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ARTICLE

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One year follow-up of participants in a randomised controlled trial of a CBT-based group therapy programme for adolescents diagnosed with ADHD

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ABSTRACT

Background: Adolescents with ADHD often struggle on many areas of their lives and have a high risk of adverse outcomes and negative life trajectories. Multimodal treatment including psychosocial interventions is recommended but evidence regarding effect of such interventions is still limited.

Materials and methods: This study was a follow-up study of adolescents participating in a randomised controlled trial (RCT) of a group intervention based on cognitive behavioural therapy (CBT). Participants were adolescents diagnosed with ADHD and still impaired by their symptoms after standard treatment including psychoeducation and medication. All participants were interviewed by telephone one year after inclusion, and outcome measures included both quantitative and qualitative measures.

Results: There were 100 adolescents included in the study. We found no significant differences between treatment and control group on measures of ADHD-symptoms, self-efficacy, overall problems, global psychosocial functioning, or symptom severity at one-year follow-up. Still, participants in the intervention group reported on positive gains and that they learned a lot about ADHD and themselves.

Conclusions: The intervention delivered in this trial failed to show a treatment effect on symptom level when added to standard care. Participants did however report on positive gains and felt they learned a lot. More research is needed to explore how the programme and delivery of treatment might be improved, and which patients might benefit the most from this type of interventions.

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Introduction

Attention deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterised by pervasive symptoms of inattention, hyperactivity, and impulsivity causing functional impairment across multiple domains of daily function [1]. ADHD affects 3–7% of the childhood population [2] with high persistence rates into adolescence and adulthood [3,4]. Adolescents with ADHD often struggle on many areas of their life. Psychiatric comorbidity including behavioural problems, substance use disorder, anxiety, and depression disorders is common and there is a high risk of adverse outcomes and a negative life trajectory into adulthood [5,6].

National and international guidelines recommend a multimodal approach to ADHD treatment [7,8]. First-line treatments consist of psychoeducational interventions and environmental modifications. Pharmacotherapy has well-documented effects on ADHD and is offered as second-line treatment to most patients [9]. Although effective in reducing core symptoms medication is often not enough to normalise function [10,11]. Added psychosocial treatment is recommended as third-line

treatment for patients with residual symptoms and/or functional impairment. Non-pharmacological interventions might also be useful as an alternative to medication for some patients.

Most psychosocial interventions developed for adolescent ADHD are multimodal, reflecting the complexity of the disorder, comorbidity, and related functional deficits. In a recent review Sibley et al [12] summarised current knowledge on non-pharmacological interventions for adolescent ADHD concluding that overall, none showed strong and consistent effects on ADHD symptoms. Evaluation of treatment effect is challenged by the heterogeneity of both treatment programmes and participants between studies [12,13].

Cognitive behavioural therapy (CBT) is a recommended treatment option for adolescents with ADHD [8]. CBT programmes incorporating behavioural, cognitive behavioural, motivational, and skills training techniques have overall shown small to medium effects on ADHD symptoms and medium to large effects on organisational skills [12]. Knowledge on efficacy of CBT programmes for adolescent ADHD is however still limited, partly due to the methodological challenges previously mentioned. Previous studies include both dyadic and

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group-format of treatment delivery. Results from qualitative studies indicate an appreciation for the group format of treatment delivery in both adolescents and adults with ADHD [14,15]. There are few studies comparing group and dyadic treatment in CBT for ADHD, but some indications that overall efficacy is comparable [16]. Some studies suggest that programmes focused on skills training have the potential of long-term effects as the use of acquired skills improves function over time [17]. Still, research on long-term outcomes of different treatment interventions is scarce.

This study is a one-year follow-up of participants in a randomised controlled trial (RCT) of a CBT-based treatment programme. The programme was delivered in a group format for adolescents still impaired by ADHD-symptoms after standard treatment including psychoeducation and medication. The CBT-based group treatment programme delivered in this trial includes focus on knowledge, motivation, coping strategies, and skills. In previous work by our group, we have shown that the programme was very well liked and feasible within the targeted population, with high attendance rates and few dropouts [18]. However, initial findings failed to prove significant treatment effects on any of the outcome measures post-treatment [19].

