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Dialectical Behavioral Therapy Skills Training for Adolescents with Attention Deficit Hyperactivity Disorder: A Pilot Study

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Abstract

Background: Attention Deficit Hyperactivity Disorder (ADHD) is a commonly occurring neurodevelopmental disorder associated with impairments in numerous aspects of functioning and quality of life. There is a growing recognition that brief and effective psychosocial interventions are needed for youth with ADHD.
Objective: The aim of this study was to assess the feasibility and preliminary effectiveness of a dialectical behavioral therapy-based skills training group for adolescents with ADHD in a routine clinical care setting.
Methods: Ten adolescents with ADHD/ADD (Attention Deficite Disorder) commenced a 10-week training group including psychoeduction, mindfulness and other self-regulatory skills training. Primary outcomes were pre- to post-treatment changes in guardian-rated ADHD-symptoms and participant-rated quality of life. Secondary outcomes were pre- to post-treatment changes in participant-rated executive functioning, depression, anxiety, and treatment satisfaction, as well as parent/guardian-rated executive functioning. All symptom/functioning scales were administered at pre-treatment, post-treatment, and a 12-week follow-up.
Results: Eight of the ten participants completed treatment, with > 80% attendance for treatment completers and high ratings for treatment satisfaction. Based on the intention-to-treat analyses, there were improvements from pre-treatment to follow-up in primary and secondary outcomes except quality of life. Based on the completer's analyses, there were improvements from pre-treatment to follow-up for guardian rated ADHD symptoms and executive functioning, depression, anxiety, and quality of life. Uncontrolled effect sizes for pre-treatment to 12-week follow-up for treatment completers were medium for inattention, executive functioning, and quality of life, and large for depression and anxiety.
Conclusions: The present study suggests that the DBT-based skills group training was feasible and, for treatment completers, yielded significant improvements across a range of symptom domains and quality of life assessed at the 12-week follow-up. However, this is only an exploratory finding and could be attributed to natural improvement or regression toward the mean. Therefore, further studies are warranted.

Keywords: ADHD, adolescents, Dialectical Behavioral Therapy, mindfulness, executive functioning.

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder with core symptoms of inattention, impulsiveness, and hyperactivity (or hypoactivity) with prevalence estimates around 7.2% (CI 95% 6.7-7.8) in children (1). Nearly two-thirds of those diagnosed with ADHD as children continue to experience this disorder in adolescence (2). ADHD often co-occurs with other conditions including learning disabilities, autism, conduct disorder, anxiety, depression, substance use, bulimia, binge eating and personality disorders (3).

In Sweden and Europe, guidelines advise education, information, and parenting strategies as the first-line treatment for children with ADHD. Cognitive behavioral therapy (CBT) is recommended to help with self-control, emotional regulation, and social skills. Medication for ADHD is advised when symptoms continue to cause significant impairment despite environmental adjustments (4). Additionally, it is widely recognized that a significant proportion (62%) of adolescents discontinue their ADHD medications for a variety of reasons, including side effects, and that medication has only a moderate effect on core ADHD symptoms, comorbid

difficulties, and overall functioning (5-6). In routine care, the most commonly available psychosocial treatments for ADHD are primarily parent and school focused (7).

A recent meta-analysis reported moderate to large effect sizes for individual and group CBT programs for adolescents with ADHD in routine clinical care (8). However, firm conclusions about efficacy were limited by significant heterogeneity in the findings.

Mindfulness based interventions (MBI), increasingly included in CBT protocols, is generally viewed as involving two components; self-regulation of attention; and acceptance (or tolerance, non/avoidance) of unpleasant emotional, cognitive, and physical sensations (9). Self-regulation of attention may develop through guided observation of thoughts, emotions, and body state during mindfulness practice. Acceptance or tolerance of unpleasant states arises from a conscious effort not to engage in strategies to suppress or avoid negative sensations (thoughts/images), as such strategies may have the unintended effect of maintaining attention to negative stimuli and exacerbating and/or maintaining negative emotional experiences and dysfunctional coping strategies (10). Recent individual studies (11-13), and meta-analyses of various CBT programs including those using MBI's (14-15), find evidence for the positive impact of MBI's on attention control, executive functioning, and emotion regulation in adults and youth with ADHD. However, and with respect to MBI's, the meta-analysis reported significant heterogeneity in findings across the age range, and relatively few studies of MBI's were carried out with children or adolescents with ADHD.

