HYPNOTHERAPY FOR ADULTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A RANDOMIZED CONTROLLED STUDY

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ABSTRACT

This is the first controlled randomized study investigating the effectiveness of hypnotherapy in treating adults with attention-deficit/hyperactivity disorder (ADHD). Results of the nine hypnotherapy participants and 10 controls are presented. Self-report questionnaires, independent evaluations, and computerized neurocognitive testing were used before and after the treatment to evaluate change. As assessed by the self-evaluations, seven of the nine participants comprising the hypnotherapy group and two of the 10 controls improved. Using independent evaluations, six of the hypnotherapy and three participants of the control group improved. There was no treatment-related improvement in cognitive performance. These promising results warrant further studies with more participants and with longer treatment duration.

Key words: attention-deficit/hyperactivity disorder (ADHD), adult ADHD treatment, hypnosis, hypnotherapy

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a developmental neurobiological disability that emerges in childhood and often continues into adulthood. In adults, the prevalence of ADHD has been estimated to be as high as 4.4% (Kessler et al., 2006). According to the child diagnostic criteria of DSM-IV (American Psychiatric Association, 1994), ADHD is characterized by deficits in attention and/or symptoms of hyperactivity and impulsivity that result in marked impairment in at least two areas of life. Problems in executive functioning, such as organizing and prioritizing, are typical. There are frequently deficits in areas such as processing speed, regulating alertness, modulating emotions, and utilizing memory (Brown, 2005). The core neurobiological impairments can lead to continued behavioural deficit and maintenance of symptoms. Life-long experiences of failure or underachievement reinforce this cycle via negative cognitions and beliefs (Safren et al., 2004; Safren, 2006) and may often result in problems of self-esteem. Moreover, psychiatric comorbidities are common including: anxiety, depression, bipolar disorder, personality disorders, and substance abuse (Biederman, 2004; Jacob et al., 2007; McGough et al., 2005; Sobanski et al., 2007; Sprafkin et al., 2007). Adults with ADHD often have considerable difficulties in managing finances, work, personal economy, and/or social relationships (Goodman, 2007).

The management of ADHD in adulthood is currently a topic of both scientific and public debate, and effective treatments are needed. The most extensively studied treatments are pharmacological (for reviews see, for example, Pliszka, 2007; Wilens, 2003). During the last 10 years, studies on psychological interventions have also emerged. Both individual cognitive-behavioural therapy (CBT) (Rostain & Ramsay, 2006; Safren et al., 2005; Wilens et al., 1999) and group interventions (Hesslinger et al., 2002; Philipsen et al., 2007; Salakari et al., 2010; Solanto et al., 2008; Stevenson et al., 2002; Virta et al., 2008; Zylowska et al., 2008) have yielded promising results in treating ADHD adults. In a meta-analysis, Arns et al. concluded that neurofeedback treatment is efficacious in treating ADHD (Arns et al., 2009).

In a meta-analysis of 18 studies targeting different patient groups (i.e. patients with pain, insomnia, obesity, or anxiety), it was found that hypnosis substantially enhanced the effectiveness of the CBT (Kirsch et al., 1995). There are no controlled experiments on either hypnotherapy alone, or hypnotherapy combined with CBT in adults with ADHD. However, one case report about the efficacy of CBT and hypnosis in an ADHD-adult has been published with encouraging results (Low, 1999). A novel multimodal approach of cognitive hypnotherapy, based on CBT but also utilizing hypnotherapy techniques, was recently described by Alladin (2008; 2009). The effectiveness of cognitive hypnotherapy has been shown at least for depression (Alladin & Alibhai, 2007), which is a common comorbidity in ADHD.

In children with attention deficit disorder or hyperactivity, there is some evidence that relaxation training (Denkowski & Denkowski, 1984; Dunn & Howell, 1982; Raymer & Poppen, 1985) and hypnotherapy (Calhoun & Bolton, 1986; Copeland, 1980) may be effective. In paediatric studies by Barabaszs' and their colleagues (Anderson et al., 2000; Barabasz & Barabasz, 1995; Warner et al., 2000), instant alert hypnosis used in conjunction with neurotherapy (EEG feedback) yielded improvements quicker than neurotherapy alone. Hypnosis has also been found to be effective in improving academic performance and self-esteem in children with learning disorders (for a review see Russell, 1984). Self-esteem is also usually low in adults with ADHD.

The aim of this study was to examine the feasibility and efficacy of hypnotherapy in adults with ADHD and its impact on ADHD symptoms, mood, quality of life, and cognitive performance. To the best of our knowledge, this is the first study of hypnotherapy for ADHD adults.