This study reports on results from one-year follow-up assessment of adolescents participating in the RCT. As we had limited resources a telephone interview including a selection of outcome measures was planned. Our primary aim was to evaluate the long-term treatment efficacy on ADHD-symptoms, self-efficacy, and global functioning. We hypothesised that participants in the intervention group would show increased improvement as compared to the control group, when given time to implement and practice skills. Our secondary aim was to explore how adolescents experienced participating in the trial and the treatment programme.

Materials and methods

Study design

This study was a follow-up of participants in a RCT with two study arms, comparing a group-CBT intervention to a control group who received no additional treatment. The treatment was offered as addition to standard care including psychoeducation and medication. A more detailed account of the study protocol and treatment given prior to inclusion to the RCT is previously published [19,20]. The study was conducted at two Child and Adolescent Psychiatric (CAP) outpatient clinics at St. Olav's University Hospital, Norway. The study was approved by the Regional Committee for Medical and Health Research Ethics in Southeast Norway (2015/2115). Patients were recruited between 2017 and 2019; the last follow-up data was collected in October 2020.

Participants

One hundred adolescents aged 14–18 years (mean 15.8 and SD 1.3) were included in the RCT, 95 of these (95%) completed the intervention period. All of these completed both

the post-intervention and the follow-up assessments. All participants had a previous clinical diagnosis of ADHD according to the International Statistical Classification of Diseases and Related Health Problems, 10th revision [21]. Demographic characteristics are presented in Table 1 and participant flow in Figure 1. Initial diagnosis was assessed after a comprehensive investigation at the CAP clinic following the national guidelines for assessment and treatment of ADHD [7]. All participants received standard care prior to recruitment, including a non-standardised psychoeducational intervention to patients and their parents, a school meeting, and an offer of a full-day course for parents and a teacher. Patients with persistent ADHD symptoms were also offered pharmacological treatment according to the national treatment guidelines.

Prior to inclusion to the RCT all participants underwent a new diagnostic evaluation to assess study eligibility. Current diagnosis of ADHD and comorbidity were based on a semi-structured diagnostic interview *The Schedule for Affective Disorders and Schizophrenia for School Aged Children-Present and Lifetime version* (KSADS-PL) [22]. Patients with a symptom score below threshold for ADHD according to DSM-5 criteria when they were both medicated and still had impairing ADHD-symptoms were diagnostically classified as sub threshold ADHD.

Inclusion criteria were a previous full diagnosis of ADHD according to ICD-10, a current confirmed diagnosis of ADHD or sub threshold ADHD according to DSM-5, and evidence of clinically impairing symptoms with a Clinical Global Impression Scale for Severity (CGI-S) [23]; score ≥ 3 . Patients should be on stable ADHD-medication (two months or longer) before inclusion. However, nine patients who had tried medication

Table 1. Clinical characteristics of study sample.

Characteristics	CBT-group (n = 50)	Control group (n = 50)
Female, n (%)	29 (58.0)	28 (56.0)
Mean age, years (SD)	15.9 (1.3)	15.8 (1.3)
Full Scale IQ, n (mean [SD])	44 (94.3 [12.8])	42 (93.4 [13.2])
ADHD presentation (Kiddie-SADS-PL), n (%)		
Predominately combined	18 (36.0)	13 (26.0)
Predominately inattentive	17 (34.0)	18 (36.0)
Subthreshold ADHD	15 (30.0)	19 (38.0)
Psychiatric comorbidities present ^a n (%)	28 (56)	25 (50)
Anxiety disorders	19 (38.0)	18 (36.0)
Depressive disorder NOS/dysthymic disorder	8 (16.0)	3 (6.0)
Tics disorder or Tourette syndrome	4 (8.0)	5 (10.0)
Obsessive-compulsive disorder	1 (2.0)	2 (4.0)
Posttraumatic stress disorder	0 (0.0)	1 (2.0)
ODD/disruptive behavioural disorder NOS	6 (12.0)	5 (10.0)
Autism spectrum disorder (mild symptoms)	2 (4.0)	2 (4.0)
Learning disorders, reading disorders, or mixed, n (%)	8 (16.0)	10 (20.0)

