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REGULAR ARTICLE

Attention-deficit/hyperactivity disorder with oppositional defiant disorder in Swedish children – an open study of collaborative problem solving

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Keywords
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ABSTRACT

Aim: To evaluate collaborative problem solving (CPS) in Swedish 6–13-year-old children with attention-deficit/hyperactivity disorder and oppositional defiant disorder (ODD).

Methods: Seventeen families completed 6–10 sessions of CPS training. Primary outcome measures were SNAP-IV [attention-deficit/hyperactivity disorder (ADHD) and ODD scores] and Clinical Global Impression-Improvement (CGI-I) scores at baseline, post-intervention and 6 months later. Secondary outcome measures were the Conners' 10-item scale and the Family Burden of Illness Module (FBIM).

Results: All 17 participants completed the intervention. The whole group had significant reductions in SNAP-IV ODD, ADHD, total Conners' and FBIM scores, both at post-intervention and at 6-month follow-up. Eight of the children, although significantly improved on ODD scores and the Conners' emotional lability subscale at post-intervention, had almost no improvement in hyperactivity/impulsivity. Post-intervention, this group received stimulant medication for their ADHD. CGI-I scores of much improved or very much improved were reached by 53% (9/17) of all at post-intervention, and by 81% (13/16) at 6-month follow-up.

Conclusion: Collaborative problem solving significantly reduced ODD, ADHD and emotional lability symptoms. A subgroup improved in their ADHD symptoms only after adding stimulant medication.

INTRODUCTION

Behavioural problems in children are common, often misunderstood and mistreated. A substantial number of children with challenging behaviour have significant problems with inattention and hyperactivity-impulsivity and meet criteria for attention-deficit/hyperactivity disorder (ADHD) (DSM-IV) (1). The cognitive problems these children suffer from are often not recognized. Instead, their effects are expressed as socially and emotionally challenging behaviours, and these attract the attention of others (2,3). Often parents are being blamed for lack of authority, and there is a prevailing assumption that the child could do better if he or she wanted to. Children with cognitive deficits in the area of executive functions are at high risk of developing behavioural problems in situations where there are specific demands on these skills. These situations are numerous in daily life: transitions from one task to another, new situations to cope with, changes that are not predictable, that is, circumstances that require the ability to act in a flexible manner. Other situations when these cognitive functions are strongly needed are when mentally demanding tasks have to be planned, organized and accomplished (4). These cognitive deficits limit the child's ability to handle frustrations and to regulate emotions, to consider the outcome of his or her actions, and to understand how their behaviour affects other people (5). There is strong evidence that children with ADHD experience problems in their school

Key notes

- Challenging behaviour in children is common, often misunderstood and mistreated. A substantial number of these children have significant problems with emotional regulation and cognitive flexibility and meet criteria for ADHD and ODD.
- Adults must consider that the child's problem behaviour is equivalent to a developmental delay, that is, that the child has lagging skills in specific cognitive domains.
- We found that collaborative problem solving (CPS) significantly reduced the children's behavioural problems. A subgroup improved only when CPS and pharmacological treatment was combined.

situation, in their interaction with others, and in their family relationships (6).

The specific cognitive deficits that underlie the challenging behaviours are hallmarks of many conditions, including ADHD, but also autism spectrum disorders (7) and obsessive compulsive disorders (OCD) (8). In addition, many children exhibit these cognitive deficits and concomitant behavioural problems on a spectrum without meeting criteria for a definitive diagnosis (9).

It is well known that many pre-school children's behaviour problems tend to aggravate during later childhood and adolescence and that symptom constellations develop that meet DSM-criteria for oppositional defiant disorder (ODD) (2,10–12) or conduct disorder (CD) (13).

Several parent training programs for child disruptive behaviour problems have been developed over the last decades (14–18). The latest Cochrane database review regarding cognitive-behavioural training interventions, that is, cognitive-behavioural therapies (CBT), was published in 2007, and evaluated studies of programmes aimed for a specific parent group, foster carers in the management of children with difficult behaviours. The authors concluded that there is currently little evidence for efficacy of CBT-based training intervention for foster carers and that there is a need for further research in this area (19). To our knowledge, there are no systematic evaluations of programmes where cognitive/psychological intervention has been combined with a neurodevelopmental/medical view.