METHOD

Participants

Participants were recruited by announcements in an ADHD magazine, in an adult ADHD internet discussion forum, and by informing local physicians and clinics specializing in treating ADHD in adults. The inclusion criteria were as follows: (1) 18–49 years of age, (2) ADHD diagnosis made by a physician, (3) no diagnosis of psychosis, severe depression, or paranoia, (4) deficits of attention, executive functions, or working memory found by neuropsychological evaluation, (5) no current alcohol dependency or drug use, (6) not retired, (7) no participation in our previous group rehabilitation study, (8) currently not undergoing any other psychological rehabilitation, and (9) no medication or medication that has been stable for at least three months.

In total, 71 interested candidates contacted the researchers and were briefly telephone-screened for the inclusion criteria. Of these, 17 individuals were excluded for not meeting

all the inclusion criteria: 11 for having no neuropsychological examination and six for reasons such as diagnosis of psychosis, severe depression or paranoia, age, retired, current psychological rehabilitation. If the medication was not stabilized, the candidate was put on a waiting list until that criterion was met.

A total of 54 potential candidates were invited to a psychologist's interview. The aim of the interview was to screen for the inclusion criteria more closely, to explain the study protocol in more detail, and to obtain the informed consent of each candidate before recruitment. Medical records were evaluated to ensure the diagnosis of ADHD and accurate fulfilment of inclusion criteria 3 and 4. Seven candidates cancelled their participation before the interview or did not attend the interview. At the end of the interview, candidates filled in a questionnaire of detailed background information and the Wender Utah Rating Scale (WURS) (Ward et al., 1993). On the basis of the collected information, the psychologists (A.S., M.V.) verified that the candidate met the DSM-IV criteria (American Psychiatric Association, 1994). Only one candidate was excluded at this stage because of lack of required neuropsychological deficits. Thus, there were 46 accepted participants who were randomly assigned to one of four groups: hypnotherapy, individual cognitive-behavioural therapy, computerized cognitive training, or control group. Four of the accepted participants cancelled their participation and three discontinued during the study (none of these were from the hypnotherapy or control groups). Thus, there were a total of 39 participants. Here we present results for the hypnotherapy and control groups; the results of manualized, 10 session individual cognitive-behavioural therapy and 20 session computerized cognitive training developed to include training of attention, executive functions, and working memory are under review elsewhere (Virta et al., forthcoming).

After the randomization, there were 10 participants each in the hypnotherapy and control groups. One participant of the hypnotherapy group was excluded from the analysis because of an acute non-treatment-related life crisis. Thus, the results are reported for nine participants in the hypnotherapy and 10 in the control group. Demographic data of the two groups are presented in Table 1. Seven of the nine participants of the hypnotherapy group were receiving medication for ADHD: six of them took methylphenidate and one took dextroamphetamine. One individual's dose of methylphenidate (Concerta) was reduced from 54 to 36 mg during the study period. Seven of the 10 participants of the control group received medication for ADHD: five took methylphenidate, one received modafinil, and one received atomoxetine (which was changed to methylphenidate during the follow-up period).

Of the hypnotherapy participants, two had completed lower secondary education only (i.e. Finnish compulsory education) and the remaining seven had received a higher education. In the control group, one individual had completed lower secondary education, whereas the remaining nine had additional formal education. Of both groups, seven participants were working (at least in a part-time job) or studying at the beginning of the treatment. The two groups did not differ (as analysed by t-test or chi-square test) in age, gender, education, work-status, WURS score, severity of the ADHD (measured by Clinical Global Impressions, CGI), or number of participants having psychiatric comorbidity (all *p*s > 0.05).

The study was approved by the Ethics Committee of Helsinki University Central Hospital, Finland, and performed in accordance with the ethical standards laid down in the

Table 1: Characteristics of participants

	Hypnotherapy	Controls
Participants (n)	9	10
Age		
mean (range)	33.9 (21–48)	34.0 (22–49)
Gender		
man/woman	3/6	4/6
ADHD medication (n)	7	7
Antidepressant drugs (n)	1	2
Psychiatric comorbidity (n)	4	3
depression (n)	2	3
anxiety (n)	3	2
personality disorder (n)	1	0
WURS score		
mean (SD)	51.6 (17.4)	51.0 (15.3)
Severity of ADHD (CGI)	3.67 (0.7)	3.40 (0.5)
mean (SD)		

1964 Declaration of Helsinki. All participants gave their written informed consent prior to participating in the study. The participation was free of charge.