Note: ADHD: attention-deficit/hyperactivity disorder; ODD: oppositional defiant disorder; Full Scale IQ: Wechsler Intelligence Scale for children or adults (WISC-IV, WAIS-IV); SD: standard deviation

^aPsychiatric comorbidities are based on the Kiddie-SADS-PL interview with the adolescents.

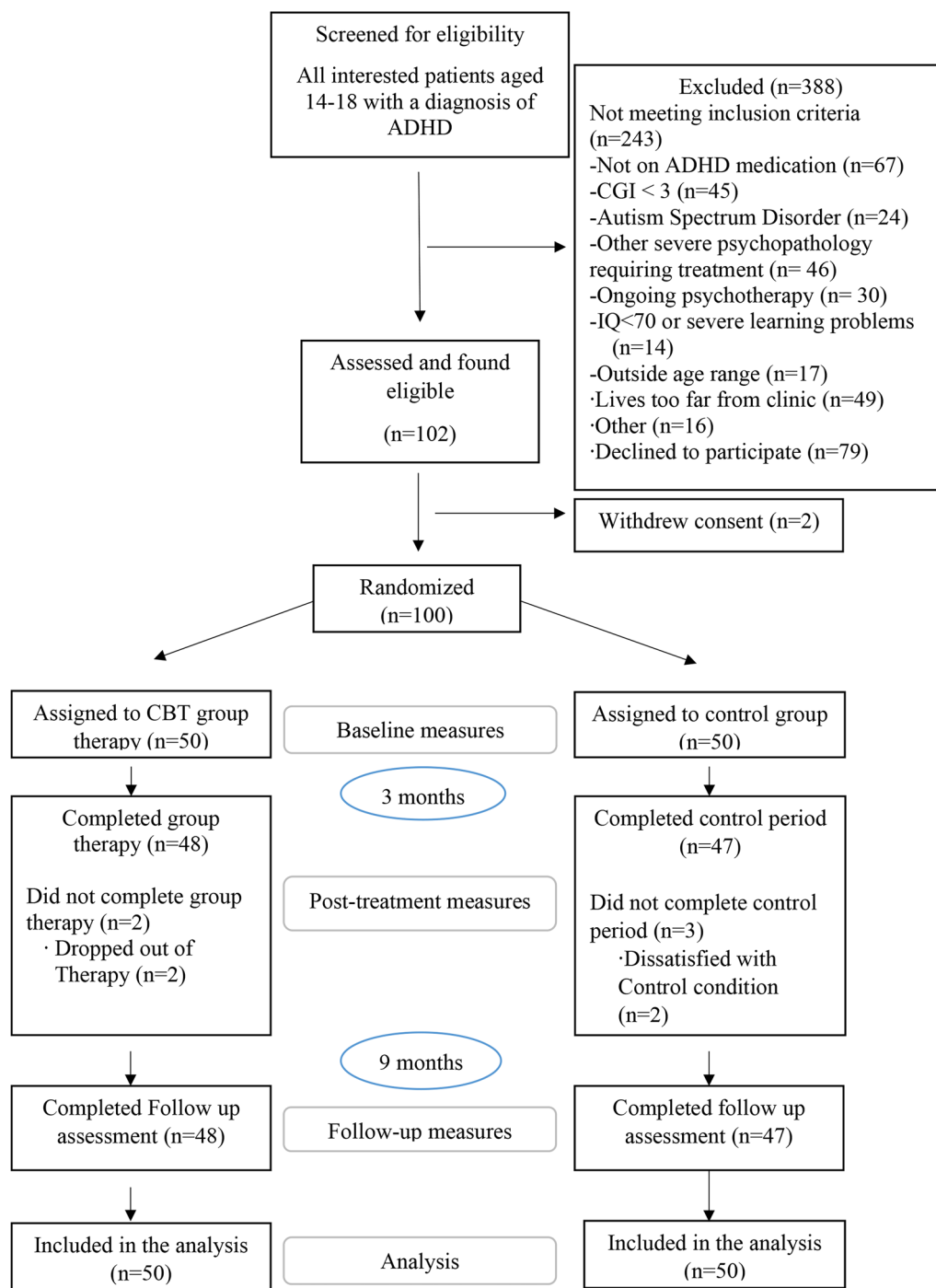


Figure 1. Participant flow.

but stopped because of minimal effect or intolerable side effects were also included due to ethical reasons. Exclusion criteria were severe depression, suicidal behaviour, psychosis, intellectual disability ($IQ < 70$), on-going substance use, severe behavioural problems, or conduct disorder, moderate to severe pervasive developmental disorder or bipolar disorder without stable medication. Patients undergoing psychotherapeutic interventions or previously having received CBT-interventions targeting core symptoms of ADHD, and patients declining psychopharmacological treatment were also excluded.

Procedures

Oral and written information about the study and treatment arms were given to all participants and their parents prior to inclusion. Participants could not engage in other psychosocial treatment in the intervention period. Written informed consent was obtained from all participants, or from their parents when participants were under the age of 16. A total of 102 patients were included in the study; two of these withdrew their consent and were not included in the analyses. A total of 100 patients completed baseline measures and were randomised to treatment arm or control group. Outcome

measures included self-reported symptom scores and clinically evaluated functional scores, assessed two weeks prior and two weeks after the intervention period, and one year after start of intervention.

The intervention

The intervention delivered was an adaption of a CBT programme developed for adolescents and adults by Young and Bramham [24]. The programme has not previously been evaluated in the adolescent population. The adaption consisted of translation to the Norwegian language and the selection of modules thought to fit the population of adolescents with ADHD and common comorbidities. The objectives of the programme were to teach participants about ADHD and to provide psychological strategies for coping with ADHD-symptoms