A cognitive-behavioural programme, collaborative problem solving (CPS), with the aim to help adults to understand the cognitive factors that may contribute to aggressive outbursts in children has been developed by RW Greene (2,3,5,20). The effectiveness of the programme was evaluated in a study of children with ODD, the majority of whom also had ADHD, and in a comparison group receiving Barkley's 10-week behaviour management program. The authors reported that the CPS programme produced significant improvement across multiple domains at the end of treatment and at 4-month post-treatment (2).

A basic principle of the CPS method is that to be able to help the child more effectively, adults must consider that the child's problem behaviour is equivalent to a developmental delay, that is, that the child has lagging skills in specific cognitive domains.

The CPS method is widely used clinically, and there is a need for further scientific studies to evaluate its usefulness.

The aim of this study was therefore to apply the CPS method, developed by Greene, in families with children with ADHD and to analyse changes in the child's behaviour during the intervention period and at a 6-month follow-up.

METHODS AND PARTICIPANTS

Study area and search procedure

Letters to inform about the study were sent in 2006–2007 to all school nurses in primary schools in one geographically defined region of Sweden (Skaraborg), with 15 municipalities and a total population of approximately 260 000 inhabitants. At the time, there were about 2300 births per year in the region. Information about the study was given in the letter, and all school nurses were also invited to meetings with the project group (consisting of paediatricians/neuropaediatricians, a clinical psychologist, and a special education teacher) with a view to sharing more detailed information about CPS and about the criteria that had to be met for individual children accepted for inclusion into the study. The school nurses contacted the families and referred them to the study team for possible participation in the study.

Inclusion and exclusion criteria

The target group consisted of children aged between 6 and 13 years, displaying considerable behavioural problems both at school and at home, *and* meeting full DSM-IV diagnostic criteria for both ADHD (of any subtype) and ODD. Exclusion criteria were diagnosed DSM-IV autistic disorder and/or intellectual disability, and recently started or perceived immediate need for treatment with stimulants or other psychoactive medications. Children who had been treated with psychoactive medications for a long period of time (more than 6 months) were not excluded from the study.

Measures

Parents (and many of the children with good reading skills) provided written informed consent to participate. Before intervention, all the children were assessed by a paediatrician (MJ) or neuropaediatrician (ML), who took a detailed developmental history from the parents, examined the child and collected information according to specific questionnaires. Clinical diagnoses were made according to DSM-IV criteria. Cognitive ability was evaluated by the project psychologist using the WISC-IV (21) and the special education teacher assessed the child's school situation and academic skills. All assessments were performed with a view to evaluating the child's cognitive skills, areas of lagging behind age peers, and unsolved problems or trigger factors for challenging behaviour.

Outcome measures were collected at baseline (Time 1), at a post-intervention visit (1–2 months after intervention, Time 2), and then again 6 months later (6-month follow-up, Time 3).

Primary outcome measures were parent-rated ADHD and ODD symptom scores on the SNAP-IV scale (22), and the investigator-rated score on the Clinical Global Impression-Improvement (CGI-I) scale (23,24). The CGI-I is a psychiatric assessment tool used to assess treatment response, measuring global symptomatic and functional improvement, scored 1 (very much improved), 2 (much improved), 3 (minimally improved), 4 (no change), 5 (minimally worse), 6 (much worse) or 7 (very much worse). A score of 1–2 is considered to reflect a good response. This rating was performed by the paediatrician (MJ) or neuropaediatrician (ML) who were responsible for the follow-up of the children and who had not been involved in the intervention.

Secondary outcome measures were the Conners' 10-item parent scale (25,26) and the Family Burden of Illness scale (27).

The collaborative problem solving model

The intervention was delivered by two trained professionals ('therapists'), one special education teacher (GF) and one psychologist (SÖ), both of whom had long-term experience in the field of neuropsychiatric and developmental disorders, and had attended the CPS advanced training course, held by Dr. Ross Greene (CPS), Boston 2007, and studied the book: Treating Explosive Kids (20), which was used as a manual. Every family met with the educator once a week, 1.5 h for 6–10 weeks; the number of sessions depending on each family's individual needs. Parents were found to need different lengths of intervention, that is, some declared that they had learnt the method and wanted to continue on their own after six sessions, some wanted to meet with the therapists for 10 sessions.