Hypnotherapy

The base theory of our treatment lies in cognitive hypnotherapy, thus the interventions used in this study were hypnotherapeutic. The themes of the treatment sessions were selected to cover the main symptoms set out in the DSM-IV diagnostic criteria (American Psychiatric Association, 1994), and by Brown (2000, 2005) when suitable for the hypnotherapy.

Before the hypnotherapy, participants were evaluated by a psychiatrist (R.V.) to ensure that there were no contraindications for hypnosis. None of the participants were excluded. Hypnotic susceptibility was evaluated using the Finnish version (Kallio, 1996; Kallio & Ihamuotila, 1999) of the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) (Shor & Orne, 1962). The mean susceptibility was 5.9 (range from 2 to 10).

The hypnotherapy consisted of 10 weekly sessions led by a psychologist experienced in hypnosis and ADHD (M.V.). The themes and content of the sessions are presented in Table 2. The first six sessions and the last session were the same for all participants, though allowing for some individual modification. Sessions seven, eight, and nine were individually tailored. Each theme could be dealt with in two sessions. For example, it was possible to have self-esteem (session six) as one of the individually chosen sessions or impulsivity (not in sessions one to six) in two individual sessions. The psychologist followed a semi-structured written manual. The duration of a session was 40 to 60 minutes. Each session

Table 2: Content of the hypnotherapy

SESSION 1: STILLNESS/CALMING
Vision about a pond in a forest and calmness; post-hypnotic suggestions about hypnosis, hypnotherapy, and the therapy process
SESSION 2: MOTIVATION TO CHANGE
Vision of a fountain and drinking strength from it; suggestions about ability to change; positively visualizing himself/herself in the future
SESSION 3: ATTENTION
Developing an anchor for the attentive experience and behavioural rehearsal of it in the future; post-hypnotic suggestions about the ability to be attentive
SESSION 4: INITIATION OF ACTIVITIES
Helping the inner 'starter'; behavioural rehearsal in the future; post-hypnotic suggestions
SESSION 5: MEMORY
Post-hypnotic suggestions about efficient memory and the use of memory strategies
SESSION 6: SELF-ESTEEM
Image about high self-esteem and developing an anchor for feeling good using a stone; post-hypnotic suggestions about good self-esteem
SESSIONS 7 TO 9: INDIVIDUALLY CHOSEN TOPICS
For example effort, fear of social situations, learning self-hypnosis/relaxation, reducing impulsivity, anger management, or second treatment of previous themes
SESSION 10: THE CONTINUATION OF THE PROCESS, ENDING THE REHABILITATION
Positively visualizing himself/herself in the future; post-hypnotic suggestions about the continuation of the process after the therapy

followed the same procedure: discussion of the preceding hypnotherapy session, discussion of the current theme, induction, hypnotherapy, and discussion.

Outcome measures

As outcome measures we used self-report questionnaires, independent evaluations, and computerized neurocognitive testing. For the hypnotherapy group, data were collected before the treatment (T1) and after the treatment (T2). Data obtained from the control group were also collected on two occasions. T2 measurements were scheduled to be taken about 11 or 12 weeks after T1 to correspond to the time in the treatment group. The mean time elapsed between T1 and T2 (questionnaires and neurocognitive testing) was 77 days (range 63–91) for the hypnotherapy group and 81 days (range 69–91) for the control group. The T1 questionnaires and testing were completed 0–12 days before the first hypnotherapy sessions and T2 measures 0–7 days after the last session. Independent evaluations were collected within two weeks (with one exception of three weeks) of collection of self-report questionnaires and neurocognitive testing. The independent evaluator was a clinical psychologist (M.A.) who was blind to the actual study group of the participants. The used measures were:

Brown Attention Deficit Disorder Scale – Adult Version (BADDS) (Brown, 1996). BADDS is a 40-item inventory from which we used the self-report version. From the BADDS, a total score and scores of the five subdomains of activation, attention, effort, affect, and memory were derived. Higher scores indicate a greater impairment.

World Health Organization's Adult ADHD Self-Report Scale (ASRS) (Kessler et al., 2005). ASRS is an 18-item scale reflecting the DSM-IV criteria modified for adults. We used both self-report and independent evaluator measurements. We report the total score in which the higher the scores the greater the impairment.

Symptom Check List (SCL-90) (Derogatis et al., 1973). SCL-90 is a 90-item self-report scale for the measurement of psychiatric symptoms. Several subscales can be calculated but we used the total score. Moreover, a 16-item sum score (SCL-16) reflecting the characteristics prominent in ADHD (Hesslinger et al., 2002) was calculated from the SCL-90. The higher the scores the greater were the symptoms.