and associated problems. CBT was the core psychological technique used in treatment delivery. Motivational interviewing techniques were also integrated to overcome ambivalence/resistance towards treatment and set personal goals. The programme was delivered in a group format in 12 weekly sessions, each group lead by two group-leaders recruited from the clinic. The intervention was manualised in a structured format, with written material summarising agenda and key points to address during each session. Group-leaders were given a copy of the Young Bramham textbook, a full day course on CBT and delivering of the treatment programme, and regular supervision by an experienced CBT supervisor. The programme consists of modules focusing on both core symptoms of ADHD and commonly associated problems. All sessions included introduction, psychoeducation, exercises, practice of new skills, and homework assignments. More detailed accounts of the intervention, treatment manual, and group-leaders are presented elsewhere [18,19].

All participants received a phone call from a research assistant between every session, reminding them of homework assignments and their next scheduled session, and verifying that they did not receive any other psychological treatment. All participants on medication were offered one routine medical follow-up during the intervention period.

Treatment fidelity was evaluated by assessment of video recordings from a random selection of sessions. Although results varied between sessions and group leaders, overall treatment fidelity was found to be acceptable for both manual adherence and therapist competence [19].

Measures

Outcome measures

The primary endpoint of this study was the change in ADHD symptoms from baseline to one-year follow up, as measured by the self-reported version of *ADHD-Rating Scale-IV* (ADHD-RS) [25]. The questionnaire includes 18 items with questions regarding symptoms of inattention, hyperactivity, and impulsivity, each item rated on a 4-point Likert-scale. The instrument has shown good validity and reliability across cultures and is widely used in both clinical and research settings [26]. A total score on ADHD-RS of 0–18 is considered within

the normal range, 19–26 in subclinical range, and above 27 in clinical range [27].

Global psychosocial functioning was measured using *The Children's Global Assessment Scale* (C-GAS) [28]. C-GAS is rated on a scale from 0 to 100, higher value indicating better function. The Norwegian version of C-GAS has shown acceptable convergent, discriminant, and predictive validity [29] in children aged 4–17 years. Inter-rater reliability (IRR) was 0.84 in this study.

The CGI-S [23], clinicians version, was used for assessing severity of ADHD. CGI-S is rated on a scale ranging from 1, *normal/not at all ill*, to 7, *among the most extremely ill patients*. CGI-S was developed for monitoring treatment effects in clinical trials, and has shown to be a reliable measure of disease severity [30]. C-GAS and CGI-S were rated by an experienced clinician blinded to treatment arm, based on observed and reported symptoms, behaviour, and function in the past seven days. At one-year follow-up these assessments were made by the clinician conducting the telephone interview.

Adolescents self-beliefs regarding abilities to cope with different demands and challenges were measured using the *General Perceived Self-Efficacy Scale* (GSE) [31]. The questionnaire contains 10 statements rated on a 4-point scale, higher scores indicating more self-efficacy. Self-efficacy is found to be a universal construct with high internal consistency between different countries, and convergent validity with similar constructs has been moderate to low [32].

Internalising, externalising, and total problems were measured using *ASEBA-Youth Self-Report, Brief Problem Monitor* (YSR-BPM) [33], a short version of the *ASEBA-Youth Self-Report* (YSR) for children and adolescents aged 11–18 years. The questionnaire contains 19 items regarding internalising, externalising, and attention difficulties, rated on a 3-point scale from 0, *not true*, to 2, *very true*. The Norwegian version of YSR-BPM is found to have good reliability and validity [34]. YSR-BPM was completed at one-year follow-up only.

Participant's experience

As part of the one-year follow-up we sought to capture the experiences of participating in the trial and the treatment programme. At the end of the telephone interview all participants were asked to reveal their allocation to control or treatment group and to respond to the following question: 'Is there anything you would like to tell us about this project?' The participants allocated to the intervention group were further asked to elaborate on their experience. The interviewer was a clinician not involved in previous assessments or treatment delivery. The interviewer was free to ask follow-up questions when needed in a non-structured manner.

Statistical analysis

Data on self-reported symptom scores and clinician-rated function scores were analysed using mixed-effects models for longitudinal data. We defined the outcome variable as the dependent variable, time point and the interaction between treatment group and time point as fixed effects, and patient as random effect. This procedure handles the baseline value of the outcome variable as recommended by Twisk et al [35].

Next, we explored if sex, age, IQ, comorbidity, or severity of ADHD-symptoms at baseline acted as moderators of treatment effect on primary outcome measures. This was done by adding the potential moderator and the relevant interactions in the linear mixed model. Secondary outcome measures only obtained at one-year follow up were analysed using t-tests for independent samples. All analysis was intention-to-treat (ITT), and separate analysis was conducted for each outcome. We report 95% confidence interval (CI) and regard two-sided p values < 0.05 to represent statistical significance. Normality of residuals was checked by visual inspection of QQ-plots. Missing data was handled using single imputation on scales using the mean score, if 70% or more of the questions were answered. Otherwise, the outcome of that specific questionnaire for that participant was treated as missing. All statistical analyses were conducted using SPSS version 27.0 (SPSS Inc., Chicago, IL).

Qualitative data from the follow-up interview were analysed using the principles of thematic analyses [36]. All comments were transcribed and read several times; the preliminary notes were then used to code and extract meaningful themes describing the adolescents experience from participating in the trial and the group intervention. These themes are presented together with illustrating comments.

Results

Sample characteristics

There were 100 adolescents aged 14–18 years (mean age 15.8, SD 1.3) included in the study, 57 (57%) of these were

girls (Table 1). Age, gender, symptom severity, and functioning were similar in the two groups pre-intervention.