The aim of the current study is to assess the feasibility and preliminary efficacy of a group treatment involving mindfulness practice and training in other emotion/behavior regulation skills. The treatment is an adolescent-adapted version of Dialectical Behavioral Therapy (DBT) developed specifically for adults with ADHD (16). DBT as applied to ADHD is focused on training in self-regulation skills (both emotional and behavioral), including mindfulness, all of which are assumed to benefit the core symptoms of ADHD and comorbid difficulties of an emotional and interpersonal nature, that together may negatively impact overall functioning and quality of life. Based on previous studies examining the tolerability and efficacy of CBT approaches involving MBI's for adolescents with ADHD, we anticipated that the treatment would be tolerable (i.e., with few dropouts), that the adolescents would be able to engage and be satisfied with the skills training approach, and that there would be small to moderate improvements across a broad range of outcome measures.

Methods

Study design

This was a pilot feasibility study involving 10 x 2-hour treatment sessions carried out in two out-patient, community psychiatric clinics in Southern Sweden. Treatment involved a therapist manual and a workbook developed for use by the adolescents, with treatment delivered in a group format by two experienced CBT therapists, with a group size of up to six participants. Assessments occurred at pre-treatment, post-treatment (10 weeks after pre-treatment), and at 12 weeks after treatment (follow-up). Feasibility was assessed by analyzing the treatment acceptance rate, the drop-out rate once treatment was completed, and for participants who completed the treatment, their attendance at weekly sessions and patient-satisfaction questionnaire. The latter included open-ended questions (see below) that allowed preliminary investigation of the feasibility of treatment components. Outcome variables (discussed below) were assessed at pre-treatment, post-treatment and follow-up.

All participants and their parents/caregivers gave informed consent, and the study was approved by the Regional Ethics Committee of Lund (dnr: 2014/323).

Participants

Participants (N=12; 8 of whom completed treatment) were recruited via an out-patient clinic database of adolescents with a primary diagnosis of ADHD who were currently receiving treatment (medication only) and/or currently not receiving treatment (any) at two outpatient, community psychiatry clinics in Southern Sweden. The inclusion criteria were a current primary diagnosis of ADHD or ADD diagnosis; aged between 15-18 years; IQ > 80; no ongoing psychosocial treatment; and no current, comorbid psychiatric condition requiring psychosocial treatment. A total of 72 possible participants were invited to the treatment study and 12 (16.7%) expressed interest. Of these, two did not meet the inclusion criteria and were referred to individual treatment for a comorbid condition within the clinic at which they were already registered. Ten adolescents and their parents/guardians participated in an information meeting with detailed information about the study and a possibility to ask questions. At the end of the meeting, all 10 families gave written consent to participate. The participants and their guardians filled in rating scales at the end of this meeting (pre-treatment). The total completion time of all outcome measures was about 40 minutes.

All participants were previously diagnosed with ADHD/ADD according to a standardized assessment protocol at the clinics from which they

were recruited. The protocol involved a clinical interview carried out by a psychiatrist assessing developmental history and diagnostic status using the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria (17), a neuropsychological assessment performed by a licensed psychologist, a pedagogic evaluation report by a teacher, and rating scales filled out by parents/guardians, teachers, and the young person. All participants were tested with the fourth edition of the Whechsler Intelligence Scale for Children (WISC-IV) (18), the Integrated Visual and Auditory Continuous Performance Test IVA+Plus (19), and/or the Test of Everyday Attention for Children (TEA-Ch) attention test (20), and completed the Beck Youth Inventories (21). Parents/guardians and teachers filled in the Swanson, Nolan, and Pelham-IV (SNAP-IV) rating scales (22).

Treatment method

A workbook for adolescents and a therapist manual were produced based on the Swedish version of the group DBT treatment for adults with ADHD (23). In creating an adolescent workbook and therapist manual, the original treatment was reduced from 14 to 10 sessions, the written material in the workbook was reduced, and the language made more age-appropriate, and with more visually based materials included. The following topics were included in the adolescent workbook: an introduction with rules and treatment contract (one session); psychoeducation about neurobiology and ADHD symptoms (one session); mindfulness and acceptance (two sessions); chaos and control (one session); dysfunctional behavior and functional behavior analysis (two sessions); emotion theory and emotion regulation (one session); control of impulsive behavior (one session); and coping with stress (one session). The following topics from the adult workbook were not included in the adolescent version used in this study: substance abuse; self-esteem and relationships; review; and closure. Finally, an effort was made such that homework assignments were focused only on what was discussed in a particular session, and the overall number of homework assignments was reduced relative to the adult workbook.

The structure of each treatment session was as follows: agenda setting and homework review; a psychoeducational review of the skill to be trained in that session; therapist-led skill training involving role-play with group members; group discussion of the skill and its use; and discussion of planned homework exercises. All treatment sessions were held in the late afternoon (between 4-6 pm), so the participants missed nothing out of school. The participants were offered a break after one hour during which beverages and sandwiches were served.

The two clinical psychologists carrying out the treatment were experienced in delivering CBT to children and adolescents with emotional and behavioral difficulties. One of the psychologists (lead author), had additional training and experience in DBT for individuals with borderline personality disorder and depression. Both psychologists lead each group.

Outcome measures

Feasibility was assessed in the following ways: treatment acceptance rate (no a priori assumption), dropout rate (assumed <25%), attendance rate (assumed > 75%), and responses to the treatment satisfaction measure administered at post-treatment. This measure included five open questions regarding advantages/disadvantages of the group treatment, and whether the participants' expectations were fulfilled. The preliminary efficacy of the treatment was assessed using standardized parent/guardian- and participant-completed measures.

The primary outcomes were pre- to post-treatment changes in parent/guardian-rated ADHD symptoms and participant-rated quality of life. Parent/guardian-rated ADHD symptoms were assessed via the Swanson, Nolan, and Pelham – IV Questionnaire (SNAP-IV) (22, 24), a DSM-IV based ADHD rating scale that assesses core symptoms of hyperactivity/impulsivity and inattention as well as symptoms of oppositional defiant disorder (ODD). The Swedish version of the SNAP-IV comprises 30 items, each scored on a 0-3 scale of symptom presence/absence (0 = "not at all", 1 = "just a little", 2 = "pretty much" and 3 = "very much"). Items 1 to 9 assess the criteria for inattention; items 11 to 19 assess impulsivity/hyperactivity; and items 21 to 28 assess the criteria for oppositional defiant disorder (ODD). Items 10 and 20 are summary questions for inattention and impulsivity/hyperactivity. Item 29 corresponds to the DSM-III-R (25) criteria for ODD, and item 30 is a summary question for ODD. Mean scores for each domain (inattention, impulsivity/hyperactivity, ODD) are computed by summing the item values and dividing by number of items in the respective domain. Clinical cut-offs for each domain indicates 95% significance. The SNAP-IV takes approximately 7 minutes to complete.

Participant-rated quality of life was assessed via the Global Quality of Life Scale (GQL), a single visual analog scale with a rating between 0 (the worst possible life situation) and 100 (the best possible life situation) (26). The GQL takes about 2 minutes to complete.

A range of secondary outcomes measures were administered to assess pre- to post-treatment change. Parents/guardians and the participants completed the Behavior Rating Inventory of Executive

Function (BRIEF-P/T/SR) (27), a standardized rating scale that assesses the individual's ability to regulate their behavior through appropriate inhibition control. The inventory is comprised of 86 items, forming eight clinical subscales: Inhibit, Shift, Emotional Control, Working Memory, Plan/Organize, Organization of Materials, and Monitor (28). Each item is scored on a 1-3 scale (1 = "never", 2 = "sometimes" and 3 = "often"), with total score computed for each subscale and transformed into a T score (range from 30 to 100). Higher T score indicates greater difficulties with an average T score = 50, and T scores > 65 being considered above the threshold for clinical impairment. The BRIEF-SR and Parent/teacher Report Forms take approximately 15 minutes to complete.

Participants completed the Depression and Anxiety Scales from the Beck Youth Inventories (BYI) (21). Each scale is comprised of 20 items, scored on a 0-3 scale (0 = "never", 1 = "sometimes", 2 = "often" and 3 = "always"); summed to a total score with higher scores indicating more severe symptoms. Clinical cut-offs for the BYI Depression and Anxiety scales are above the 74th percentile compared to published norms. The Depression and Anxiety Scales take about 10 minutes to complete. Finally, participants completed the Five Facets of Mindfulness Questionnaire (FFMQ) (29), comprised of 29 items, scored 1-5 (1 = "never", 2 = "seldom", 3 = "sometimes", 4 = "often" and 5 = "always"); summed to yield total and subscale scores. Only the total score is used in this study; higher scores indicate greater levels of mindfulness. The FFMQ takes about 5 minutes to complete.

Analytic Strategy

Pre- to post-treatment changes on the primary and secondary outcomes were evaluated using Wilcoxon Signed Rank Tests in SPSS (IBM SPSS Statistics Version 28.0.1.0 (142) with a prespecified significance level ($p <= .05$). Wilcoxon Signed Rank Tests are nonparametric, i.e. they do not assume (or require) that data are normally distributed. The test statistic is the absolute value of the smaller of the sum of ranks of positive and negative differences. The formula is as follows:

$[w_s = \min(\Sigma_{i=1}^{n} \operatorname{sgn}(x_i - y_i) R_i, \Sigma_{i=1}^{n} \operatorname{sgn}(y_i - x_i) R_i]$, where x_i and y_i are the paired observations, R_i is the rank of $|x_i - y_i|$, and sgn is the sign function that returns 1 for positive values, -1 for negative values, and 0 for zero values. Uncontrolled pre- to post-treatment effect sizes r were calculated using Z-score divided by the square root of the total number of observations. Analyses were first carried out in an intention-to-treat manner, i.e. based on all available data for the 10 participants who started treatment, and using the last observation carried forward method. The analyses were repeated based on all available data from the treatment completers; both sets of findings are reported.

Data collection and missing data

The ten participants who started treatment and their parents/guardians filled out all measures at pre-treatment. One participant (who didn't complete treatment) filled out a half of a questionnaire (FFMQ) which was not included in the outcome analyses. Of the eight participants who completed treatment, all eight and seven of their parent/guardians filled out all outcome measures at post-treatment and the follow-up. One parent/guardian of treatment completers failed to fill out the outcome measures at post-treatment but did complete the follow-up assessment. There were no missing items on the rest of the completed measures.

Results

Participants

All ten adolescents were on stable stimulant medication at the time of enrollment to the study. One participant discontinued treatment after session 1 and another after session 3, leaving 5 participants in one group and 3 in the other group. There were three males and two females in one group and three males in the other group. All participants were between 15 and 17 years of age with a mean age of 16. Four participants were 15 and the other four were 17 years old. Four participants had a learning disability. Characteristics of the ten study participants are presented in Table 1.

Feasibility

Of the 72 potential participants who were invited to participate in the study treatment, 12 accepted and 10 met the study inclusion criteria. Eight of the 10 (80%) who were enrolled in the study completed the treatment. One participant wanted to try the treatment and dropped out after one session, while another attended three sessions and didn't want to continue because he perceived that he had milder difficulties than the rest of the group (self-expressed reason). Of the eight participants who completed the treatment, they attended 8 out of the 10 planned group sessions. No adverse events were reported during the treatment phase or the 12-week post-treatment follow-up phase. According to the treatment satisfaction filled out at post-treatment by the eight participants who completed treatment, most were satisfied with the treatment. In response to the question, "What is your opinion about the treatment?", seven participants indicated that the treatment was good or very good. Five participants reported that their expectations were fully met by the

TABLE 1. Baseline (T1) characteristics of the 10 participants in the DBT-based skills training.