Beck Depression Inventory – Second Edition (BDI-II) (Beck et al., 1996). BDI-II is a 21-item scale that evaluates current self-reported symptoms of depression. Higher scores reflect greater problems.

Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q) (Endicott et al., 1993). Q-LES-Q is a 93-item self-report scale, from which 91 items can be grouped into eight subscales that indicate: satisfaction with physical health, subjective feelings, work, household duties, school, leisure activities, social relationships, and general activities. We combined the work and school subscales into a work/study subscale. When a participant gave both scores, the main score was used (i.e. if the participant was working full time and also taking some educational courses, then the work score was used). Higher scores indi-

cate a greater enjoyment or satisfaction. The scores are reported as a percentage of the maximum score.

Clinical Global Impressions (CGI) (Guy, 1976). CGI was completed by the independent evaluator. At T1, severity of ADHD was evaluated according to the CGI, which is a single 7-point rating scale of functioning varying from 1 = normal, not at all ill, to 7 = among the most extremely ill patients. At T2, global improvement was assessed using a 7-point scale varying from 1 = very much improved, to 7 = very much worse (4 = no change).

CNS Vital Signs (CNSVS) (Gualtieri & Johnson, 2006a; Gualtieri & Johnson, 2006b). CNSVS is a computerized neurocognitive test battery comprising seven neuropsychological tests: verbal memory, visual memory, finger tapping, symbol-digit coding, the Stroop test, the shifting attention test, and the continuous performance test. Five standardized domains were obtained from the tests: memory, psychomotor speed, reaction time, cognitive flexibility, and complex attention. In addition, we used the neurocognitive index, which is the mean of the domains. A detailed description of the tests in CNSVS have been given by Gualtieri and Johnson (2008).

In addition, the hypnotherapy participants evaluated their benefit of the rehabilitation at T2 using a five-option rating scale of no benefit, minor benefit, moderate benefit, clear benefit, and substantial benefit.

Statistical analyses

Any missing values on the questionnaires were substituted with that particular respondent's mean score. However, no replacements were made in Q-LES-Q as the scores were calculated as a percentage of the maximum score. Distribution properties of the variables were inspected visually and with Shapiro-Wilk tests. Parametric tests were chosen for the statistical analyses. The two-way mixed ANOVA, with one between-factor, group (hypnotherapy vs. control) and one within-factor, time (T1 vs. T2) was performed. The effect sizes were quantified by partial eta squared, η_p^2. Where the ANOVA was significant or almost significant ($p < 0.10$) and the effect size was large ($\eta_p^2 > 0.138$), paired t-tests were also performed for both groups separately. Changes in CGI were analyzed using the chi-square test (χ^2).

RESULTS

Table 3 contains mean scores of the self-report measures for the hypnotherapy and control groups. There were no differences between the groups at T1 for any measure (all *p*s > 0.05). The two-way ANOVA, with one between-factor, group (hypnotherapy vs. control), and one within-factor, time (T1 vs. T2) was performed. There was a significant Time x Group interaction in BADDS memory [$F(1,17) = 6.30$, $p < 0.05$, $\eta_p^2 = 0.27$] and total scores [$F(1,17) = 4.53$, $p < 0.05$, $\eta_p^2 = 0.21$]. Moreover, a trend was found for BADDS activation [$F(1,17) = 4.37$, $p = 0.05$, $\eta_p^2 = 0.21$], BADDS attention [$F(1,17) = 3.32$, $p = 0.09$, $\eta_p^2 = 0.16$], and in SCL-16 [$F(1,17) = 3.09$, $p = 0.10$, $\eta_p^2 = 0.15$]. These results are reflected by a decrease of symptoms mainly in the hypnosis group (see Table 3). There were no statistically significant interactions for BADDS effort and affect scores, BDI-II or SCL-90. In Q-LES-Q there was a statistically significant interaction with the satisfaction in work/study subscale [$F(1,17) =$

Table 3: Mean (standard deviation) scores for participants' self-ratings at T1 (before treatment) and T2 (after treatment)