Primary and secondary outcome measures

Descriptive statistics for primary and secondary outcome measures for each time point and group, as well as estimated treatment effects, are presented in Table 2. No statistically significant differences were found between the intervention group and the control group on neither total score nor subscales of the self-reported ADHD-RS at one-year follow-up. Post-hoc subgroup analysis to explore the potential moderating effect of age, IQ, comorbidity, severity of ADHD symptoms, and severity of anxiety symptoms revealed no statistically significant treatment effect on self-reported ADHD-RS total score or subscales.

There was no significant difference between the intervention group and the control group on functional impairment measured by C-GAS at any study point. Neither were there any significant differences between groups on measures of symptom severity or self-efficacy at one year follow up. On the GSE improvement was observed in both groups from pre-intervention to one-year follow up, with a point increase in mean score of 1.99 (SD 4.72) and 1.65 (SD 3.64) in intervention group and control group, respectively.

YSR-BPM was obtained at one-year follow-up only, descriptive statistics and between group differences are presented in Table 3. We found no significant difference between the groups on neither total problem score nor on any of the subscales of the YSR-BPM.

Table 2. Primary and secondary outcome measures.

Measures	CBT group (n=50)			Control group (n=50)			Difference (group × time)		
	n	Mean	SD	n	Mean	SD	Estimate	95% CI	p Value
ADHD RS-IV self, total									
Pre-treatment	44	21.55	9.75	47	21.49	10.15			
Post-treatment	44	19.80	9.88	45	18.67	10.21	1.27 ^a	−1.66–4.21	0.394
12 months follow up	48	18.02	7.99	47	18.11	7.57	−0.32 ^a	−3.18–2.54	0.828
ADHD RS-IV self, inattention subscale									
Pre-treatment	47	12.32	4.99	49	11.31	6.28			
Post-treatment	47	11.09	5.50	46	10.13	6.08	0.55 ^a	−1.15–2.24	0.527
12 months follow up	48	10.48	4.62	47	10.55	4.89	−0.61 ^a	−2.29–1.07	0.476
ADHD RS-IV self, hyperactivity/impulsive subscale									
Pre-treatment	46	9.35	6.10	47	9.96	5.14			
Post-treatment	44	8.82	6.17	46	8.67	5.07	0.42 ^a	−1.30–2.14	0.628
12 months follow up	48	7.54	4.82	47	7.55	4.30	0.16 ^a	−1.52–1.84	0.851
Clinic Global Impression Severity									
Pre-treatment	50	3.96	0.53	50	3.92	0.67			
Post-treatment	47	3.38	0.82	47	3.40	0.99	0.04 ^a	−0.26–0.35	0.772
12 months follow up	48	3.42	0.87	47	3.57	0.85	−0.15 ^a	−0.45–0.15	0.333
Children's Global Assessment Scale									
Pre-treatment	50	62.18	6.98	50	62.12	6.82			
Post-treatment	47	61.30	8.66	47	61.04	10.44	−0.05 ^b	−3.37–3.27	0.978
12 months follow up	48	62.50	8.75	47	61.68	9.49	0.51 ^b	−2.76–3.79	0.757
General Perceived Self-Efficacy Scale									
Pre-treatment	49	27.56	5.22	49	28.04	5.05			
Post-treatment	47	29.21	4.13	47	29.15	5.84	0.45 ^b	−1.19–2.09	.586
12 months follow up	48	29.54	4.86	47	29.85	4.24	−0.01 ^b	−1.64–1.63	.994

Descriptive statistics at baseline, post-treatment, and 12 months follow up, and estimated treatment effect (coefficient for the interaction term) from the mixed-model analyses.

Note: ADHD-RS: Attention-Deficit/Hyperactivity Disorder Rating Scale.

^aA negative difference estimate is in favour of the CBT group and a positive estimate is in favour of the control group.

^bA positive difference estimate is in favour of the CBT group and a negative estimate is in favour of the control group.

Table 3. Youth Self Report-Brief Problem Monitor (YSR-BPM).

Measure	CBT group (n=50)			Control group (n=50)			Difference (Student's t-test)		
	n	Mean	SD	n	Mean	SD	Estimate	95% CI	p Value
YSR-BPM total	48	13.13	6.53	47	13.19	6.54	−0.07 ^a	−2.73–2.60	0.961
YSR-BPM T-score	48	59.5	7.35	47	60.2	7.30			
Externalising subscale	48	3.23	2.27	47	3.43	2.16	−0.20 ^a	−1.10–0.71	0.667
Externalising subscale T-score	48	54.4	5.63	47	54.8	5.79			
Internalising subscale	48	3.71	3.37	47	3.70	3.65	0.01 ^a	−1.42–1.44	0.993
Internalising subscale T-score	48	57.8	7.93	47	58.2	9.08			
Attention subscale	48	6.19	2.61	47	6.06	2.62	−0.12 ^a	−0.94–1.19	0.818
Attention subscale T-score	48	63.3	6.91	47	63.5	7.08			

Descriptive statistics at 12 months follow up, and results from independent samples t-test comparing intervention group and control group.

Note: ^aA negative difference estimate is in favour of the CBT group and a positive estimate is in favour of the control group.

Participant's experience

80 of the 95 participants (84%) interviewed at one-year follow-up answered the open questions, 34 in the control group, and 46 in the intervention group. Participants in the intervention group were overall positive. Most frequently identified themes were related to the social aspect of the programme and perceived usefulness of meeting and learning from peers. The participants also frequently expressed that they learned more about ADHD and useful strategies for coping with their difficulties. Some found participation in the group therapy time-consuming and stressful. Some adolescents in the control group reported that not being able to receive other therapy or change medication during the trial period made participation challenging. The main themes identified from the interview are presented in [Appendix 1](#) along with illustrating comments.

Discussion

This study reports on results from a one-year follow-up assessment of adolescents participating in a RCT of a CBT-based treatment programme delivered in a group format for adolescents still impaired by ADHD-symptoms after standard treatment and care. Long-term effects after interventions with behavioural treatment components have been found in previous studies, as participants continue to use new skills after the intervention period [37,38]. We thus hypothesised that given time to implement skills participants in the intervention group would show an improvement in ADHD-symptoms as compared to the control group. However, contrary to our hypothesis there were no difference between the intervention group and the control group on any outcome measures at one-year follow-up. There were however some improvements in both ADHD-symptoms and self-efficacy in both groups. This might be a continuous effect of interventions given before entering the trial, but could also be explained by regression to the mean or the general effect of age/maturity [39].

There are several possible explanations for the lack of treatment effect in our study. First, 34% of the participants presented with subthreshold symptoms at time of inclusion, this might indicate that many patients were already significantly improved by previous interventions and medication. This might have limited possibilities for further improvements. Further, the treatment programme might have been too extensive, with many treatment components delivered

over a short period of time. In previous work by our group, we have drawn attention to challenges related to homework adherence [18,19]. The involvement of parents to support the use of skills between sessions might have been useful. Moreover, adolescents with ADHD are a heterogeneous group regarding symptoms, impairment, and comorbidity, and the programme might not have been a good enough fit for individual needs.

ADHD-symptoms as measured by ADHD-RS were within normal range for both groups at one-year follow up. Still, there were only minor, non-significant improvement on measures of symptom severity and overall functioning. Biederman et al [3] found that ADHD expression changes with maturity and that although many cases of childhood ADHD fails to meet diagnostic criteria in adolescence and adulthood, a vast majority (77%–78%) still experience clinical impairment. In a recent study including children followed over several time points into adolescence and young adulthood [40], found that patterns of remission from ADHD varied considerably over time. Although more research is needed these results suggest that ADHD is a chronic disorder with a fluctuating pattern of symptoms and impairment, and that periods of full remission are more often temporary than sustained. In line with these findings, we found that despite decline in overall ADHD-symptoms many of the participants in our study still experience impairment from their ADHD and/or comorbid difficulties at one-year follow-up.

Clinical experience and research show that compliance and willingness to engage in ADHD treatment is particularly low in adolescence [41]. Research into adolescent's experiences of psychotherapy is limited and the use of qualitative data brings user perspective and valuable insight. The themes that emerged from the interview on participants' experiences at one-year follow-up indicate an appreciation for the social aspects of the programme and the possibility of sharing experiences with peers. Receiving treatment together in a group could be an important and helpful aspect of psychosocial interventions for adults with ADHD [15,42]. Although there is limited research on the adolescent population findings are similar [14]. Some of the participants also commented on negative experiences related to participation in the group intervention, finding the treatment time consuming, and stressful. The total burden of school, homework, and therapeutic intervention is yet another issue potentially influencing treatment adherence and efficacy. These issues are in line with recent findings highlighting the need for more

individualised treatment taking not only morbidity and comorbidity but also treatment preferences and social and family resources into account [13,16]. More research is still needed to understand the complex interactions between individual phenotypes and different treatments to improve individualised treatment.

Strengths and limitations

This study has several strengths, including the use of a control group and blinded evaluators. The inclusion of participants with common comorbid disorders is also considered a strength. The broad inclusion criteria increase the ecological validity of our sample, as the included participants is considered representative for a clinical population of adolescents with ADHD. The heterogeneity of symptom severity and comorbidities does however make interpretation of results challenging. There are more female than male participants in our study, as male participants were more difficult to recruit. This might have affected the rates of comorbidities in our study population, with few participants presenting with comorbid behavioural disorders. The gender distribution also limits the generalisability of the results as this might represent a selection bias.

The use of self-reported outcome measures only represents a weakness, as parental or multiple informants could have given additional information. The limited resources available when planning this follow-up study resulted in a selection of outcome measures. The study would have benefited from repeated measures on executive function and emotional symptoms as well as a broader range of measures on functional outcomes. Although the open questions in the follow up interview gave useful information about participants' experiences the questions were few and maybe not specific enough to invite more detailed feedback about different aspects of the programme.

Conclusions

This study adds to the limited knowledge on psychosocial interventions for adolescents with ADHD by reporting on results from a one-year follow-up of participants in a CBT-based group intervention. There was no significant difference between treatment and control group on any of the outcome measures at one-year follow-up. The treatment programme thus failed to show additional effect on symptom level when added to standard care. Despite normalised mean scores on primary outcome measures there were only minor improvements in functional impairment and many participants reported overall clinical symptoms in the clinical range. Despite the failure to prove that this programme was more effective than control conditions participants reported on positive gains and that they learned a lot about ADHD and themselves. More research is needed on non-pharmacological treatment for adolescent ADHD to better inform individual treatment recommendations. A wider range of outcome measures including focus on functional outcomes would be recommended in future studies.

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AMS has received travel support and congress fee from MEDICE in the last 3 years. PHT has received speaker's fee from MEDICE and Takeda in the last 3 years. SY has received honoraria for consultation and/or educational talks in the last 5 years from Takeda and MEDICE. She is the author of 'ADHD Child Evaluation (ACE) and ACE+ (for adults), and lead author of 'R&R2 for ADHD Youths and Adults'. TSN has received travel support from MEDICE in the last 3 years. ACA and SL report no conflicts of interest.

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Appendix 1

Most relevant themes extracted from the interview with some exemplifying comments. Sorted in descending order from most frequent.

It was nice and useful to meet others in the same situation as me
 'It was really nice to feel that I am not alone, that the others were normal (teenagers) in the same boat as me'
 'It was useful for me to meet others in the same situation'
 'We learned a lot from each other'

I learned about ADHD and useful strategies
 'I learned about how to better deal with ADHD'
 'I understood more about my diagnosis'

Participation in the group therapy was helpful
 'I had a lot of anxiety that almost made me quit school. I felt better able to cope, it was a turning point for me'
 'I am doing a lot better now than before I participated in the group therapy'

I would recommend the programme to others in my situation
 'All kids diagnosed with ADHD should be offered this intervention'

Participation was time consuming and stressful
 'I didn't manage to practice between sessions, I had enough with school and homework. It was too much work'
 'Homework was stressful'