Variables	*Value*
Age (years), mean (SD)	16.0 (1.0)
Gender, Males, n (%)	6 (75%)
Ethnicity, No.(%)	White: 8 (80%)
	Multiethnic: 2 (20%)
Education:	
Secondary school, n	5
Upper secondary school, n	5
Pharmacological treatment	
Methylphenidate, n (%)	10 (100%)
ADHD subtype[a],	
ADHD-C, n (%)	7 (70%)
ADHD-IN, n (%)	3 (30%)
[a,b]SNAP-IV-P inattention, median (IQR)	2.0 (0.7)
[a,b]SNAP-IV-P hyperacticity/impulsivity, median (IQR)	0.7 (0.8)
[c]GQL, median (IQR)	70.0 (25.9)
[a,d]BRIEF-P (GEF), median (IQR)	70.0 (7.8)
[d]BRIEF-SR (GEF), median (IQR)	58.5 (12.5)
[e]BYI Anxiety Scale, median (IQR)	66.5 (26.0)
[e]BYI Depression Scale, median (IQR)	69.5 (29.3)
[f]FFMQ, median (IQR)	3.2 (0.5)

Notes: ADHD=attention deficit hyperactivity disorder; C = combined type, IN = predominantly inattentive type; BRIEF-P GEF = Behavior Rating Inventory of Executive Function - Parent scale Global Executive Function; BRIEF-SR GEF= Behavior Rating Inventory of Executive Function - Self-Report scale Global Executive Function; BYI Anxiety = Beck Youth Inventories Anxiety Scale; BYI Depression = Beck Youth Inventories Depression Scale; GQL = Global Quality of Life; FFMQ = Five Facets of Mindfulness Questionnaire; IQR = Interquartile Range; SD = standard deviation; SNAP-IV = Swanson-Nolan-Pelham scale, fourth edition. [a]missing values from one guardian concerning SNAP-IV-P inattention, SNAP-IV-P hyperactivity/impulsivity and BRIEF-P (GEF). [b]SNAP-IV-P inattention and hyperactivity/impulsivity was measured as a mean score (summary score/9 items). [c]GQL was measured as an ordinal scale 1-100. [d]BRIEF was standardized according to age and sex and raw scores were converted to T scores (mean=50; SD=10). [e]BYI was standardized according to sex and raw scores were converted to percentiles. [f]FFMQ was measured as a mean score. Higher scores in SNAP. BRIEF, and BYI indicate greater impairment. Higher scores in GQL an FFMQ indicate greater functioning.

treatment, while two participants noted partial fulfillment of their expectations, and one participant did not respond to the question. They reported several advantages of the skills training, such as the possibility to learn new knowledge, to feel calm when practicing mindfulness, and to talk about their problems. The participants also reported the benefits of meeting other adolescents with ADHD. One participant indicated that the treatment was too time consuming, and the sessions and homework assignments competed with time needed for schoolwork; another adolescent wanted a shorter break in the middle of sessions; and another wanted more time to discuss their own problems in the group.

Efficacy

As planned, data were analyzed according to the intention-to-treat principle (all participants who started treatment) and per-protocol (treatment completers). Table 2 presents the medians, and Z-scores for the outcome measures at T1, T2, and T3, the p-values for the change score, and r (uncontrolled effect size) for primary and secondary outcome variables from T1 to T2, and T1 to T3 according to intention-to-treat analyses.

There was no improvement for the primary outcomes of parent/guardian-rated ADHD or participant-rated quality of life between pre-treatment (T1) and post-treatment (T2) according to the intention-to-treat analyses. However, there was a significant improvement for parent/guardian rated ADHD symptoms between pre-treatment (T1) and the 12-week follow-up (T3), with a medium effect size. A similar pattern was observed for the secondary outcomes with no significant improvements for the pre-treatment to post-treatment phase but significant improvements between pre-treatment and the 12-week follow-up (except participant-rated mindfulness), with the effect sizes in the moderate to large range.

Table 3 presents the medians, and Z-scores for the outcome measures at T1, T2, and T3, the p-values for the change score, and r (uncontrolled effect size) for primary and secondary outcome variables from T1 to T2, and T1 to T3 for the participants who completed treatment.

The completer analyses showed a similar pattern as the intention-to-treat analyses with no significant improvement for the primary outcomes of parent/guardian-rated ADHD or participant-rated quality of life between pre-treatment (T1) and post-treatment (T2). Nevertheless, there were significant improvements for these completer outcomes between pre-treatment (T1) and the 12-week follow-up (T3), with a medium effect size. Similarly, there were no significant improvements for the secondary outcomes for the completers between pre-treatment and post-treatment but significant improvements between pre-treatment and the 12-week follow-up (except participant-rated mindfulness), with effect sizes in the moderate to large range.

Discussion

The current study examined the feasibility and preliminary efficacy of a 10-week (20 hours) DBT-based skills training group for adolescents with ADHD seen in routine care. Overall, the findings suggest that the treatment was feasible for those that agreed to participate, with 8 of 10 participants

TABLE 2. Primary and secondary outcomes for intention-to-treat analyses (N=10) at pre-treatment (T1), post-treatment (T2) and 12-week follow-up (T3).

Outcome measure	Pre-treatment Median	Post-treatment Median (Z)	Follow-Up Median (Z)	Pre-treatment to post-treatment *p*-value	Pre-treatment to Follow-Up *p*-value	Pre-treatment to post-treatment *r*	Pre-treatment to Follow-Up *r*
SNAP-IV-P inattention	2.0	1.5 (-1.3)	1.8 (-2.0)	.8	.05	.4	.6
SNAP-IV-P hyperactivity/impulsivity	0.7	0.6 (-1.2)	0.7 (-0.5)	.2	0.6	.4	.2
GQL	70.0	79.5 (-1.3)	79.5 (-1.7)	.2	.09	.4	.5
BRIEF-P (GEF)	70.0	69.0 (-1.6)	67.0 (-2.1)	.1	.04	.5	.7
BRIEF-SR (GEF)	58.5	55.0 (-1.3)	54.5 (-2.0)	.2	.05	.4	.6
BYI Anxiety	66.5	66.0 (-1.4)	49.5 (-2.2)	.2	.03	.4	.7
BYI Depression	69.5	51.5 (-1.3)	51.5 (-2.4)	.2	.02	.4	.7
FFMQ	3.2	3.2 (-1.1)	3.2 (-1.2)	.3	.2	.3	.4

Notes: BRIEF-P GEF = Behavior Rating Inventory of Executive Function - Parent scale Global Executive Function; BRIEF-SR GEF= Behavior Rating Inventory of Executive Function - Self-Report scale Global Executive Function; BYI Anxiety = Beck Youth Inventories Anxiety Scale; BYI Depression = Beck Youth Inventories Depression Scale; GQL = Global Quality of Life; FFMQ = Five Facets of Mindfulness Questionnaire; SD = standard deviation; SNAP-IV = Swanson-Nolan-Pelham scale, fourth edition.

TABLE 3. Primary and secondary outcomes for treatment completers (N=8) at pre-treatment (T1), post-treatment (T2) and 12-week follow-up (T3).

Outcome measure	Pre-treatment Median	Post-treatment Median (Z)	Follow-Up Median (Z)	Pre-treatment to post-treatment *p*-value	Pre-treatment to Follow-Up *p*-value	Pre-treatment to post-treatment *r*	Pre-treatment to Follow-Up *r*
SNAP-IV inattention	2.2	1.4 (-1.35)	1.5 (-1.96)	.2	.05	.5	.7
SNAP-IV hyperactivity/impulsivity	0.6	0.2 (-1.16)	0.8 (-0.51)	.2	0.6	.4	.2
GQL	70	88 (-1.35)	83 (-2.12)	.2	.03	.5	.7
BRIEF-P (GEF)	71	69 (-1.57)	67 (-2.1)	.1	.04	.6	.7
BRIEF-SR (GEF)	58	50 (-1.33)	50 (-1.96)	.2	.05	.5	.7
BYI Anxiety	74	58 (-1.4)	35 (-2.2)	.2	.03	.5	.8
BYI Depression	79	63 (-1.26)	51 (-2.38)	.2	.02	.4	.8
FFMQ	73	75 (-0.42)	77 (-0.28)	.67	.78	.15	.1

Notes: BRIEF-P GEF = Behavior Rating Inventory of Executive Function – Parent scale Global Executive Function; BRIEF-SR GEF= Behavior Rating Inventory of Executive Function - Self-Report scale Global Executive Function; BYI Anxiety = Beck Youth Inventories Anxiety Scale; BYI Depression = Beck Youth Inventories Depression Scale; GQL = Global Quality of Life; FFMQ = Five Facets of Mindfulness Questionnaire; SNAP-IV = Swanson-Nolan-Pelham scale, fourth edition.

completing the treatment and the treatment completers attending 80% of the available treatment sessions. In a post-treatment questionnaire including open-ended questions, participants indicated the usefulness of individual treatment components as well as high levels of satisfaction with the treatment. It is important to note in relation to acceptability, that only 16.7% of those invited agreed to participate in the treatment (discussed further below). In a preliminary fashion we examined the efficacy of the treatment and found no significant improvements in primary or secondary outcomes assessed at the post-treatment interview, but significant improvements observed at the 12-week follow-up for both primary and secondary outcomes.

When considering both primary and secondary outcomes, the absence of a significant effect at post-treatment was somewhat surprising. Previous studies of MBI's have found significant pre-to-post-treatment improvements in adolescents with ADHD (8). In partial support of the treatment's efficacy there were moderate to large improvements in the primary and secondary outcomes by the time of the follow-up assessment and based on the intention-to-treat analyses, this was not due to the participants receiving additional treatment during the 12-week follow-up phase. All participants were on stable medication (Methilphenidate) for ADHD-symptoms during the treatment and follow-up phases, suggesting a possible lag-effect of the DBT intervention on the primary and secondary outcomes. The improvements at the 12-week follow-up were of similar size to those reported at post-treatment for core ADHD symptoms, comorbid anxiety and depression, and overall functioning or quality of life, in previous MBI studies of adolescents with ADHD (14, 30-31). It is possible that the improvements at the 12-week follow-up represent a regression towards the mean. Further studies involving longer follow-ups and control groups are needed.

Finally, we were somewhat surprised by the lack of change on the participant-rated mindfulness measure during the treatment or follow-up phases. It is possible that measure used here (FFMQ) was not sufficiently sensitive to the effects of this mindfulness-based intervention, or that the improvements attributable to the treatment (observed at follow-up) were owing to the skills training other than mindfulness done during the groups. Further studies employing larger sample and a control condition, with additional or different measures of mindfulness, are warranted to determine whether this form of treatment yields improvements in mindfulness and if such improvements mediate outcomes in MBI treatments for ADHD.

There is one study, to the best of our knowledge, which adapted and examined the same adult DBT-based skills training protocol in a randomized controlled trial with adolescents with ADHD (12). In comparison to psychoeducational program for ADHD, the DBT-based skills training intervention (group) failed to yield significant improvements in ADHD symptoms, depression, anxiety, or total difficulties (parent- and participant rated). The authors concluded that DBT-based skills training groups may be suitable only for a subgroup of adolescents with ADHD. More research is needed to investigate this issue.

Overall, the present study provides preliminary evidence of the feasibility, acceptability, and efficacy of a DBT-based intervention involving mindfulness and other skills training, and delivered in a group format, for adolescents with ADHD. The study benefits from the use of standardized parent/guardian-rated and participant-rated outcome measures with adolescents recruited from routine child psychiatric care clinics. Nevertheless, the findings from this study must be viewed within the context of certain limitations. Only 12 of the 72 adolescents with ADHD who were contacted showed interest in the treatment, and 2 of the 10 who started treatment discontinued because of low motivation (self-expressed reason). The study did not include a control group and the follow-up interval was relatively brief (12 weeks). Significant improvements in the primary and secondary outcomes were not observed at post-treatment but were the 12-week follow-up. Finally, we found no significant improvements on a participant-rated measure of mindfulness despite the current treatment involving training in mindfulness. Further trials are warranted.

Clinical significance

Within routine health care services in the south Sweden guardians of adolescents with ADHD get digital and practical psychoeducational programs about the disorder, providing knowledge of how to handle everyday challenges associated with ADHD. However, there is a lack of treatment for adolescents themselves. The current study showed that a group intervention for adolescents with ADHD is feasible in a frame of the routine mental health care settings. It also indicated that adolescents with ADHD can learn to handle inattention, improve executive functioning, depression, anxiety and quality of life using mindfulness and other regulatory/behavior skills. It means that an overall risk for negative development decreases, while child and adolescent psychiatry service can get access to an effective and cost-efficient treatment for adolescents with ADHD.

Conflicts of interest

The authors have no conflicts of interest to disclose.

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