5 |

[a] Within the city of Stockholm 19% of children aged 0–12 years live with a single parent (Statistics Sweden, 2006).
[b] Within the city of Stockholm 20% of the population are immigrants (Statistics Sweden, 2008a).
[c] Higher education is defined as at least three years of education post senior high-school. Within the city of Stockholm 38% of women and 33% of men aged 25–64 years have higher education (Statistics Sweden, 2008b).

randomization, at postintervention, and at a 6-month follow-up. The interval between pre- and postmeasurement was slightly shorter for parents in the waiting-list ($M = 119$ days), compared to the PMT-P ($M = 126$ days) and PMT-S ($M = 134$ days) groups, $F(2, 123) = 3.17$, $p < .05$. This difference had no moderating effect on the treatment outcomes when used as a covariate. Because parents in the WL group received training immediately after posttest, they were excluded at follow-up. The time between randomization and follow-up ($M = 319$ days) did not differ significantly between the two PMT groups, $F(1, 99) = 0.33$, $p > .05$.

### PROCEDURE AND REFERRAL

Parents from the greater Stockholm urban area (population = 1.9 million) were informed about the study mainly through information in schools and newspaper advertisements. The inclusion criteria were that the targeted child (a) should be between 3 and 10 years old, (b) should display conduct problems at a clinical level, and (c) should not be part of any ongoing psychosocial treatment or intervention. To assess the impact of the conduct problems, the parents completed the burden and impact scales from the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1999). The scales have proved to discriminate clinical populations of children with diagnoses such as ODD and ADHD from normal controls in Scandinavian populations (Heiervang, Goodman, & Goodman, 2008; Malmberg, Rydell, & Smedje, 2003). To be included in this study, the score had to be above the cut-off (90th percentile) on the impact or burden scale compared to Scandinavian norms (Heiervang et al., 2008; Malmberg et al., 2003). SDQ scores above the 90th percentile on the burden or impact scale have been shown to predict independently diagnosed psychiatric disorders with a specificity of 80% to 96% (Goodman, 1999; Goodman, 2001). A total of 203 families announced interest to participate in the study. Of those, 20 did not meet the inclusion criteria and 24 declined to take part in the study when informed about the conditions of participation. Three cohorts were enrolled in the trial over three terms, starting in 2004 and ending in 2005. Possible effects of cohort were controlled for in the analyses of intervention effects.

Parents were informed of condition allocation at the initial data collection, which took place immediately following randomization. Informed signed consent was required from all participants. For each completed postassessment, families were paid SEK 200 (about $25). Blind to the treatment condition, research assistants collected the data. The study presented here was approved by the Swedish Ethical Review Board in Stockholm.

### ATTRITION

Of the 159 families who participated in the study, 14 (9%) withdrew before posttest (Figure 1). These participants did not differ significantly ($p > .05$) from the remaining participants on any of the demographic measures or outcome measures at pretest. At follow-up, 6 more participants dropped out. Again, there were no significant differences on any of the measures between dropouts and the remaining participants ($p > .05$).

### INTERVENTIONS

The Swedish PMT program, Comet (COmmunication METhod), is administered by the Stockholm Social Services Administration as a regular part of their services to families. Comet includes evidence-based behavioral parent-training components from Barkley (1997), Webster-Stratton (1996), and Bloomquist and Schnell (2002). The program consists of eleven sessions with the following content: (1) self-directed play and positive interaction; (2 and 3) preparations before activities, effective commands, and praise; (4 and 5) tokens and rewards; (6) involving school teachers through home-notes; (7) extinction of negative behavior; (8 and 9) behavioral contracts; (10) structured problem-solving; and (11) relapse prevention. Between sessions, parents are given homework in which they practice the session content with their child. Some of the homework assignments are the same for all families (e.g., scheduling of play-time), while some are tailored to the individual family through the use of applied behavior analysis (e.g., praise of specific target behavior).

Comet has been tested in a pilot study (Hassler & Havbring, 2003) and was then further modified during a test period on approximately 200 parents. A pre-post study on 635 families revealed significant decreases in child problem behaviors (Kling & Sundell, 2006). Furthermore, the attendance rate was high (90%) and parents' approval of the program was excellent.

### PMT-P

Regular staff members at social welfare centers and preschools were trained to become group leaders. A total number of 72 group leaders were trained and led parent groups throughout the study. The majority of the group leaders (79%) were social workers, family counselors, or welfare officers within the social services. The remaining group leaders (21%) were teachers working with families within the school system. The group leaders generally had a long experience in working with families ($M = 16$ years, $SD = 9$ years) and 57% had prior training in family and/or systemic therapy, usually between 1

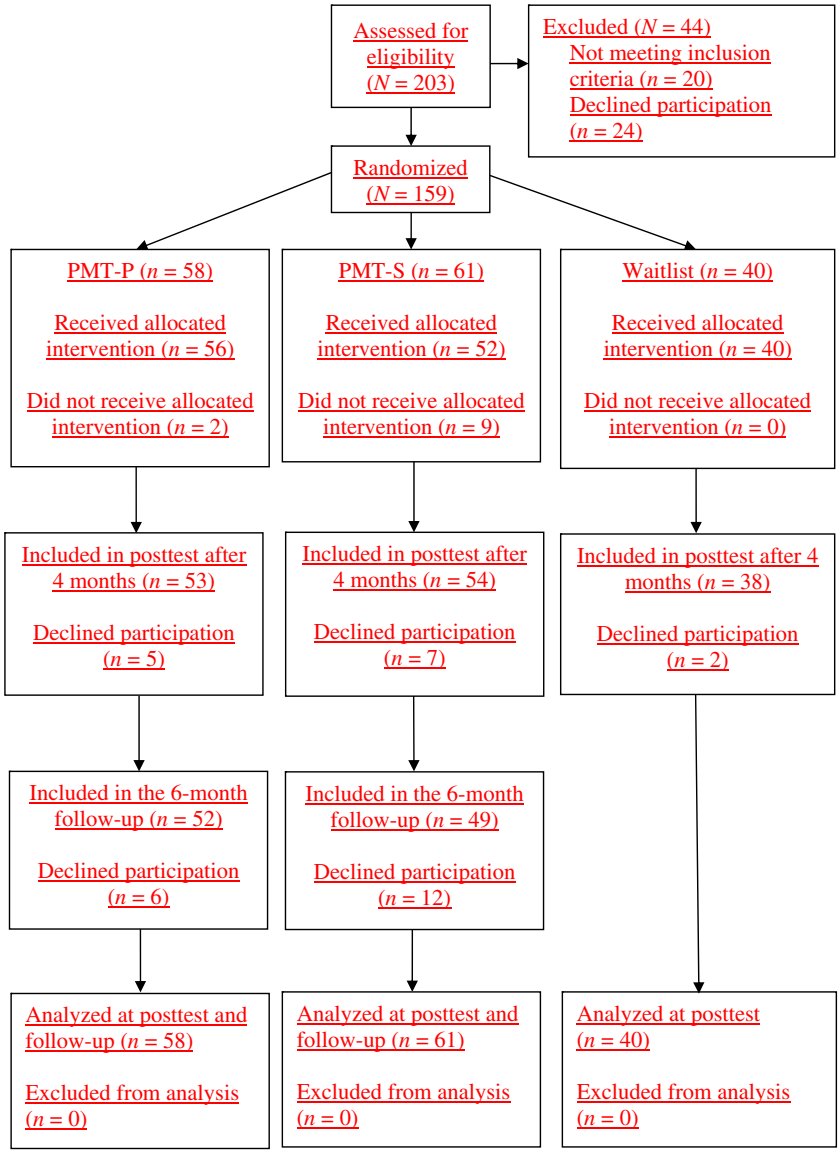


FIGURE 1 Flow diagram of the process through the phases of the study.

and 3 years. However, none of the group leaders had any prior training in or experience in behavioral parent training or CBT. An educational unit within the social services, independent of the research group, was responsible for the training and supervision of the group leaders. The training comprised three full-day workshops and supervision by clinical psychologists. The supervision was conducted in 15 groups of no more than six group leaders during eight sessions spread out across the implementation of the program. This was the regular procedure of training group leaders in PMT-P within the social services in the city of Stockholm.

The parent groups met weekly with two group leaders for eleven 2.5-hour sessions. A typical session encompassed teaching, brief video clips depicting various child-parent interactions, discussions, role-playing, and homework assignments for the coming week. Parents were provided with written handouts each week as well as material for the token system at that particular session. The total number of homework assignments throughout the program was 29 for each parent. Both parents of the child attended the group sessions in 8% of the families that participated in the study. The average number of families in each parent group was 5.8 ($SD = 1.7$; range 3–10).

### PMT-S

The parents in the PMT-S condition attended a single 7-hour instructional workshop. During the workshop the program content was explained and

the parents were given general instructions on how to implement the program on their own in the coming 11 weeks. They were provided with the same written material and a homework schedule prescribing the same type and amount of exercises as in the PMT-P condition. No further support was given to the parents after the initial workshop. The workshop was given on three different occasions each semester/cohort. Each workshop was led by two group leaders who received the same training and supervision as in the PMT-P condition. The total number of workshop leaders was seven. Both parents of the child attended the workshop in 52% of the families. The average number of families in each workshop-group was 5.8 *(SD* = 2.0; range 3–9).

*Implementation Fidelity*

The group leaders in both intervention groups followed a comprehensive manual to ensure implementation fidelity. Detailed checklists were completed weekly by parents in the PMT-P group through a website questionnaire or a telephone interview. Similar checklists were completed by the group leaders after each session (and after the initial full-day workshop in the PMT-S group). The checklists included questions about program content, number of video clips shown, role-plays performed, and homework assignments completed. The fidelity in the PMT-S group was assessed through a modified version of the checklist.

The mean number of sessions attended by PMT-P parents was 9.4 (*SD* = 2.0); 73% attended 9 or more sessions. In the PMT-S conditions, 52 out of 61 parents (85%) attended the initial workshop. Because attendance was a prerequisite in the PMT-S condition, the 9 parents who failed to attend did not receive the allocated intervention. All 9 parents intended to attend, but were unable to do so at any of the occasions that the workshop was given. PMT-P parents completed on average 63% (*SD* = 24%) of the homework assignments, and the PMT-S parents completed on average 45% (*SD* = 26%), which was a significant difference ($t = 3.6$, $p < .001$).

According to PMT-P group leaders, 76% of the program content was covered during the training sessions. The corresponding portion according to parents was 70%. This difference was not significant. In the PMT-S group, 100% of the program content was covered during the single workshop included in that condition according to the group leaders. Parents in both intervention groups rated group leader competence equally. On a 5-point scale (5 = best), the average score for both groups was 4 (*SD* = 0.7).

## MEASURES

*Parent Daily Report (PDR)*

The PDR is a structured telephone interview with 34 dichotomous items (Chamberlain & Reid, 1987). The questions refer to whether the child has displayed certain behaviors in the previous 24 hours, and the interview was repeated for 5 days each data collection period. Parents could choose, after the initial interview administered by phone, between reporting by phone or Internet. The concurrent validity of the PDR has been demonstrated in association with a number of measures of child and family functioning, including live observations of family interactions coded in the home (Forgatch & Toobert, 1979). The stability and interrater reliability of the PDR has previously been found adequate (Chamberlain & Reid, 1991; Weinrott, Bauske, & Patterson, 1979). In this study, the internal consistency ($\alpha = .79$) as well as the test-retest reliability between pretest and posttest in the waitlist ($r = .69$) was adequate.

*Eyberg Child Behavior Inventory (ECBI)*

The ECBI is a parent rating scale consisting of 36 child problem behaviors (Eyberg & Pincus, 1999). Parents are asked to indicate the frequency on a 7-point Intensity Scale (IS) ranging from "never" (1) to "always" (7), and to identify by "yes" or "no" on the Problem Scale (PS) which behaviors are perceived as problems. A recent Swedish translation has demonstrated acceptable reliability (Axberg, Johansson Hanse, & Broberg, 2008). Both scales had adequate internal consistency in this sample ($\alpha = .92$ and .89, respectively) and high test-retest reliability in the waitlist ($\alpha = .88$ and .79, respectively).

*Social Competence Scale–Parent (P-Comp)*

The P-Comp is designed to assess child prosocial behaviors, communicative skills, and self-control (Webster-Stratton & Hammond, 1998). The scale consists of 12 items on a 5-point scale, with adequate internal consistency and stability (Gouley, Brotman, Huang, & Shrout, 2008). For this sample, internal consistency ($\alpha = .80$) was adequate, as was test-retest reliability in the waitlist ($r = .76$).

*Parent Practices Interview (PPI)*

The PPI is an 80-item questionnaire measuring parenting style on a 7-point scale, including constructs such as appropriate discipline, harsh and inconsistent discipline, praise, and monitoring (Webster-Stratton, 1998; Webster-Stratton, Reid, & Hammond, 2001). High to moderate levels of temporal stability have been demonstrated for the PPI (Baydar, Reid, & Webster-Stratton, 2003). In this sample, the total sum score was used with

adequate internal consistency (α = .86). The test-retest reliability in the waitlist was moderate (*r* = .52).

*Intervention Credibility*

Parents rated intervention credibility at posttest using the revised version of the questionnaire developed by Borkovec and Nau (Devilly & Borkovec, 2000). The scale consists of five items related to credibility of an intervention (e.g., its reasonableness, effectiveness, and the participants' willingness to recommend this intervention). Each item was rated on a 10-point scale (10 = best). The internal consistency for this sample was high (α = .89).

### STATISTICAL ANALYSES

Because missing values on single items were relatively infrequent (on the average less than 1% of the entries in the data set), single variable imputation was used (Widaman, 2006). Missing values were imputed using the Markov chain Monte Carlo (MCMC) method in SAS (version 9.1.3). Baseline differences between treatment conditions on demographic and psychosocial variables were examined using chi-square test for categorical variables and one-way analysis of variance (ANOVA) for continuous variables. Consistent with recent literature in addressing attrition, a multiple imputation procedure was used (Brown et al., 2008; Little & Rubin, 2002; Schafer & Graham, 2002). This allows for an intention-to-treat analysis, because all participants in the study can be included in the analysis. Five imputed datasets were created using the software NORM v.2.03 (Schafer, 1999) with pretest measures as covariates. The imputation was performed separately for each group to preserve treatment effects.

Analysis of covariance at posttest with baseline scores as covariate was used to test the effectiveness of the two PMT conditions compared to the waitlist control group. For the direct comparison between the two PMT conditions, ANOVA repeated measures with baseline scores as covariate were used to evaluate effects at posttest and follow-up, following recommendations by Norman and Streiner (2008). Effect sizes (Cohen's *d*) were calculated by taking the difference in pre- to post-measure means (or pre- to follow-up) for each group and dividing these by their pooled standard deviations (cf. McCart, Priester, Davies, & Azen, 2006). With an alpha set at .05, three groups, two measurement points and a sample size of 159 (posttest), the power was .80 to detect the medium effect size according to conventional standards (*d* = .50). At follow-up (two groups, three measurement points and a sample size of 119), the corresponding power was .85.

## Results

### BASELINE COMPARISONS

There were no significant ($p > .05$) differences at baseline between the three groups with respect to age, gender, or demographic family variables. Nor were there any significant differences between the groups for any of the outcome measures (Table 1).

### PMT COMPARED TO WAITLIST

Intervention effects for the two PMT conditions compared to the WL group were tested with ANCOVA, using outcome at posttest as the dependent variable and baseline scores as covariate. There were significant between-group effects for all outcome measures except for P-Comp (Table 2). Planned contrasts showed that both PMT conditions were significantly superior to the WL at posttest on all measures, except for P-Comp, where the PMT-S group failed to show significant superiority. In a supplementary analysis of non-imputed data (i.e., study completers), all reported effects were found again. A second supplementary analysis, in which the interaction effect between cohort and intervention condition was examined, showed no significant interaction effects for any of the outcome measures, $F(2, 152) < 1.4$, $p > .05$, which means that cohort did not moderate the intervention effects.

Table 2
Means and Standard Deviations for Outcome Variables at Pre-, Post-, and Follow-Up

| | PMT-P | | | PMT-S | | | WL | |
|---|---|---|---|---|---|---|---|---|
| | M (SD) | | | M (SD) | | | M (SD) | |
| | Pre | Post | Follow-up | Pre | Post | Follow-up | Pre | Post |
| PDR | 9.4 (3.8) | 6.0 (4.0) | 5.0 (3.2) | 9.7 (3.7) | 7.6 (3.7) | 6.4 (3.9) | 10.6 (3.9) | 10.1 (4.9) |
| ECBI-IS | 137.5 (20.6) | 118.9 (25.6) | 115.3 (25.1) | 137.0 (28.1) | 122.3 (30.8) | 113.7 (29.7) | 140.2 (29.8) | 139.8 (28.9) |
| ECBI-PS | 15.5 (5.0) | 10.0 (6.9) | 8.2 (5.9) | 15.2 (6.9) | 12.0 (7.5) | 10.2 (7.1) | 16.4 (6.4) | 16.4 (6.5) |
| P-COMP | 31.0 (6.1) | 34.9 (7.0) | 36.9 (7.5) | 33.1 (6.7) | 35.3 (7.9) | 37.8 (7.9) | 32.7 (8.0) | 33.7 (8.8) |
| PPI | 364.8 (30.4) | 398.0 (25.1) | 407.6 (24.4) | 373.0 (34.9) | 393.1 (23.8) | 410.1 (25.4) | 376.9 (35.0) | 380.5 (23.5) |

### DIRECT COMPARISON BETWEEN PMT-P AND PMT-S

The two PMT conditions were tested against each other with ANCOVA repeated measures, using outcome at posttest and follow-up as dependent measures and baseline scores as covariate. Because the WL parents received training after posttest, they were excluded from this analysis. There were significant between-group effects for the measures PDR and the problem scale of ECBI, showing that the PMT-P group was superior to the PMT-S group (Table 3). There were no significant interaction effects between time and group for any outcome measure, indicating similar developments between posttest and follow-up for the two conditions and also that the advantage of PMT-P over PMT-S was stable. Furthermore, there were significant main effects of time on all outcome measures, indicating that both groups showed further improvements between posttest and follow-up. The between-group effect sizes of PMT-P compared to PMT-S at post and follow-up were in the small to medium range, all favoring PMT-P with larger differences at follow-up. In a supplementary analysis of nonimputed data (i.e., study completers), all reported effects were found again, apart from the between-group effect for PDR, which was only close to significant ($p<.10$). A second supplementary analysis, in which the interaction effect between cohort and intervention condition was examined, showed no significant interaction effects for any of the outcome measures, $F(1, 114)<0.76$, $p>.05$.

### MEDIATORS OF INTERVENTION EFFECTS

Mediator analyses were performed to investigate whether the effects of group assignment on measures of child conduct problems were indirectly affected by improved parenting skills, which has been shown in several previous studies of parent training (e.g., Ogden & Amlund Hagen, 2008; Reid, Webster-Stratton, & Hammond, 2007). According to Baron and Kenny (1986), a variable M is considered to be a mediator if (a) the independent variable X significantly predicts M, (b) X significantly predicts the dependent variable Y, (c) M significantly predicts the dependent variable Y controlling for X, and (d) the relation of X to Y is no longer significant. The last criterion is required to conclude that M completely mediates the relation of X to Y. However, if the relation of X to Y still is significant, but reduced, the mediation is considered to be partial, provided that the reduction is nontrivial. This procedure results in three regression models for each potential mediator variable (Table 4).

In previous studies reporting mediation through parenting practices, subscales related to positive and negative parenting have frequently been used as mediator variables, rather than entire constructs of parent behaviors (e.g., Beauchaine, Webster-Stratton, & Reid, 2005; Gardner, Burton, & Klimes, 2006; Ogden & Amlund Hagen, 2008;). For that reason, the mediator variables in the present analyses were changes at posttest in two summary scores from PPI that were used in a study by the developers of the questionnaire (Reid et al., 2007). The first summary score represents harsh and inconsistent parenting—HI (15 items), and the second represents praise and incentives—PI (11 items). The internal consistency in this sample was $\alpha=.74$ for the HI score and $\alpha=.64$ for the PI score, which was similar to Reid et al. (2007). The dependent variable was change in child conduct problems at posttest, which was calculated by taking the standardized means of PDR, ECBI-IS, and ECBI-PS. As shown in Table 4, partial mediation was established for both the HI score and the PI score, which were significant ($z=2.6$, $p<.01$ and $z=2.0$, $p<.05$, respectively) according to

Table 3
Intervention Effects and Effect Sizes at Post- and Follow-Up

| | PMT vs. waitlist at posttest | | | PMT-P vs. PMT-S | | | | |
|---|---|---|---|---|---|---|---|---|
| | *F* (*N*=159) | ES vs. waitlist (*d*)[a] | | *F* (*N*=119) | | | ES (*d*)[b] | |
| | Between | PMT-P | PMT-S | Between | Within | Interaction | Post | Follow-up |
| PDR | 11.0*** | .76*** | .46*** | 6.6** | 8.4** | 0.3 | .30 | .38 |
| ECBI-IS | 13.2*** | .79*** | .48*** | 0.2 | 7.9** | 1.7 | .30 | .16 |
| ECBI-PS | 12.6*** | .91*** | .45*** | 4.1* | 7.8** | 0.2 | .46 | .62 |
| P-COMP | 2.3 | .48* | .18 | 0.9 | 14.2*** | 1.1 | .30 | .22 |
| PPI | 8.0*** | 1.07*** | .55** | 0.5 | 25.6*** | 2.9 | .52 | .34 |

*$p<.05$, **$p<.01$, ***$p<.001$.

[a] The effect size within each intervention group has been compensated by the effect size in the waitlist group. Significant effect sizes indicate a significant contrast between the PMT group and the waitlist.

[b] Effect sizes are computed as PMT-P compared to PMT-S. Positive values reflect a larger effect for PMT-P.

Table 4
Regression Models for the Mediation Analyses

| | *Beta* | *t-value* |
|---|---|---|
| *PPI HI-score* | | |
| Model 1 – HI-score as DV | | |
| PMT-P/S vs. WL | .27 | 3.19** |
| Model 2 – Conduct problems as DV | | |
| PMT-P/S vs. WL | .36 | 4.56*** |
| Model 3 – Conduct problems as DV | | |
| PMT-P/S vs. WL | .24 | 3.01** |
| HI-score | .38 | 4.73*** |
| *PPI PI-score* | | |
| Model 1 – PI-score as DV | | |
| PMT-P/S vs. WL | .27 | 3.19** |
| Model 2 – Conduct problems as DV | | |
| PMT-P/S vs. WL | .36 | 4.56*** |
| Model 3 – Conduct problems as DV | | |
| PMT-P/S vs. WL | .28 | 3.35** |
| PI-score | .22 | 2.62** |
| *Homework fidelity* | | |
| Model 1 – Homework fidelity as DV | .33 | 3.55*** |
| PMT-P vs. PMT-S | | |
| Model 2 – Conduct problems as DV | .20 | 2.05* |
| PMT-P vs. PMT-S | | |
| Model 3 – Conduct problems as DV | | |
| PMT-P vs. PMT-S | .03 | 0.33 |
| Homework fidelity | .28 | 2.65** |

*$p<.05$, ** $p<.01$, *** $p<.001$.

the Sobel test (Baron & Kenny, 1986). In the Sobel test, the beta weights of the independent variable to the mediator and of the mediator to the dependent variable are entered to evaluate the strength of the mediation. The direction of the mediation was as expected; the larger increase in the PI score as well as decrease in the HI score, the larger reductions of conduct problems.

A third mediation analysis was performed to investigate if the differences in intervention effects between PMT-P and PMT-S were mediated by homework fidelity, which was significantly lower in the PMT-S group. In this case the dependent variable was the change in a compound score of the two measures of child conduct problems that were significantly different between the groups (PDR and ECBI-PS). The analysis revealed that homework fidelity completely mediated the change in conduct problems at posttest and follow-up (Table 4), which was significant according to the Sobel test ($z=2.1$, $p<.05$). The more homework the parents completed, the larger reductions of conduct problems.

### MODERATORS OF INTERVENTION EFFECTS

Multiple regression analyses with forced entry were conducted to examine the possible moderating effects of the eight variables describing the participants' characteristics (Table 1). The reason for investigating these variables was that previous studies have shown that such family characteristics can moderate intervention effects (Ogden & Amlund Hagen, 2008; Reyno & McGrath, 2006). Because the number of participating families in each training group varied considerably, that variable was also tested as a possible moderator. The nine possible moderator variables were tested against the posttest score of the outcome measures. For the outcomes of child conduct problems, a compound score was calculated as the standardized means of PDR, ECBI-IS, and ECBI-PS. For each regression analysis, the pretreatment score of the outcome measure, a dummy variable that represented the treatment group, and the tested moderator variable were entered into the first equation. In the second equation, the interaction between treatment condition and the moderator variable was added. With a strong moderator effect, the addition of the interaction variable increases the amount of variance explained. Two instances moderated the intervention effects. Younger mothers showed significantly greater improvements in parent practices (PPI) in the PMT-P group compared with the PMT-S group ($R^2$ change = .02). The children of younger mothers also showed significantly greater improvements in P-COMP in the two PMT-conditions compared to the waitlist ($R^2$ change = .04). However, two significant moderating effects is close to what would have been expected by chance, given 27 analyses (nine moderator variables × three outcome variables) and $p<.05$.

### INTERVENTION CREDIBILITY

The average rating of intervention credibility at posttest was 8.7 ($SD=1.1$) out of a maximum of 10 in the PMT-P group, compared to 8.1 ($SD=1.6$) in the PMT-S group. The difference was close to significant: $t(118)=1.95$, $p<.10$.

## Discussion

The present study is one of the few randomized trials evaluating parent training implemented in routine care. It also adds to the growing number of studies evaluating parent training with limited therapist support (Hahlweg et al., 2008; Markie-Dadds & Sanders, 2006; Morawska & Sanders, 2006; Turner & Sanders, 2006). The hypothesis that both PMT-P and PMT-S would be superior to the waitlist control group was supported. Furthermore, the results partly supported the hypothesis that the PMT-P group would perform better than the PMT-S group. This was true for two out of three

outcomes related to child conduct problems. Both intervention groups improved further between posttest and follow-up on all outcome measures. Improved parent practices and homework fidelity mediated the intervention effect on child conduct problems. The interventions were essentially equally effective regardless of family characteristics and the number of participating families in the training groups. The only significant moderator of intervention effects was the age of the participating mother.

The purpose of conducting effectiveness studies is to evaluate to what extent intervention effects found in efficacy studies can be generalized to the context of routine care. A recent meta-analysis of parent training including only randomized efficacy trails reported effect sizes on ECBI-IS and ECBI-PS of $d = .67$ and $d = .62$, respectively (Dretzke et al., 2009), which were exceeded in this study ($d = .79$ and $d = .91$). The number of comparable effectiveness studies is limited, but two previous randomized studies also reported significant effects on parent practices and child conduct problems (Ogden & Amlund Hagen, 2008; Van den Hoofdakker et al., 2007), with effect sizes in the small to medium range. The large effects found in this study were therefore surprising, especially with respect to the group leaders' limited training and experience compared to the therapists in the referred studies. However, some dissimilarities in study characteristics may explain the differences in effect sizes. Both of the referred studies compared the interventions to active control groups (treatment as usual). Furthermore, the participants were referred to service, as opposed to the self-referred sample in this study. Despite comparable family characteristics (e.g., education and marital status) and equal levels of conduct problems at baseline compared to this study, the different procedures of referral may have moderated the intervention effects. Self-referred participants in parent training have in previous studies shown better results than participants referred from other sources (Reyno & McGrath, 2006). It is therefore important to further investigate the relative effectiveness of the PMT-P model with other populations, including families who are referred to service. In sum, this study adds support to the findings from the few previous studies of parent training in routine care. The specific finding that brief training of group leaders, without prior experience of behavioral parent training, effectively can implement PMT has important implications in terms of cost-effectiveness.

Although the PMT-S condition included an initial instructional workshop, the following implementation of the program was entirely self-administered. A relevant comparison is evaluations of the Triple-P program, which has been implemented with limited therapist support as well as through self-administration alone. In this study, each practitioner spent 145 minutes per participating family in the PMT-S condition and the average effect size on parent reports of child conduct problems at posttest was $d = .46$. In the Triple-P studies, the support has been delivered through weekly telephone sessions or brief live sessions with an average of 131 minutes of practitioner support per participating family. The effect sizes for parent reports of child conduct problems (PDR and ECBI) were $d = .52$ (Turner & Sanders, 2006), $d = .58$ (Morawska & Sanders, 2006), $d = .60$ (Hahlweg et al., 2008), and $d = 1.71$ (Markie-Dadds & Sanders, 2006). The last effect size is remarkable, but should be considered with caution because of the small sample size and differences between the groups at pretest. In studies of the Triple-P program implemented as a self-administered intervention without therapist support, the effect sizes have been lower (Markie-Dadds & Sanders, 2006; Morawska & Sanders, 2006; Sanders, Markie-Dadds, Tully, & Bor, 2000). In sum, the Triple-P studies have reported somewhat larger effect sizes than the findings regarding PMT-S in this study. In contrast, the significant increase in intervention effects found at follow-up in this study were not found at the 6-month follow-up in the Triple-P-studies.

In the direct comparison between PMT-P and PMT-S, homework fidelity emerged as a mediator of change. It was not surprising that the PMT-P parents showed better fidelity, since they received continuous therapist and group support throughout the implementation of the program. Although not measured in this study, it could be assumed that the continuous support not only increased the quantity, but also the quality of the completed homework assignments. In future studies, measures to improve homework fidelity in PMT-S need to be investigated. For example, participants in PMT-S could be encouraged to support each other, using telephone, Internet forums, or through meetings without a therapist. In this study, the opportunity to contact other parents during the implementation was highlighted at the initial workshop. However, this was not encouraging enough, since less than 20% of the participants chose to follow that recommendation. Another possible way to enhance the implementation is to provide telephone support from therapists, which has proved to be effective in other studies (Hahlweg et al., 2008; Morawska & Sanders, 2006).

The relatively large effect sizes found comparing PMT-P to PMT-S on the measure of PPI at posttest

and follow-up were not significant. One reason for the large effect sizes is the fact that the groups were relatively, although not significantly, different at pretest. Because our analyses controlled for this, the effect sizes were not statistically significant.

It is worth noting that it was much more common that both parents of a child participated during the initial workshop in PMT-S (52% of participants) than during the group sessions in PMT-P (8% of participants). A meta-analysis of father involvement in parent training suggests that this variable is important (Lundahl, Tollefson, Risser, & Lovejoy, 2008). However, the possible moderating effect of this variable could not be tested in this study, due to lack of variation within the PMT-P condition. It is also not known to what extent both parents actually were engaged in the implementation of the program in the home setting, even if they attended the workshop (PMT-S) or group sessions (PMT-P).

In regard to the increasing number of studies showing that parent training with limited therapist support is effective, it is important to evaluate the relative advantage of supplying full practitioner assistance. In this study two out of five outcome measures favored PMT-P over PMT-S with effect sizes in the small to medium range. Sanders et al. (2000) found some advantages for full therapist assistance (each practitioner invested 600 minutes per family) over self-administration at posttest and at the 6-month follow-up. However, the self-administered version of the program included no therapist support at all. Nevertheless, at the 3-year follow-up, no significant differences emerged between intervention conditions (Sanders, Bor, & Morawska, 2006). The question remains whether the relative small advantages of PMT-P were worth the larger costs involved; the group leaders spent 145 minutes in PMT-S per participant versus 570 minutes in PMT-P. To answer this question, several issues have to be addressed.

First, even though the differences in effect sizes were relatively small between the two training conditions, the practical significance may still be meaningful for serious and fairly intractable problems (Lipsey & Wilson, 1993). To better understand how meaningful the effects in this study are, further studies need to investigate the short-term cost-effectiveness, as well as long-term societal gains of parent training. So far, few studies have been published involving cost-effectiveness and cost-utility of parent training (Romeo, Byford, & Knapp, 2005). However, a related issue was evaluated in a recent study by Foster, Olchowski, and Webster-Stratton (2007). They investigated the relative cost-effectiveness of stacking intervention components in parent and teacher. Although the relative advantage for extra components was relatively small in terms of intervention effects, the authors still concluded that these efforts were cost-effective.

Second, the general importance of matching intervention type to the needs of individual families has lately been highlighted (e.g., La Greca et al., 2009). Despite the lack of significant moderating variables in this study, it is still likely that some families benefit relatively more from one particular training condition. For example, because this study as well as the Triple-P studies employed self-referral of participants, further studies need to target families referred to service. Parents in such families may be less motivated to actively engage in self-administration of interventions.

Third, consumer preferences and satisfaction is an important variable in successful dissemination of interventions. Parents seem to prefer the continuous support from therapists. The parents tended to rate the PMT-S condition as less credible than the PMT-P condition ($p < .10$) and in the Triple-P studies conditions including therapist support have consistently been rated as more satisfying (Markie-Dadds & Sanders, 2006; Morawska & Sanders, 2006; Sanders et al., 2000).

With these issues in mind, the findings in this study still justify parent training with limited therapist support as a viable alternative in choice of intervention for children with conduct problems. To succeed in the implementation of family interventions, it is important to take the needs and interests of all involved parties into account (Aarons & Palinkas, 2007). Although PMT-S was slightly less effective than PMT-P, it may still be a warranted alternative for some families due to practical circumstances (e.g., distance to training facilities) or due to personal preferences. PMT-S may also be considered as a cost-effective first option in a stepped-care procedure.

Although several factors favor the credibility of the present findings, such as a well-controlled design and support for a link between parent practices and child conduct, there were limitations. Limitations related to the outcome measures included the single informant source of the measurements. A second limitation was the fact that a relative large number of parents randomized to the PMT-S condition did not receive their allocated intervention, which may have affected the results. However, against that risk stands the fact that the supplementary analysis of study completers (i.e., nonimputed data) essentially showed the same differences between the groups as the intent-to-treat analysis. A third limitation was that the

proposed mediators related to parenting practices were measured at the same time as the outcome variables (i.e., at posttest), meaning that there is no temporal precedence proven by a midtreatment assessment. The reason for this was that the waitlist only was assessed at two time points.

To conclude, the findings that brief training of group leaders as well as limited therapist support were effective ways to implement the intervention, have implications for large-scale dissemination of parent training. Kazdin (2008) points out that the debate about the advances in evidence-based interventions so far has focused on issues related to limits of highly controlled studies and applicability of the evidence to clinical work. Less often discussed is arguably the more salient issue, namely, that most people in need of interventions do not receive services.

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