The intervention started with a *situational analysis of the circumstances or possible triggers* precipitating explosive reactions by challenging the child's cognitive lagging skills. The parents and children were given *strategies to solve problems collaboratively* in a way that reduced the risk of conflicts. The *parents were encouraged to act according to the stages set up by Greene*: (i) show empathy, (ii) define the problem – including also the child's concern and (iii) invite the child, by speaking *with* the child, to solve a problem that might create a conflict. During the sessions with the educators, different problem situations in the family and methods for problem solving and handling of challenging situations were discussed. The sessions were divided so as to give *separate attention for the parents, the child and the whole family*.

Participants

Between September 2008 and March 2009, 31 children with challenging and explosive behaviours were referred to the project group from school health units in the study area. Of these, a total of 14 children were excluded from the study for various reasons (for six of them, parent interviews made it clear that the child had significant ADHD and ODD *symptoms* only at school, not at home, and therefore did not meet criteria for study entry; two children were considered to be in need of pharmacological treatment without delay; four had other types of interventions ongoing when invited to the project and therefore chose not to participate; one had autistic disorder, and one was found to have mild mental retardation/learning disability). Thus, 17 children remained eligible for the project, 12 boys and five girls, mean age 9.2 years, range 7–13 years, and all of them opted for and completed the intervention. All 17 had the combination of ADHD (combined subtype) and ODD according to DSM-IV criteria. Two children (one girl, one boy) of the 17 also had autistic traits (but did not meet criteria for any diagnosis within the autism spectrum), and one boy met (28) criteria for Asperger syndrome (in addition to ADHD and ODD). One of the boys with ADHD and autistic traits had been treated with methylphenidate for a couple of years and continued with unchanged dosing during the study. All the other children were medication-naïve at the study start.

Ethics

The study was approved by the Regional Ethical Review Board, Gothenburg, and all parents provided signed informed consent for their own and the child's participation. Many of the children also themselves signed such consent forms.

Statistical methods

Descriptive statistics (mean, median and percentiles) were used to monitor how scores on different measures and assessments changed from baseline to post-intervention and 6-month follow-up. As the number of participants was small especially when divided into subgroups and as most of the variables were of the ordinal data type, we decided to use nonparametric statistical tests.

To detect any change between the three time points, we used Friedman's test for related samples. Whenever a significant difference was found, we followed up by Wilcoxon pairwise comparisons, so as to detect which time point measurement was differentiated from each of the other two. To compare the magnitude of drop in symptom score across 'medication after intervention group' and 'no medication', we used Mann–Whitney test applied on calculated individual changes between the time points.

RESULTS

All 17 children and their families completed the CPS intervention. The families participated in up to 10 sessions. Fourteen families completed all 10 sessions, and three families felt confident to continue practicing the model themselves after 6–8 sessions. The boy with Asperger syndrome discontinued the study after the intervention period because of lack of efficacy, leaving 16 subjects remaining in the trial at the 6-month follow-up.

The families were informed at *baseline* (Time 1) that pharmacological treatment for the child's ADHD symptoms might be initiated after the intervention period if considered indicated. At the *post-intervention* visit (Time 2; about 4–5 months from baseline), eight families opted for medication for their child to further improve ADHD symptoms, and the boy who had been on medication for several years before study start continued with his dose unchanged. At the *6-month follow-up* (Time 3), these nine children were still on medication, and the remaining seven were still medication-naïve. The aim was to evaluate CPS in unmedicated children, and we wanted to see whether some children could benefit from CPS without a following stimulant therapy. It was not intended to offer a behaviour modification program before a subsequent medication trial.

For the whole group, the SNAP-IV ODD scores were significantly reduced from baseline to post-intervention and to 6-month follow-up. The improvement was statistically significant for all periods (Table 1). The SNAP-IV total ADHD

Table 1 Outcome variables for the whole group (SNAP-IV, FBIM and Conners' scores)

Outcome Measure	Assessment Median (1-st and and 3-rd quartile)			p-Value*		
	Baseline[a] (n = 17)	Post-intervention visit[b] (n = 17)	6-month follow-up[c] (n = 16)	a vs b	b vs c	a vs c
ODD (SNAP-IV)	20 (17–22)	14 (8–16)	7 (4–14)	**0.001**	**0.020**	**0.000**
ADHD (SNAP-IV)	39 (35–47)	35 (27–39)	18 (12–30)	**0.004**	**0.010**	**0.001**
Hyperactivity (SNAP-IV)	23 (18–26)	16 (13–19)	10 (6–16)	**0.001**	**0.008**	**0.001**
Inattention (SNAP-IV)	19 (17–23)	18 (13–19)	7 (6–15)	0.052	**0.006**	**0.001**
FBIM	14 (10–16)	12 (5–15)	5 (3–11)	**0.035**	0.069	**0.016**
Conners total	22 (19–25)	17 (8–19)	9 (6–18)	**0.002**	0.096	**0.001**
Conners restless/impulsive†	14 (11–15)	10 (6–13)	6 (5–13)	**0.016**	0.406	**0.004**
Conners emotional lability‡	9 (9–10)	7 (4–8)	4 (1–6)	**0.002**	**0.007**	**0.001**

ADHD = attention-deficit/hyperactivity disorder; ODD, oppositional defiant disorder.
*Pairwise comparisons by Wilcoxons test for paired data.
†Conners – subscale restless/impulsive.
‡Conners – subscale emotional lability.
Bold means statistically significant values.

symptom scores and the subscores for inattention and hyperactivity/impulsivity were also significantly reduced across all time points, with the exception of the inattention subscore from baseline to post-intervention for which the drop in symptom score fell just short of statistical significance (Table 1).

The Conners' 10-item scale total score was significantly reduced from baseline to post-intervention and from baseline to 6-month follow-up, but not between post-intervention and 6-month follow-up (Table 1). The same pattern was seen for the 'restless/impulsive behaviour' subscale of the Conners, while the 'emotional lability' subscale showed more substantial reductions through all periods (Table 1).

The Family Burden of Illness Module (FBIM) scores showed significant reductions from baseline to post-intervention and from baseline to 6-month follow-up, but not from post-intervention to 6-months (Table 1).

At *post-intervention,* CGI-I scores of 1–2 (much to very much improved) were attained by 53% (9/17) of the participants, a score of 3 (minimally improved) by 18% (3/17), and a score of 4 (no change) by 29% (5/17). At the *6-month follow-up,* CGI-I scores of 1–2 were recorded for 81% (13/16) of the subjects, while the remaining three children received a score of 4.

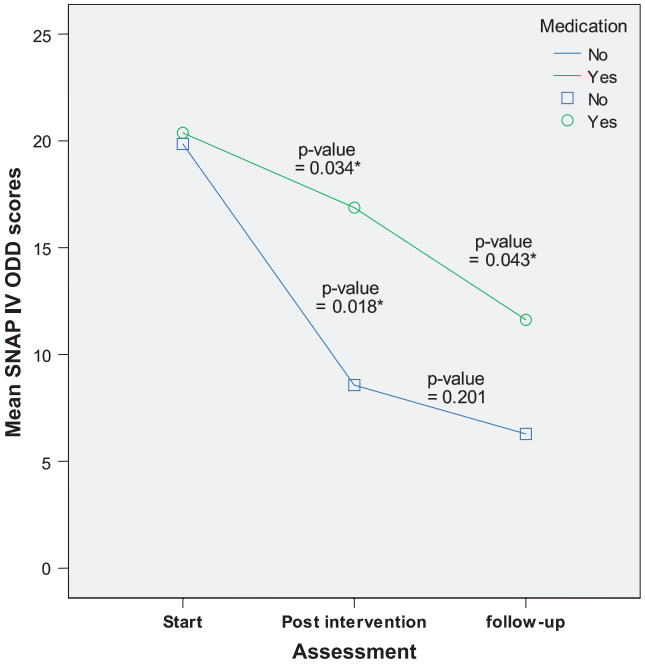

Figure 1 Mean ODD (SNAP-IV) scores over time by *Med/No-Med group* (p-values refer to comparisons within the groups).

Medication vs. no medication

From post-intervention (Time 2) to 6-month follow-up (Time 3), eight children received ADHD medication (*Med group*) because of insufficient symptom control, while seven children remained medication-naïve (*No-med group*). The medication used was long-acting methylphenidate, starting with approximately 0.5 mg/kg and dose-optimized according to response. At post-intervention, the *No-med group* showed significant improvements on all outcome measures (SNAP-IV ODD and ADHD scores, Conners' hyperactivity/impulsivity and emotional lability scores). In contrast, the *Med Group*, although significantly improved on the ODD and emotional lability scores at post-intervention, had almost no improvement in ADHD and hyperactivity/impulsivity symptoms (Figs 1–4). It was only after medication that the *Med group* showed a trend towards significant ADHD symptom reduction (Fig. 2).

Comparison *between* the groups showed that during the CPS intervention, the *Med group* had significantly less improvement than the *No-med group* (p-value <0.05) on all outcome measures (Figs 1–4). From post-intervention to 6-month follow-up, however, no significant differences in symptom reductions between the two groups could be found.

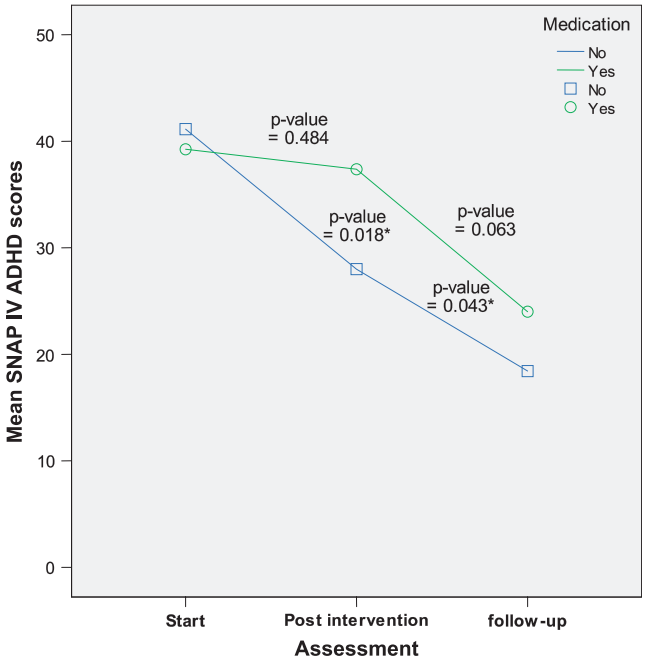

Figure 2 Mean ADHD (SNAP-IV) scores over time by *Med/No-Med group* (p-values refer to comparisons within the groups).

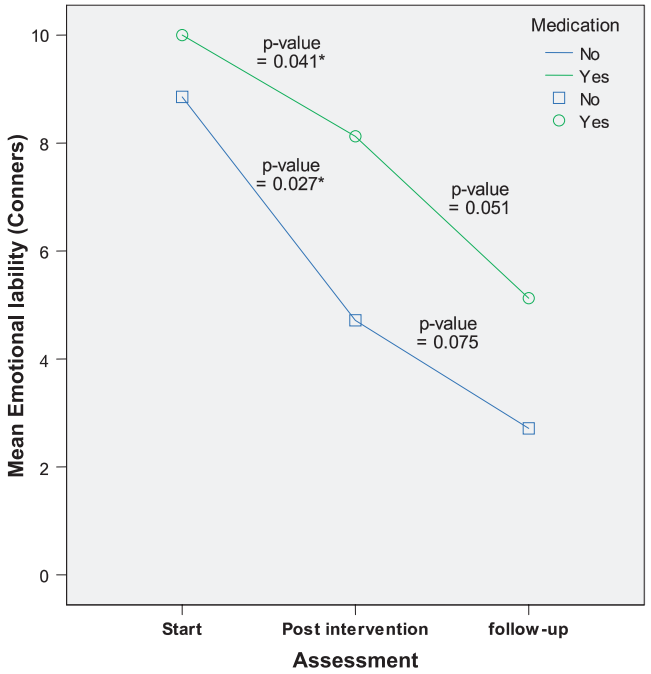

Figure 4 Mean scores on Conners' 'emotional lability' subscale by *Med/No-Med group* (p-values refer to comparisons within the groups).

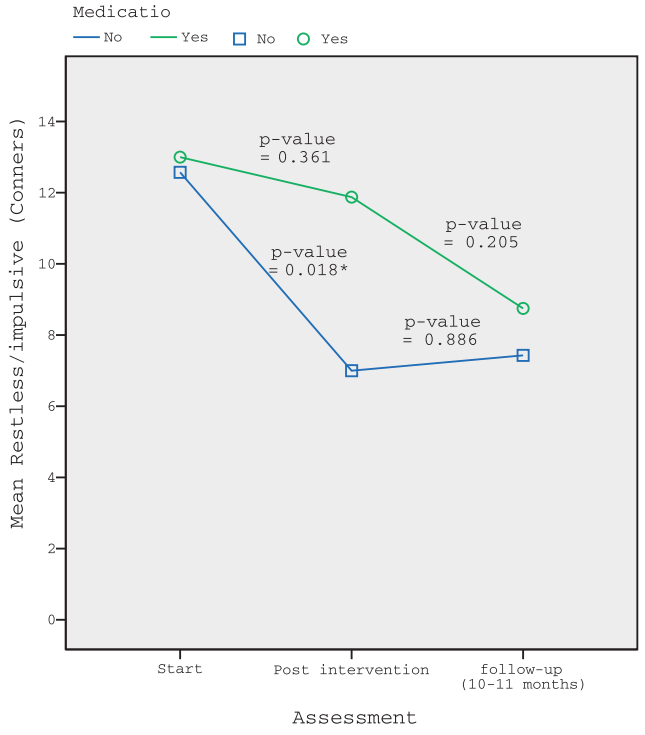

Figure 3 Mean scores on Conners' restless/impulsive subscale by *Med/No-Med group* (p-values refer to comparisons within the groups).

DISCUSSION

The results of this ten-month study of intervention with CPS for children with diagnostic levels of symptoms and impairment from ADHD combined subtype and ODD should be of interest to students of interventions in ADHD, despite the small sample size and the open nature of the assessments. Significant improvements in ODD and ADHD symptoms and in family burden were obtained from baseline to post-intervention. Further significant improvements were seen from post-intervention to 6-month follow-up on the SNAP-IV scale, but not on the Conners' and family burden scales. However, when separating the Conners' scale into a 'restless/impulsive' and an 'emotional lability' subscale, it was clear that the emotional symptoms showed marked improvement throughout the study. This could be an important finding supporting the positive role of CPS in reducing frustration and explosive behaviour.

There was little attrition, and the intervention appeared to be generally well tolerated, with more than 80% of the children showing considerable global improvement 6 months after completion of the intervention based on CGI-I assessments. No obvious side-effects were reported, and no family reported worsening of problems over time.

The comparison between the group who did not choose ADHD medication at post-intervention and the group who did indicates that while both groups started at similar symptom levels at baseline, the *No-med group* had substantial improvement throughout the study, while the *Med group* had a clearly insufficient effect of the intervention with a remaining high level of ADHD symptoms at post-intervention. This is possibly a key factor in parental and child intervention programmes, that is, the importance of including a clinical assessment of the child to evaluate the degree of ADHD core symptoms. Because these symptoms may

negatively interfere with the child's capacity to benefit from intervention, a combination of CPS and medication for ADHD may be the treatment of choice for a subgroup of children. Lack of CPS efficacy could also reflect a parental difficulty to learn the CPS model. Although there was no systematic assessment in this respect, it was our impression that parental factors, including ability to control impulses and to shift mindset to adopt the CPS strategies, played an important role for the efficacy of the intervention.

A model where the child's cognitive disabilities are highlighted in the intervention programme, combined with pharmacological treatment when needed to reduce the severity of ADHD symptoms appears to be a research field that merits further study.

Overall, it is suggested that a family intervention such as the CPS can be helpful for children with ADHD and ODD and their families. However, the findings also indicate that a combination of CPS and pharmacological treatment may be necessary for a subgroup of children.

In conclusion, the key issue in this intervention program (CPS) is that adults have an understanding of the child's lagging cognitive skills, to avoid situations that put high demands on the child's problems with flexibility and frustration tolerance. To solve problems *with* the child, in a mutual way, discussing the concerns of both parents and child is fundamental. The method provides a cognitive-behavioural approach for working with aggressive/explosive children and adolescents. By using this method, the child gets training in thinking for problem solving and there will be an opportunity for the child to learn new skills. The method has been suggested to be superior to traditional parent training programs (2). The results of the present study emphasize the importance of a multidisciplinary approach in the care of these children and their families, also including medical aspects and consideration of needs for pharmacological treatment.

Limitations

There are important limitations to this study. The study group was small, consisting of only 17 children. Moreover, the study was 'double open' (rather than double or single blind) and there was no comparator group. The group included eight children who started pharmacological treatment for ADHD after the CPS intervention and seven who remained medication-naïve. The findings should be considered as suggestive, and in need of replication in a larger sample. A longer follow-up period would also be of importance. Various types of comparison groups should be considered for inclusion in future studies, including waiting-list controls. Perhaps, most important would be outcome assessment by raters blind to original ratings and group status.

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