	Hypnotherapy				Controls				P-value (ANOVA)
	T1		T2		T1		T2		
BADDS									
Activation	18.0	(5.0)	14.6	(6.1)	17.2	(6.1)	16.8	(6.1)	ns (0.052)
Attention	19.2	(4.7)	16.6	(5.3)	19.3	(3.3)	19.1	(3.2)	ns (0.086)
Effort	15.3	(5.5)	14.0	(4.8)	15.6	(5.9)	14.4	(6.1)	ns
Affect	9.2	(3.8)	7.7	(3.6)	9.1	(3.1)	8.7	(4.4)	ns
Memory	12.4	(4.0)	10.4	(2.4)	10.4	(4.4)	11.0	(4.1)	0.022
Total	74.2	(16.0)	63.2	(16.6)	71.6	(16.3)	70.0	(14.2)	0.048
BDI II	11.3	(10.3)	8.9	(10.4)	11.0	(7.7)	9.5	(11.6)	ns
SCL-90	85.3	(44.2)	62.2	(38.1)	94.1	(37.8)	89.7	(48.0)	ns
SCL-16	27.9	(11.6)	20.7	(9.4)	31.5	(11.9)	30.2	(11.5)	ns (0.010)
ASRS	48.1	(8.3)	42.4	(11.6)	50.8	(7.7)	47.8	(12.0)	ns
Q-LES-Q									
General	56.6	(15.4)	63.8	(13.7)	54.1	(11.7)	59.0	(21.2)	ns
Work/study[a]	59.9	(19.5)	67.9	(24.4)	75.4	(10.5)	62.0	(28.2)	0.044

Note[a] N=8 in hypnotherapy and N=7 in control groups

4.95, $p < 0.05$, $\eta_p^2 = 0.28$], but no statistically significant interactions in general activities or other subscales (all ps > 0.10). There were no statistically significant interactions in domains or tests for CNS Vital Signs (all ps > 0.10).

For those measures for which the ANOVA indicated significant or almost significant interactions and effect sizes were large, paired t-tests were performed for both groups separately. There were no differences between T1 and T2 in any measures for the control group (all ps > 0.05). In contrast, there was significant decrease of symptoms between T1 and T2 in BADDS activation [$t(8) = 2.69$, $p < 0.05$, $\eta_p^2 = 0.48$], attention [$t(8) = 3.41$, $p < 0.01$, $\eta_p^2 = 0.59$], memory [$t(8) = 2.62$, $p < 0.05$, $\eta_p^2 = 0.46$], and total scores [$t(8) = 3.71$, $p < 0.01$, $\eta_p^2 = 0.63$], and SCL-16 [$t(8) = 3.53$, $p < 0.01$, $\eta_p^2 = 0.61$] for the hypnotherapy group. In addition, there was a trend for improvement of satisfaction in the Q-LES-Q work/study subscale [$t(7) = 2.23$, $p = 0.06$, $\eta_p^2 = 0.41$].

The participants were also classified into two groups according to their individual improvement or non-improvement during the study period. The participant was defined as 'improved' when he or she had reduced self-reported symptoms in all ratings of ADHD-symptoms, namely the BADDS total score, SCL-16, and ASRS. In cases of either symptom elevation or no change in any of the measures, the participant was classified as 'not-improved'. Seven of the nine participants (78%) in the hypnotherapy group were improved compared with two of 10 (20%) in the control group. The difference was statistically significant ($\chi^2 = 6.34$, df = 1, $p < 0.05$).

According to the independent evaluators' CGI ratings, six of the nine (67%) participants in the hypnotherapy group and three of 10 individuals (30%) in the control group improved from T1 to T2. However, this difference was not statistically significant ($\chi^2 = 2.55$, df = 1, $p = 0.11$). Moreover, there was no statistically significant change for the independent evaluator rated ASRS [$F(1,17) = 1.43$, p = ns, $\eta_p^2 = 0.08$].

In the participants' self-evaluations of the treatment benefit, eight of nine hypnotherapy participants reported at least a moderate benefit.

DISCUSSION

The aim of the present study was to evaluate the feasibility of hypnotherapy treatment and its impact on ADHD symptoms, mood, quality of life, and cognitive performance of adults with ADHD. Across the self-report measures, participants randomized to hypnotherapy showed significantly more improvement than those randomized to control group. This was mainly seen in BADDS activation, attention, memory, and total scores subscales, SCL-16 and Q-LES-Q work/study subscale. The results were also evident in effect sizes, which indicated large benefits of hypnotherapy. According to the self-reports, seven of the nine participants (78%) of the hypnotherapy group and two of the 10 (20%) of the control group were classified as improved. In the independent evaluations, 67% of participants of the hypnotherapy group were assessed as improved (vs. 30% of the control group), but this improvement was not statistically significant. In addition, participants' self-evaluations regarding the benefit of the treatment were quite high; eight of the nine participants reported at least a moderate benefit. There were no drop-outs during the therapy period. Thus, the hypnotherapy seemed to be well tolerated in addition to being beneficial. This is in line with the few studies or case reports in which hypnotherapy has been used with children with attention deficits (Calhoun & Bolton, 1986; