



Internet delivered cognitive behavioral therapy for adults with ADHD - A randomized controlled trial

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ABSTRACT

Evidence-based psychological interventions for adults with attention deficit hyperactivity disorder (ADHD) are seldom available in clinical settings. Medication is often offered as the sole treatment, with non-optimal effects for a majority of patients. The objective was to compare internet-based cognitive behavioral therapy (iCBT) to an active control treatment of internet-based applied relaxation training (iART), and to treatment as usual only (TAU) in adult outpatients with ADHD.

One hundred and four patients, of which 67 % used ADHD medication, were randomized to 12 weeks of iCBT ($n = 36$), iART ($n = 37$), or TAU ($n = 31$). Primary outcome was change in the Adult ADHD Self Report Scale (ASRS) up to 3 (FU3) and 12 months (FU12) after treatment.

ASRS improved more for iCBT ($p < .01$; Cohen's $d = 0.42$ at post-treatment and 0.67 at FU3) and iART ($p < .01$; Cohen's $d = 0.57$ at post-treatment and 0.66 at FU3) than for TAU. The effects sustained over 12 months for iCBT ($p < .001$) and iART ($p < .001$). No significant difference was found when comparing iCBT to iART ($p = .53$).

Treatment responders reached 25 % for both treatments, which was superior to the 3 % responders in TAU ($p < .05$).

iCBT and iART could both be promising add-ons to medication and increase availability to psychological treatment with sustained symptom reductions after one year.

1. Introduction

ADHD is a disabling and often lifelong disorder, affecting 2–4 % of adults. It is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with executive functioning such as emotion regulation, inhibitory control, working memory and motivation (Seidman, 2006).

A majority of adult ADHD patients are only offered medication, which is not enough for about 50 %–70 %, who experience residual symptoms (Mongia and Hechtman, 2012; Safren, 2006; Safren et al., 2010). Also, psychiatric comorbidity is highly prevalent (80 %) (Sobanski et al., 2007). Consequently, the need for complementary

interventions such as psychological treatments is highly emphasized (Jensen et al., 2016; Seixas et al., 2011). Trials evaluating cognitive behavioral therapy (CBT) and dialectical behavioral therapy (DBT) show promising results (Boyer et al., 2015; Halmøy et al., 2022; Hesselinger et al., 2004; Hirvikoski et al., 2011; Mongia and Hechtman, 2012; Safren et al., 2005; Weiss et al., 2012; Vidal et al., 2015; Young et al., 2020). One pilot study has evaluated a combination of these therapeutic approaches to better address the complex problem profile (Nasri et al., 2017) and the findings indicate beneficial effects on ADHD-symptoms as well as on comorbidity such as depression and anxiety. Furthermore, findings from a recent scoping review, exploring the effects of Acceptance and Commitment Therapy (ACT) for individuals

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with ADHD (Munawar et al., 2021) suggest that ACT could be promising in targeting ADHD symptoms and more general psychosocial issues, such as poor quality of life, academic procrastination, depression and anxiety symptoms, when delivered in group or individually. Thus, the evidence base for this treatment approach is still very limited in the treatment of ADHD.

It is still unclear if previously found effects derive from specific treatment mechanisms or from non-specific mechanisms such as patient expectations and therapist credibility (Donovan et al., 2009). Moreover, evaluation of long-term outcomes is limited (Mongia and Hechtman, 2012). As in many other psychological treatments (Rozenal et al., 2014), adverse events related to psychological interventions for adult ADHD have not been explored.

Limited access to CBT therapists makes internet-based CBT (iCBT), an online self-help treatment with brief therapist support, an attractive alternative. This treatment format has rapidly increasing scientific support for a wide range of conditions (Andersson, 2016).

Three studies on adult ADHD and self-help have shown promising effects (Moëll et al., 2015; Pettersson et al., 2014; Stevenson et al., 2003). The most comprehensive trial compared iCBT to group CBT and a waiting list. However, low power, lack of attention-matched controls needed to rule out non-specific effects, and dubious handling of missing data points to a need for further evaluations. Thus, the objective of this study was to evaluate the direct and long-term effects on ADHD symptoms, everyday functioning, quality of life and adverse events of adding a comprehensive iCBT-program based on CBT and DBT techniques to treatment as usual.

We hypothesized that iCBT would have specific treatment effects as shown by being superior to the active control matched on a range of factors. We also expected both active treatments to show better effects when compared to treatment as usual only.

2. Methods

2.1. Design

A randomized controlled design was used with three groups; internet-based CBT for adult ADHD (iCBT), internet-based applied relaxation training (iART), and treatment as usual (TAU). Outcomes were measured with web questionnaires and interviews, blinded at follow-ups, at pre-treatment, after 12 weeks of treatment (post-treatment), and after 3 (FU3) and 12 (FU12) months. TAU received treatment after the 3-month follow-up and then ceased being a control. The protocol was approved by Stockholm Regional Ethics Committee (2013/2115–31/1) and registered at [Clinicaltrials.gov](https://clinicaltrials.gov) (NCT02041884).

2.2. Recruitment and patient characteristics

The trial was conducted at the Internet Psychiatry Unit at the Psychiatry Southwest Clinic in Stockholm, Sweden between January 2014 and May 2017. Outpatients living in Stockholm who fulfilled the following criteria were included: 18–65 years old; ADHD diagnosis according to DSM-IV; >16 points on one of the subscales of the Adult ADHD Self Report Scale version 1.1 (ASRS-v1.1) (Adler et al., 2006); access to Internet and a smartphone; ability to understand and read Swedish; no practical barriers to participate; stable or no medication for ADHD or other psychiatric conditions 1 month before baseline; no ongoing non-pharmacological treatment for ADHD; no plans to receive other psychological treatment for ADHD; no substance misuse during the last 3 months (verified with urine dipstick test if necessary); no organic brain injury, no suicidality or severe depression (as assessed by a clinician (Montgomery and Asberg, 1979)) or by >34 points on the self-rated Montgomery-Åsberg Depression Rating Scale, (MADRS-S) (Svanborg and Asberg, 1994); IQ ≤85 according to previous neuropsychological assessments; no psychiatric or somatic condition that could affect treatment negatively; and no level 2 or 3 autism spectrum disorder

according to DSM-5.

Patients were recruited mainly from specialized ADHD units and via information on the website of the Internet Psychiatry Unit. Applicants conducted an online screening with informed consent and self-assessments. Diagnosis verification was made through medical records, a copy of a neuropsychiatric report and/or a medical certificate. Furthermore, same procedure was used to rule out level 2 or 3 autism spectrum disorder.

A two-hour semi structured face-to-face interview was then performed, by either a clinical psychologist with extensive experience of ADHD patients or by a final year student at the five-year clinical psychology university program, the latter receiving thorough supervision. The M.I.N.I. interview (Sheehan et al., 1998) was used to identify comorbidity, such as severe depression or problematic alcohol/drug use. The ADHD Rating Scale IV (DuPaul et al., 1998) and Montgomery-Åsberg Depression Rating Scale (MADRS) (Montgomery and Asberg, 1979) were used to rate ADHD and depressive symptoms. Excluded patients were further referred if necessary. Reasons for exclusion are found in Fig. 1. Baseline characteristics of included patients are presented in Table 1.

2.3. Randomization

Patients were consecutively randomized. Two randomization lists were created with randomly sized blocks of 8–16 slots each, using www.randomizer.org. The first list consisted of 90 slots, with a 1:1:1 ratio, the second had 50 slots with a 1:1 ratio between iCBT and iART only. Sealed and numbered envelopes were created from the lists. University staff not involved in the study created the lists and the envelopes. An independent research nurse at the Internet Psychiatry Unit allocated patients to interventions.

2.4. Measures

Assessment points and references for all outcome measures are described in Appendix A.

2.4.1. Primary outcome

Adult ADHD Self-Report Scale version 1.1 (ASRS-v1.1) (Adler et al., 2006) is an established self-rating for ADHD symptoms, comprising two subscales with nine items each; inattention and hyperactivity/impulsivity. Each item is rated “Never” (0), “Rarely” (1), “Sometimes” (2), “Often” (3) or “Very Often” (4) and the total range is 0–72. A 30 % reduction in ASRS was used to classify responders (24). A short interview version of ASRS (first six items) (Kessler et al., 2005) was used at follow-ups by blind assessors. In cases where the self-rated ASRS was missing, the interview-ASRS was used for imputation in line with a previously established method (Hedman et al., 2013). The interview ASRS was used for n = 69 at post-treatment and for n = 55 at FU3.

2.4.2. Secondary outcomes

Blind assessors used ADHD Rating Scale to measure ADHD symptoms and CGI-S to measure ADHD symptom severity after treatment. Self-rated measures were used to assess depressive symptoms, misuse of alcohol and drugs, work ability, quality of life, sleep difficulties, subjective stress, general health status, functional impairment in different life domains, and emotion dysregulation. All measures and their references are further described in Appendix A.

2.4.3. Treatment process measures

Adherence was measured as number of treatment modules completed. Therapist-client interaction was measured as number of sent messages and number of telephone calls. The Treatment Credibility Scale (Devilly and Borkovec, 2000) was administered after treatment week one and five. The Client Satisfaction Questionnaire (CSQ-8) (Larsen et al., 1979) was administered at post-treatment. Changes in

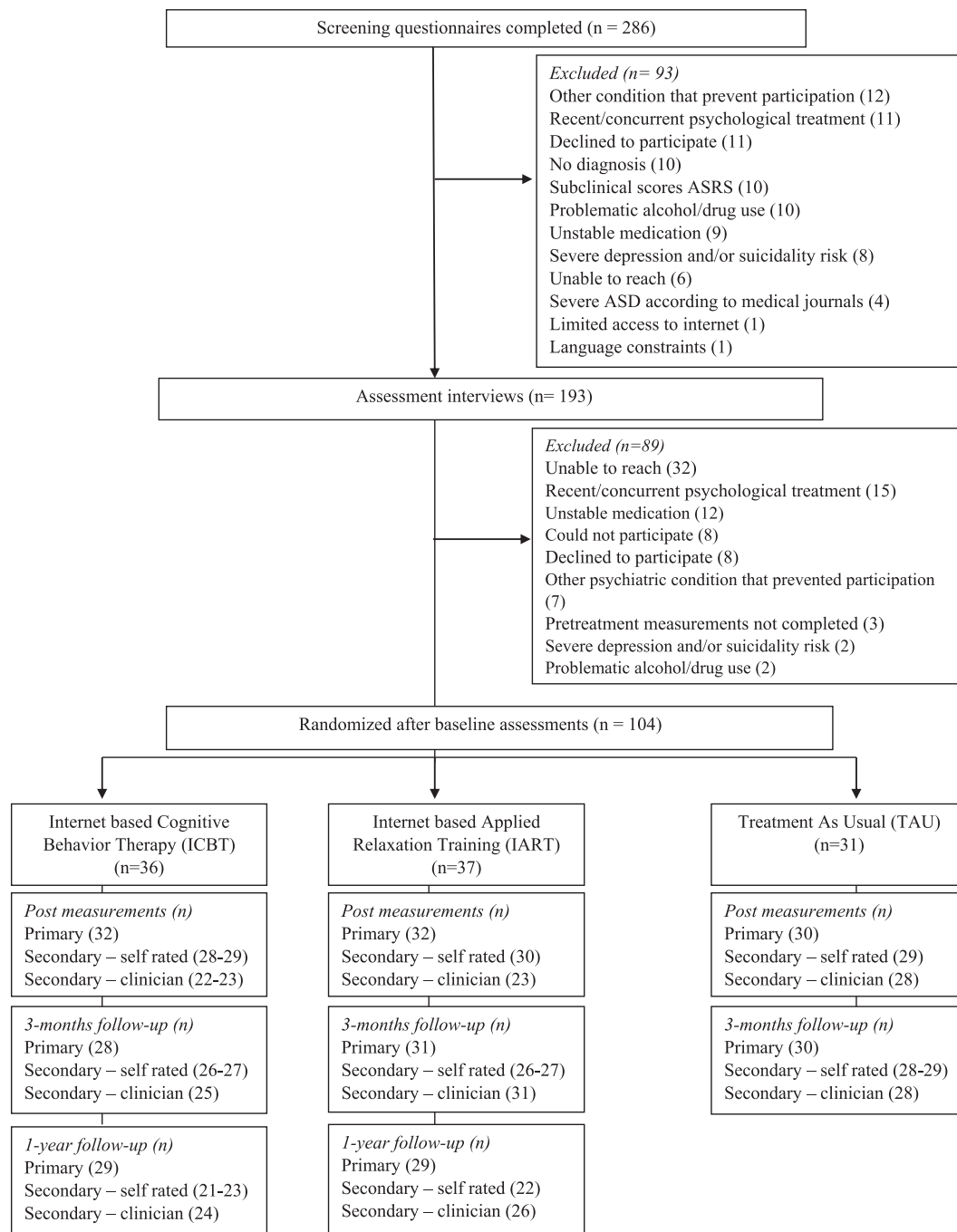


Fig. 1. Flowchart of study participants and reasons for exclusion.

Note. Post measurements = post intervention assessments. Abbreviations: ASRS = Adult ADHD Self Report Scale v1.1. ASD = Autism Spectrum Disorder. Assessment points for all outcome measures are described in [Appendix B](#).

ADHD medication and engagements in other therapeutic interventions during the treatment period were assessed primarily through interviews, with self-ratings used as a confirmatory, secondary source. Medication change was categorized as reduced/stopped, unchanged/never taken and started/increased dose since baseline. Adverse events were addressed through the question “Did you experience any negative consequences because of your treatment?” Patients were asked to elaborate if they answered yes.

2.5. Interventions

iCBT and iART were given as add-ons to treatment as usual. Both

lasted 12 weeks and were based on well-established treatment manuals (Hesslinger et al., 2004; Safren, 2005; Öst and Breitholtz, 2000). The web platform at the Internet Psychiatry Unit, with a secure, double authentication log-in, contained the treatments. Both treatments had the same structure; a text and media based self-help material divided into modules with educative material; descriptions, rationales, and instructions for therapeutic techniques; quick, often self-reflective, exercises; and more time demanding homework assignments. Generally, the patient works with each module for one week and receives access to the next one after having their homework reviewed by their therapist, often within 36 hours. Treatments were matched for duration, the number of standard modules given to the patients, therapists and their supervision,

Table 1
Sociodemographic and clinical characteristics of participants at baseline (n = 104).

Baseline characteristics		ICBT (N = 36)	IART (N = 37)	TAU (N = 31)	Statistics ^d
Gender	Women	25 (69%)	30 (81%)	17 (54%)	$\chi^2(2) = 5.45; p = .07$
Age	Mean (SD)	36.7 (11.4)	35.97 (9.4)	37.2 (10.3)	$F(2) = 0.12; p = .89$
Highest education	Elementary school	2 (6%)	6 (16%)	1 (3%)	$p = .18$ (Fisher's)
	High school	16 (44%)	15 (41%)	9 (29%)	
	College/university	18 (50%)	16 (43%)	21 (68%)	
Occupational status ^a	Working	25 (70%)	23 (62%)	23 (74%)	$\chi^2(2) = 3.99; p = .82$
	Sick leave	7 (19%)	7 (19%)	3 (10%)	$\chi^2(2) = 1.44; p = .51$
	Unemployed	3 (8%)	4 (11%)	3 (10%)	$p = 1.0$ (Fisher's)
	Retired/disability pension	0 (0%)	2 (5%)	0 (0%)	$p = .33$ (Fisher's)
Subjective economic situation	Parental leave/housewife or house husband	1 (3%)	1 (3%)	2 (6%)	$p = .75$ (Fisher's)
	Very bad/bad	13 (36%)	14 (38%)	4 (13%)	$p < .05$ (Fisher's)
	Neither good or bad	18 (50%)	10 (27%)	13 (42%)	
Relational status	Good/very good	5 (14%)	13 (35%)	14 (45%)	
	Married/in partnership	19 (53%)	24 (65%)	18 (58%)	$p = .57$ (Fisher's)
	Divorced/widow(er)	4 (11%)	2 (5%)	1 (3%)	
Alcohol use (AUDIT)	Single/other	13 (36%)	11 (30%)	12 (39%)	
	Mean (SD)	5.53 (4.1)	3.57 (3.7)	5.9 (4.3)	$F(2) = 3.46; p < .05$
Drug use (DUDIT)	Mean (SD)	0.19 (1.1)	0.84 (3.0)	1.3 (4.0)	$F(2) = 0.80; p = .45$
	Subtype ADHD	Combined	31 (86%)	34 (92%)	24 (77%)
Psychiatric comorbidity	Inattention	5 (14%)	3 (8%)	7 (23%)	
	Hyperactive	0 (0%)	0 (0%)	0 (0%)	
	Depression	5 (14%)	6 (16%)	3 (10%)	$p = .72$ (Fisher's)
	Bipolar disorder	2 (6%)	5 (14%)	0 (0%)	$p = .12$ (Fisher's)
	Anxiety disorder	12 (33%)	10 (27%)	7 (23%)	$\chi^2(2) = 0.98; p = .61$
	Autism spectrum disorder	4 (11%)	2 (5%)	1 (3%)	$p = .50$ (Fisher's)
	Eating disorder	1 (3%)	0 (0%)	0 (0%)	$p = .64$ (Fisher's)
Psychotic disorder	0 (0%)	0 (0%)	0 (0%)	n/a	

Table 1 (continued)

Baseline characteristics		ICBT (N = 36)	IART (N = 37)	TAU (N = 31)	Statistics ^d
ADHD medication	Antisocial disorder	1 (3%)	0 (0%)	0 (0%)	$p = .27$ (Fisher's)
	Any	22 (61%)	25 (68%)	22 (71%)	$\chi^2(2) = 1.56; p = .46$
	Regular	17 (47%)	24 (65%)	21 (68%)	$\chi^2(2) = 1.16; p = .47$
	If needed	5 (14%)	1 (3%)	1 (3%)	$p = .32$ (Fisher's)
	Both	1 (3%)	5 (13%)	3 (10%)	$p = .28$ (Fisher's)
ADHD medication type	None	13 (36%)	7 (19%)	6 (19%)	$\chi^2(2) = 3.99; p = .14$
	Psychostimulants	19 (83%)	24 (80%)	22 (88%)	$\chi^2(2) = 1.54; p = .46$
	Non stimulants	0 (0%)	2 (7%)	1 (4%)	
Antidepressant medication	Unspecified ^b	4 (17%)	4 (13%)	2 (8%)	
		6 (17%)	12 (32%)	7 (23%)	$p = .74$ (Fisher's)
Number of previous psychosocial interventions for ADHD ^c		0.43 (0.7)	0.47 (0.74)	0.29 (0.46)	$F(2) = 0.70; p = .50$

Note: ICBT = Internet-based Cognitive Behavioral Therapy, IART = Internet-based Applied Relaxation Training, TAU = Treatment As Usual (waiting list condition), AUDIT = Alcohol Use Disorders Identification Test, DUDIT = Drug Use Disorders Identification Test.

^a Multiple choice question, can for example be working and on part time sick leave.

^b Unspecified due to difficulties to remember the medication type according to patient records.

^c Previous psychosocial treatment for ADHD includes cognitive and/or dialectical behavior therapy, psychoeducation, counseling, working memory training and interventions from occupational therapist.

^d Statistics for either ANOVA, Chi-square or Fisher's exact test.

and weekly measures with a short version of ASRS and the MADRS-S to monitor progress and detect risks (>4 on the MADRS-S suicide item led to additional telephone assessment). Inactive patients were reminded and encouraged to continue their work via text messages and phone calls, in iCBT after 2–3 days and in iART after one week.

Five therapists were final year students at a clinical psychologist program, and one was a psychologist in supervised training, all with theoretical and practical training in CBT. Group supervision was conducted weekly by a licensed clinical psychologist with extensive training and experience in CBT and adults with ADHD. Supervision included monitoring the written interaction. Patients had continued access to their treatments for another six months after the first 12 weeks, without support from a clinician.

2.5.1. iCBT

iCBT was based on a combination of established methods taken from CBT (Safren, 2006) and DBT (Hesslinger et al., 2002) for adults with ADHD, expected to have effects exceeding those of non-specific interventions. One of the modules (Valued Living) was based on ACT (Munawar et al., 2021) Audio clips were used to convey mindfulness exercises. Thirteen standard and two optional modules were available. The combined manual has been evaluated as a group treatment with promising results (Nasri et al., 2017) and is thoroughly described in Appendix B.

2.5.2. iART

iART treatment was based on the well-established relaxation program Applied Relaxation (Öst, 1987), which has shown effects similar to traditional CBT in anxiety, for example (Öst and Breitholtz, 2000). Relaxation has been used as a control treatment in a study of adult ADHD (Safren et al., 2010), with inferior effects compared to CBT, indicating a specific effect of CBT. iART was designed as an active control treatment with a thorough and credible rationale presenting the intervention as a stress reducing technique aimed at breaking the vicious circles fueled by ADHD symptoms but was expected to only have a low to medium non-specific effect. Appendix B contains a more detailed description.

2.5.3. TAU

The treatment as usual condition consisted of each patient's standard medication and/or standard psychiatric care. Patients were only contacted for assessments. Initially, 71 % of patients were undergoing ADHD medication. Changes in medication and received psychosocial interventions during the three months are presented in Results.

2.6. Statistics

The target sample size was set to 140, with 55 patients in the active conditions and 30 in TAU, to reach 80 % power at an α -level of 5 % to detect an estimated Cohen's $d = 0.6$ between iCBT and iART and $d = 0.8$ between iCBT and TAU. The effect size was based on Cohen's d in a previous study (Safren et al., 2010) where applied relaxation training was compared to CBT during twelve weeks of treatment ($d = 0.52$).

Thus, we estimated an adjustment for a slightly larger effect in our study between the two treatment groups because we expected our recruited sample to have less psychiatric comorbidity due to the study format.

Hierarchical Linear Mixed-effect models (HLM), fitted with full information maximum likelihood, tested interactions of condition and time (i.e. if change over time differed between two groups) in all outcomes. This approach uses all available data, making it an intention-to-treat analysis, and is recommended for handling missing data and repeated-measures data (Gueorguieva and Krystal, 2004). Effect sizes on primary outcome are reported as Cohen's $d = (\text{mean } 1 - \text{mean } 2) / \text{pooled standard deviation [SD]}$ (Borenstein et al., 2009).

One model included pre, post, and 3-month assessments and used two dummy variables to compare each active treatment to TAU (zero in both dummies). A second model compared iCBT and iART, including also the 12-months assessment. Within-group change from pre to 12-months was tested for iCBT and iART separately. Including random intercept and slopes and a squared time parameter resulted in the best model fit. A sensitivity analysis included baseline variables correlated to missingness (age, gender, level of education, employment status, and psychiatric comorbidity), to control for non-random missing data.

Categorical data was analyzed with χ^2 tests or Fisher's exact test, while t-tests or ANOVAs were used for continuous variables. Effect sizes were expressed as Hedges' g . Significance was 0.05 and SPSS Statistics 22 was used.

3. Results

3.1. Baseline characteristics

As reported in Table 1, no significant differences were found between groups on any baseline characteristic except for subjective economic situation and alcohol use. In general, patients in TAU perceived their subjective economic situation as better than the other groups.

Patients in iART rated their alcohol consumption as lower than iCBT and TAU.

Due to limited resources, the trial inclusion was discontinued at 104 patients.

3.2. Attrition and number of patients analyzed

In line with intent-to-treat all patients were included in the analyses (36 in iCBT, 37 in iART, and 31 in TAU) by using the two HLM-models. Overall response rates for the primary outcome were 90 %, 86 %, and 79 %, more thoroughly presented in Fig. 1.

3.3. Primary outcome

Fig. 2 presents the course of improvement for the primary outcome ASRS and observed means, standard deviations, and effect sizes are found in Table 2. The first model showed a larger reduction over time for iCBT ($t(93.8) = 3.2$; $p < .01$; Cohen's $d = 0.42$ at post-treatment and 0.67 at FU3) and iART ($t(91.5) = 3.2$; $p < .01$; Cohen's $d = 0.57$ at post-treatment and 0.66 at FU3) in comparison to TAU.

The second model, comparing iCBT and iART over all four assessment points, did not show any significant interaction ($t(98.3) = 0.63$; $p = .53$), with a Cohen's d for the groups difference at post-treatment of 0.05, $d = 0.11$ at FU3 and for FU12 equal to $d = 0.07$. A decrease over the whole period was confirmed for both iCBT ($t(80.5) = -5.1$; $p < .001$) and iART ($t(86.1) = -5.5$; $p < .001$). Sensitivity tests (as described in Methods) did not alter any of the above results.

At post-treatment, 8 patients (25 %) in each treatment group were responders. This was significantly more than the 1 responder (3 %) in TAU (Fisher, $p < .05$). After 3 months, 7 patients (25 %) in iCBT and 6 (19 %) in iART were responders, but none in TAU (Fisher, $p < .01$). After 12 months, 5 patients (17 %) were responders in iCBT and 6 (21 %) in iART ($\chi^2(1) = 0.11$; $p = .74$). Sensitivity tests where patients with missing data were classified as non-responders did not alter results.

3.4. Secondary outcomes

Observed data and the results of statistical tests for all secondary outcomes are presented in Appendix C and, for ASRS subscales, Table 2. The first model with all groups showed a significantly larger reduction over time for iCBT and iART in comparison to TAU for ASRS Inattention, ASRS hyperactivity/impulsivity, ADHD Rating Scale, and ADHD-related quality of life (AAQoL). For five of the secondary outcomes (CGI-S,

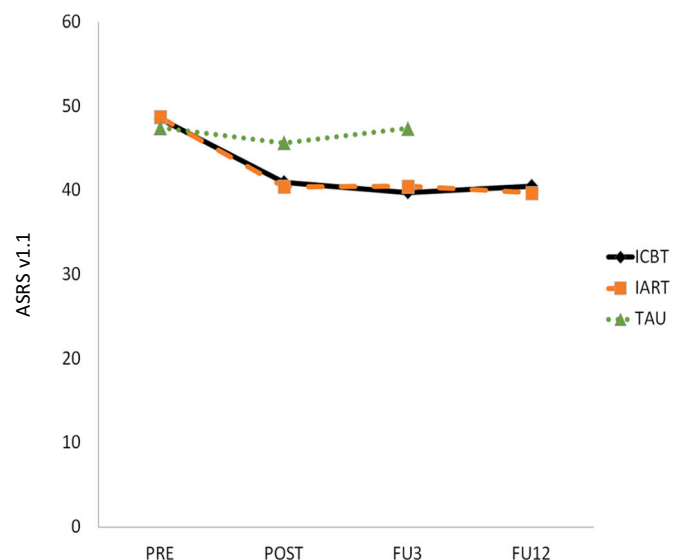


Fig. 2. Course of improvement on ASRS v1.1 from baseline (pre) to 12-month after treatment (FU12).

Note: ASRS v1.1 = Adult ADHD Self Report Scale v1.1. ICB = Internet-based Cognitive Behavior Therapy; IART = Internet-based Applied Relaxation Training (control group); TAU = Treatment As Usual; Post = Post-treatment assessment; FU3 = 3-month follow-up assessment.

Table 2
Observed means, standard deviations, effect sizes, confidence intervals and hierarchical linear model tests of change and interactions for outcomes.

Measure (range)	Pre		Post		Effect ^a (CI 95 %)	3-months follow-up			Difference in change ^b (vs TAU)	1-year follow-up			
	M	SD	M	SD		M	SD	Effect ^a (CI 95 %)		M	SD	Within-group change	Difference in change ^c (ICBT vs IART)
ASRS (0–72) <i>(Primary)</i>													
ICBT	48.5	9.51	41.0	12.4	0.42 (–0.09–0.92)	39.8	13.1	0.67 (0.14–1.20)	$p < .01$	40.5	10.5	$p < .001$	$p = .53$
IART	48.7	8.98	40.5	8.50	0.57 (–0.06–1.07)	40.5	11.5	0.66 (0.17–1.14)	$p < .01$	39.8	10.5	$p < .001$	
TAU	47.5	9.00	45.7	9.55		47.4	9.02			–	–		
ASRS Inatt (0–36)													
ICBT	26.5	4.05	22.0	6.87	0.46 (–0.06–0.99)	21.6	7.16	0.63 (0.08–1.18)	$p < .01$	22.0	5.98	$p < .001$	$p = .19$
IART	26.6	4.36	22.5	5.47	0.44 (–0.08–0.95)	21.9	6.24	0.64 (0.09–1.18)	$p < .01$	21.3	5.16	$p < .001$	
TAU	25.9	4.93	24.8	4.89		25.4	4.51			–	–		
ASRS Hyp/Imp (0–36)													
ICBT	22.0	6.96	18.3	7.73	0.41 (–0.12–0.93)	17.9	7.24	0.55 (0.01–1.09)	$p < .01$	17.5	7.37	$p < .001$	$p = .91$
IART	22.2	6.35	17.7	5.66	0.59 (0.06–1.11)	18.0	7.60	0.52 (–0.02–1.06)	$p < .01$	18.3	8.08	$p < .001$	
TAU	21.5	6.02	21.1	5.79		21.6	6.01			–	–		

Note. Since TAU received treatment after the 3-months follow-up results for this condition are not presented for the 1-year follow-up. Abbreviations: ICBT = Internet-based Cognitive Behavior Therapy. IART = Internet-based Applied Relaxation Training. TAU = Treatment As Usual. ASRS-v.1.1 = Adult ADHD Self Report Scale v1.1. ASRS Inatt = Adult ADHD Self Report Scale v1.1 inattention subscale. ASRS Hyp/Imp = Adult ADHD Self Report Scale v1.1 hyperactivity/impulsivity subscale.

^a Between group effect sizes comparing active treatments toward TAU shown as Hedge's G based on observed m and SD (pooled). Positive effect sizes indicate a lower value for the treatment group. CI 95 % = 95 % Confidence Interval.

^b Refers to the first model which includes pre-, post- and 3-months follow-up.

^c Refers to the second model which includes pre-, post-, 3-months and 12-months follow-up.

MADRS-S, PSS-4, SDS, and SWLS) iCBT showed superiority over TAU while iART did not. For the EQ-5D, DERS, WAI, and ISI none of the active treatment groups were superior to TAU.

The second model comparing only iCBT and iART revealed no significant interactions except for MADRS-S and SDS, both favoring iCBT. However, MADRS-S interaction did not remain significant in the sensitivity analysis. The within-group change for patients in iCBT was in the desired direction for all outcomes and significant except for EQ5D and ISI.

3.5. ADHD medication and other interventions during treatment period

In iCBT, 3 patients had reduced/stopped taking their medication, 19 patients reported a stable dose or no medication, and 8 patients reported that they had started medication or increased their medication dose. The corresponding figures for iART were 3, 22, and 6, for TAU 2, 22, and 6, and no significant difference was found ($p = .94$, Fisher's exact test). At post-treatment 2 patients in each condition reported having tried other, non-medical, interventions on their own. In TAU, 2 patients had received CBT or psychoeducation and 1 a weighted blanket.

3.6. Adherence and therapist client interaction

There were no drop-outs from treatment, although completion of modules varied between patients. In iCBT, 7.3 (SD = 3.7) standard modules out of 13 were completed and 0.07 (SD = 0.29) optional modules. iART patients completed 6.8 (SD = 3.6) modules out of 13.

The therapists in iCBT sent 27.4 (SD = 21.2) messages, significantly more than the 15.6 (SD = 8.6) in iART ($t(71) = 3.1$; $p < .001$). The number of messages sent by patients, 29.0 (SD = 18.4) in iCBT and 17.8 (SD = 7.9) in iART, also differed significantly ($t(71) = 3.4$; $p < .001$). iCBT therapists spent 11.2 min (SD = 9.5) on each patient whereas therapists in iART spent 7.3 min (SD = 4.3) which was significantly less ($t(71) = 2.53$; $p < .01$).

Each patient in iCBT received 7.2 telephone calls compared to 4.4 in iART. The average length was 17.1 min (SD = 15.7) in iCBT, significantly longer than the 7.3 min in iART (SD = 4.9; $t(46) = 2.7$; $p < .01$).

3.7. Treatment credibility, treatment satisfaction and adverse events

There was no significant difference in treatment credibility between iCBT ($m = 33.3$, SD = 7.1) and iART ($m = 35$, SD = 9.9) after one week ($t(66) = -0.81$; $p = .42$), but after week five iCBT was rated more credible (iCBT: $m = 34$, SD = 8.6, iART: $m = 29$, SD = 12; $t(60) = 2.1$; $p < .05$).

No significant difference was found ($t(53) = 1.8$; $p = .07$) regarding patient satisfaction (iCBT: $m = 26$, SD = 5, iART: $m = 23$, SD = 5.6).

One fourth of all patients indicated some sort of adverse event. In iCBT, 3 patients reported increased stress, 2 an increased depressive state, 2 felt overwhelmed, 1 felt discomfort and 1 dissatisfied with the treatment's layout and technical aspects. In iART, 4 patients reported increased stress, 3 increased anxiety, 1 perceived the treatment as unclear, and 1 experienced somatic problems due to treatment.

4. Discussion

This is the first randomized controlled trial to compare internet delivered cognitive behavioral therapy (iCBT) for adults with ADHD to both treatment as usual and to an active control treatment (iART), thus exploring specific and non-specific treatment effects. iCBT, as well as the control treatment, improved more than treatment as usual, with moderate effects on ADHD symptoms. Symptom reductions were stable one year after treatment but did not differ between iCBT and iART.

All ADHD related measures, including blind assessor ratings, followed the above pattern. For five of the secondary outcomes (depressive symptoms, clinician rated global severity, perceived stress, life quality, and disability) iCBT showed superiority over TAU while iART did not, indicating a small advantage for iCBT. However, in a direct comparison between treatments over the follow-up period, only one stable

significant difference was found, favoring iCBT regarding everyday functioning.

Medication is beneficial but not sufficient for a majority of adults with ADHD (Mongia and Hechtman, 2012; Safren et al., 2010), and a need to add psychological interventions has been highlighted (Jensen et al., 2016). Traditional CBT has been found to help adults with ADHD implement effective coping strategies in their daily life (Ramsay, 2010). Thus, the stable add-on effect of this 12-week iCBT-program in a group of patients where a majority undergoes pharmacotherapy, supports iCBT as a promising candidate in a multimodal treatment approach. The high and stable credibility ratings of iCBT and an “excellent” satisfaction with treatment according to previous norms (Smith et al., 2014) are also promising from a clinical point of view. The satisfaction ratings are on par with the ratings in our group treatment pilot study (Nasri et al., 2017) and suggest that iCBT is a feasible treatment format for this patient group.

However, the overall changes were very similar in both treatments, indicating either that the effects of the iCBT-program were mainly non-specific, or that the relaxation control treatment also had a specific effect, possibly through other mechanisms. Previous research indicates that the CBT and DBT techniques included do produce larger effects than relaxation (Safren et al., 2010). Possibly, the current internet-administered program did not reach the full potential of the included therapeutic techniques. This assumption is supported by the fact that in comparison to previously reported effects of traditional CBT or DBT for adults with ADHD, our effects seem lower. For example, we found that about one fourth of the patients in iCBT were treatment responders, while this figure previously has ranged from 32 % to 67 % (Hirvikoski et al., 2011; Nasri et al., 2017; Safren et al., 2010; Solanto et al., 2010). Moreover, when the current treatment manual was administered in a face-to-face group format, the within-group effect on ADHD symptoms was larger (Nasri et al., 2017).

Also, the effect sizes seem lower compared to previous internet delivered interventions for adult ADHD (Moëll et al., 2015; Pettersson et al., 2014), although the reported effect in one of these trials (Pettersson et al., 2014) was strongly inflated by a mishandling of missing data. In the study using mobile applications to enhance organizational skills (Moëll et al., 2015), a larger effect size was found for inattention ($d = 1.21$) while the effect on impulsivity/hyperactivity was smaller ($d = 0.19$), possibly indicating a specific effect on inattention.

Although half of the treatment content in iCBT derived from DBT, the treatment didn't reach significance in DERS (Gratz and Roemer, 2004) when compared to TAU at post-treatment. At baseline, levels of emotion dysregulation were comparable to DERS baseline scores in a recent similar study evaluating the effect of DBT to TAU (Halmøy et al., 2022).

The most reasonable explanation to this finding is that in average, 56 % of the modules were completed in iCBT, corresponding to the first seven modules, or the first “block” of treatment, mainly based on Safren's manual (Safren et al., 2005). The “DBT” block started as of module eight. Nevertheless, the within-group effects were significant for both treatment groups indicating that treatment components such as mindfulness or relaxation training could be beneficial in order to enhance emotion regulation.

The non-optimal iCBT might be a consequence of the wide array of therapeutic techniques presented in the treatment, possibly overwhelming the patients and lowering adherence. Although the number of completed modules was similar in iCBT and iART, the modules in the relaxation treatment were all rather similar, the content was more experientially oriented and less intellectually demanding. Comparatively, the average iCBT patient was exposed to six different techniques, each with its own educational material, instructions, worksheets and homework, possibly leading to fragmentation. One possible conclusion could be that also iCBT could have benefited more from focusing more on fewer and shorter interventions. Furthermore, the written material could have been reduced in favor of more experiential homework and exercises. In the group treatment pilot trial (Nasri et al., 2017),

considerable time was spent on problem solving related to homework and we thus anticipated a need for more therapist support in iCBT. This was confirmed by our analyses but did not lead to enhanced effects for iCBT. Thus, future studies of iCBT should consider reducing the number of techniques presented to patients, although the decreasing credibility of iART suggests that too little variation in content might also be problematic. Moreover, prolonging the treatment period might be beneficial.

Major strengths of this study are that it is one of the largest of any form on psychological intervention for adults with ADHD, comparing to both an active control treatment and treatment as usual, and including a one-year follow-up. Study patients were mainly recruited from regular psychiatric health care, thoroughly assessed with a verified diagnosis. Compared to other studies conducted within specialized treatment centers (Cole et al., 2016; Safren et al., 2010) our patients had about the same scores in ASRS Inattention and ASRS total (Cole et al., 2016) and higher scores for ADHD Rating Scale (Safren et al., 2010) at baseline, indicating generalizability to a clinically impaired sample in routine care. However, the findings could be limited to a population of patients willing and able to self-refer to and engage in an Internet-delivered guided self-help treatment.

Furthermore, adverse events were assessed, something that has not been done in previous trials on psychological interventions for ADHD.

One possible limitation is that a patient-rated scale was used as the primary outcome. However, the results were closely mirrored by the blinded clinician ratings of ADHD symptoms (ADHD RS). Multiple testing of the many secondary outcomes could be problematic, but out of 56 secondary measures tests 31 (55 %) were significant, well above the 5 % expected from pure chance. Furthermore, the fact that recruitment was stopped before we reached the targeted sample size also constitutes a limitation.

At baseline, patients in iCBT and TAU rated their alcohol consumption as higher than iART which could have influenced outcomes as a potential confounder. However, the alcohol use ratings reported in both iCBT and TAU (Table 1) were below the threshold of a hazardous or harmful alcohol consumption (Skipsey et al., 1997) for all groups. Also, problematic alcohol use was ruled out during the pre-inclusion M.I.N.I. interview.

Finally, we were not able to control changes in medication. However, no differences in this respect were found between the three groups.

4.1. Conclusions

In conclusion, iCBT has the potential to be a promising add-on to medical treatment for adults with ADHD and thus an attractive and feasible component of a multimodal treatment setup. As internet-delivered treatment requires less resources and spans geographical distances, it could increase availability. Furthermore, our findings also indicate that iART could be a promising intervention for the treatment of adult ADHD. As for increased everyday functioning, iCBT showed better outcomes over time, indicating a slight advantage for this treatment. Nevertheless, there's some way to go before the full potential of iCBT can be achieved for adults with ADHD.

Further efforts to verify our findings and increase the efficacy of the included therapeutic techniques are needed.

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Declaration of competing interest

The author(s) report no potential conflicts of interest with commercial interests regarding the research, authorship, and/or submit of this manuscript.

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Appendix A. Assessment points for all measures

Measure	Screen	Assessment interview ^a	Pre	Weekly	Post	3-months follow-up	12-months follow-up
<i>Patient rated</i>							
ASRS v1.1 (Adler et al., 2005)	x		x		x	x	x
ADHD symptoms (Primary)							
AUDIT (Skipsey et al., 1997)	x						
Alcohol use							
DUDIT (Berman et al., 2005)	x						
Drug use							
AaQoL (Brod et al., 2006)	x		x		x	x	x
ADHD related life quality							
MADRS-S (Svanborg and Asberg, 1994)	x		x	x	x	x	x
Depression symptoms							
DERS (Gratz and Roemer, 2004)	x				x	x	x
Emotion regulation							
PSS-4 (Eskin and Parr, 1996)	x		x		x	x	x
Perceived stress							
WAI-1 (Ahlstrom et al., 2010)	x				x	x	x
Work ability							
SWLS (Diener et al., 1985)	x				x	x	x
Life satisfaction							
SDS (Sheehan et al., 1996)	x		x		x	x	x
Functional impairment							
EQ-5D Index (Brooks, 1996)	x				x	x	x
General health status and life quality							
EQ-5D VAS	x				x	x	x
Self-rated health							
ISI (Bastien et al., 2001)	x		x		x	x	x
Sleep difficulties							
TCS ^b (Deville and Borkovec, 2000)				x			
Treatment credibility							
Questions about changes in ADHD medication and other interventions					x	x	x
Questions about adverse events					x	x	x
<i>Clinician rated^c</i>							
ADHD RS (DuPaul et al., 1998)		x			x	x	x
ADHD symptoms (Blind)							
ASRS Screener (Kessler et al., 2005)		x			x	x	x
Short version of ASRS							
MADRS (Montgomery and Asberg, 1979)		x					
Depression symptoms							
CGI-S (Rapoport et al., 1985)		x			x	x	x
Symptom severity (Blind)							
CGI-I (Rapoport et al., 1985)					x	x	x
Symptom improvement							

Note. Pre = Pretreatment. Weekly = week 1-12 of treatment. Post = Posttreatment. Abbreviations: ASRS-v.1.1 = Adult ADHD Self Report Scale v1.1. AUDIT = Alcohol Use Disorders Identification Test. DUDIT = Drug Use Disorders Identification Test. AAQoL = Adult ADHD Quality of Life Questionnaire. MADRS (-S) = Montgomery-Åsberg Depression Rating Scale (self-report version). DERS = Difficulties in Emotion Regulation Scale. PSS-4 = Perceived Stress Scale-4 item version. WAI-1 = Work Ability Index 1-item. SWLS = Satisfaction With Life Scale. SDS = Sheehan Disability Scale. EQ-5D index = EuroQol-five dimensions Questionnaire. EQ-VAS = EuroQol-5D with Visual Analogue Scale. ISI = Insomnia Severity Index. TCS = Treatment Credibility Scale. ADHD-RS = ADHD Rating Scale. CGI-S = Clinical Global Impression-Severity scale. CGI-I = Clinical Global Impression-Improvement Scale.

^a Not blinded assessor ratings.

^b Week 1 and 5 of treatment.

^c Blind assessor ratings at posttreatment, 3-months and 12-months follow-up.

Appendix B. Module content of ICBT and IART during 12 weeks of treatment

Module	ICBT	IART
1	Introduction <i>Information on how to work with internet-based treatment</i>	Introduction <i>Information on how to work with internet-based treatment</i>
2	Psychoeducation about ADHD	Psychoeducation about ADHD
3	Valued living <i>Define how values and principles direct personal goals. Set goals in the Life Compass work sheet.</i>	Stress and ADHD <i>The relationship between ADHD and stress (the vicious cycle). Introduction to relaxation training.</i>
4	Attention training <i>Introduction to mindfulness.</i> <i>Mindfulness exercise: Counting Breaths (observing each breath and focusing on the wandering mind)</i>	Progressive relaxation (part 1) <i>Tension-release of the muscles (upper body)</i>
5	Organizing and planning everyday life (part 1) <i>Break down activities to reduce procrastination</i> <i>Learn how to use To Do-Lists and prioritize activities</i> <i>Mindfulness exercise: Counting Breaths</i>	Progressive relaxation (part 2) <i>Tension-release of the muscles (lower body)</i>
6	Organizing and planning everyday life (part 2) <i>Incorporate the to-do list in a calendar</i> <i>Use efficient reminders</i> <i>Mindfulness exercise: Counting Breaths</i>	Short relaxation <i>Release muscles (without tension)</i>
7	Organizing and planning everyday life (part 3) <i>Handling distractions and Stimulus-control</i> <i>Mindfulness exercise: Bodyscan (sweeping awareness on different body parts as a form of attention training)</i>	Positive imaging <i>Learn how to use positive images to enhance relaxation</i>
8	Behavior analysis (part 1) <i>How to understand and change dysfunctional behavior patterns – introduction</i> <i>Mindfulness exercise: optional</i>	Cue-controlled relaxation <i>Condition relaxation to an optional word (e.g “breathe”)</i>
9	Behavior analysis (part 2) <i>Tools for reducing dysfunctional patterns</i> <i>Mindfulness exercise: The Movie Screen (increase distance to feelings, thoughts and impulses)</i>	Differential relaxation <i>Practice relaxation during activities</i>
10	Behavior Analysis (part 3) <i>Use behavior analysis to try alternative behaviors in difficult situations</i> <i>Mindfulness exercise: The Movie Screen</i>	Rapid relaxation <i>Relaxing through the conditioned word within 30-60 seconds</i>
11	Impulsivity and Impulse-control <i>Increase control over dysfunctional patterns due to impulsivity</i> <i>Mindfulness exercise: Surfing Emotions (viewing and labeling uncomfortable mental images, feelings, memories and thoughts)</i>	Applied relaxation training in stressful situations <i>Use rapid relaxation as a skill 15-20 times a day in a variety of situations</i>
12	Emotion regulation. <i>Learning about the value of emotions and how to regulate them</i> <i>Mindfulness exercise: Smiling Buddha (practicing acceptance and self-compassion)</i>	Practice relaxation <i>Repetition of previous skills learned through the program</i> <i>Optional skills training</i>
Optional	Communication skills <i>Practice communication skills in order to enhance listening and participating during conversations</i>	
Optional	Sleep hygiene <i>Discover and change dysfunctional sleep patterns</i>	
13	Relapse prevention <i>Mindfulness exercise: optional</i> <i>Repetition of previous skills</i> <i>Learn strategies to prevent setbacks and relapses</i> <i>Plan how to work with achieved skills after treatment</i>	Relapse prevention <i>Learn strategies to prevent setbacks and relapses</i> <i>Plan how to work with achieved skills after treatment</i>

Note: ICBT, Internet delivered Cognitive Behavior Therapy; IART, Internet-delivered Applied Relaxation Training; In ICBT, module 5-7 was based on Safren’s ADHD manual and module 4 and 8-12 on Hesslinger’s DBT manual.

Appendix C. Observed means, standard deviations, effect sizes, confidence intervals and hierarchical linear model tests of change and interactions for outcomes

Measure (range)	Pre		Post		Effect ^a (CI 95%)	3-months follow-up			Difference in change (vs TAU)	1-year follow-up			
	M	SD	M	SD		M	SD	Effect ^a (CI 95%)		M	SD	Within-group change	Difference in change (ICBT vs IART)
ADHD RS (0–54) (Blind)													
ICBT	30.4	7.60	24.1	8.39	0.35 (–0.21–0.91)	23.0	8.46	0.56 (0.01–1.11)	<i>p</i> < .01	21.9	8.60	<i>p</i> < .001	<i>p</i> = .48
IART	29.9	7.29	23.7	8.54	0.40 (–0.16–0.95)	24.1	8.67	0.41 (–0.11–0.92)	<i>p</i> < .05	23.5	8.50	<i>p</i> < .001	
TAU	29.3	7.50	27.0	7.93		27.4	7.12			–	–		
CGI-S (0–7) (Blind)													
ICBT	3.94	0.63	3.17	0.72	1.09 (0.5–1.68)	3.12	0.83	0.92 (0.35–1.49)	<i>p</i> < .01	3.21	1.02	<i>p</i> < .001	<i>p</i> = .40

(continued on next page)

(continued)

Measure (range)	Pre		Post		Effect ^a (CI 95%)	3-months follow-up			Difference in change (vs TAU)	1-year follow-up			
	M	SD	M	SD		M	SD	Effect ^a (CI 95%)		M	SD	Within-group change	Difference in change (ICBT vs IART)
IART	3.86	0.67	3.68	0.84	0.42 (-0.14-0.98)	3.55	1.06	0.33 (-0.19-0.84)	<i>p</i> = .16	3.50	1.11	<i>p</i> = .12	
TAU	3.81	0.75	4.04	0.84		3.86	0.76			-	-		
AAQoL (21-105)													
ICBT	65.9	10.1	59.8	11.2	0.39 (-0.13-0.92)	60.5	10.9	0.42 (-0.12-0.96)	<i>p</i> < .01	59.7	11.1	<i>p</i> < .01	<i>p</i> = .76
IART	64.5	10.3	59.6	7.32	0.51 (-0.01-1.02)	60.2	10.0	0.46 (-0.07-1.00)	<i>p</i> < .05	60.5	9.09	<i>p</i> < .05	
TAU	63.5	9.29	63.9	9.38		65.2	11.2			-	-		
MADRS-S (0-54)													
ICBT	16.4	8.30	11.3	7.81	0.60 (0.07-1.13)	12.6	8.34	0.46 (0.07-0.99)	<i>p</i> < .01	10.7	5.78	<i>p</i> < .01	<i>p</i> < .05 ^b
IART	15.4	8.84	12.6	7.58	0.44 (-0.07-0.96)	15.1	8.66	0.18 (-0.35-0.70)	<i>p</i> = .40	15.1	8.66	<i>p</i> = .47	
TAU	15.2	7.97	16.1	8.00		16.7	9.06			-	-		
DERS (36-180)													
ICBT	104	25.7	97.8	29.0	-0.18 (-0.70-0.34)	93.7	27.3	0.04 (-0.50-0.57)	<i>p</i> = .13	82.9	26.4	<i>p</i> < .05	<i>p</i> = .32
IART	102	25.0	89.8	22.4	0.12 (-0.39-0.63)	85.7	26.3	0.31 (-0.22-0.85)	<i>p</i> = .051	83.4	23.5	<i>p</i> < .01	
TAU	94.7	28.1	92.7	26.2		94.8	30.5			-	-		
PSS-4 (0-16)													
ICBT	8.97	3.25	7.71	3.57	0.07 (-0.45-0.59)	7.46	3.85	0.41 (-0.13-0.95)	<i>p</i> < .01	7.81	4.02	<i>p</i> < .05	<i>p</i> = .20
IART	6.97	2.30	7.77	2.79	0.06 (-0.45-0.57)	7.56	3.56	0.40 (-0.14-0.93)	<i>p</i> = .45	7.38	3.8	<i>p</i> = .22	
TAU	7.45	3.62	7.97	3.76		9.00	3.58			-	-		
WAI-1 (0-10)													
ICBT	4.56	2.73	6.04	2.58	-0.20 (-0.73-0.32)	5.65	2.65	-0.05 (-0.59-0.48)	<i>p</i> = .057	5.57	2.87	<i>p</i> < .01	<i>p</i> = .21
IART	5.14	2.61	5.60	2.82	-0.05 (-0.56-0.46)	5.11	3.09	0.13 (-0.40-0.65)	<i>p</i> = .63	4.86	3.32	<i>p</i> = .72	
TAU	5.90	3.04	5.45	3.08		5.50	3.05			-	-		
SWLS (5-35)													
ICBT	16.1	7.03	19.3	8.29	0.07 (-0.46-0.59)	20.5	7.82	-0.28 (-0.81-0.26)	<i>p</i> < .05	19.8	8.89	<i>p</i> < .01	<i>p</i> = .13
IART	17.9	6.68	19.4	5.61	0.06 (-0.47-0.60)	19.8	6.06	-0.21 (-0.74-0.33)	<i>p</i> = .45	19.1	7.36	<i>p</i> = .12	
TAU	18.5	6.62	19.8	6.74		18.4	7.15			-	-		
SDS (0-30)													
ICBT	19.1	5.86	13.8	6.94	0.45 (-0.08-0.97)	14.0	7.65	0.38 (-0.16-0.92)	<i>p</i> < .01	12.6	8.22	<i>p</i> < .001	<i>p</i> < .01
IART	16.7	6.39	14.3	7.13	0.37 (-0.14-0.89)	15.0	8.16	0.24 (-0.29-0.77)	<i>p</i> = .63	14.0	7.51	<i>p</i> = .10	
TAU	17.8	6.94	16.9	6.70		16.8	6.75			-	-		
EQ-5D index (0-1)													
ICBT	0.72	0.19	0.77	0.21	-0.30 (-0.82-0.22)	0.74	0.27	-0.19 (-0.72-0.35)	<i>p</i> = .66	0.75	0.20	<i>p</i> = .67	<i>p</i> = .19
IART	0.69	0.26	0.77	0.18	-0.32 (-0.83-0.20)	0.72	0.25	-0.12 (-0.42-0.65)	<i>p</i> = .96	0.64	0.26	<i>p</i> = .16	
TAU	0.68	0.28	0.70	0.25		0.69	0.26			-	-		
EQ-5D VAS (0-100)													
ICBT	61.4	22.7	66.1	18.5	-0.06 (-0.58-0.46)	65.3	21.1	-0.19 (-0.73-0.34)	<i>p</i> = .18	67.9	18.5	<i>p</i> = .46	<i>p</i> = .85
IART	58.0	19.8	67.9	17.0	-0.17 (-0.68-0.34)	63.0	18.8	-0.09 (-0.63-0.44)	<i>p</i> = .34	63.8	18.3	<i>p</i> = .09	
TAU	64.7	19.2	64.9	18.4		61.0	23.1			-	-		
ISI (0-28)													
ICBT	11.3	5.40	11.0	6.42	0.17 (-0.35-0.69)	10.0	6.56	0.31 (-0.23-0.85)	<i>p</i> = .43	10.7	6.48	<i>p</i> = .45	<i>p</i> = .98
IART	9.19	5.65	9.80	5.34	-0.38 (-0.14-0.90)	10.2	6.27	0.29 (-0.25-0.82)	<i>p</i> = .70	8.62	4.96	<i>p</i> = .26	
TAU	11.7	5.53	12.1	6.53		12.0	6.15			-	-		

Note. Since TAU received treatment after the 3-months follow-up results for this condition are not presented for the 1-year follow-up. Abbreviations: ICBT = Internet-based Cognitive Behavior Therapy. IART = Internet-based Applied Relaxation Training. TAU = Treatment As Usual. ADHD-RS = ADHD Rating Scale. CGI-S = Clinical Global Impression – Severity scale. AAQoL = Adult ADHD Quality of Life Questionnaire. MADRS-S = Montgomery-Åsberg Depression Rating Scale (self-report version). DERS = Difficulties in Emotion Regulation Scale. PSS-4 = Perceived Stress Scale – 4 item version. WAI-1 = Work Ability Index 1item. SWLS = Satisfaction With Life Scale. SDS = Sheehan Disability Scale. EQ-5D index = EuroQol-five dimensions Questionnaire. EQ-VAS = EuroQol-5D with Visual Analogue Scale. ISI = Insomnia Severity Index.

^a Between group effect sizes comparing active treatments toward TAU shown as Hedge's G based on observed m and SD (pooled). Positive effect sizes indicate a lower value for the treatment group. CI 95% = 95% Confidence Interval.

^b Not significant in sensitivity test ($p = .053$)

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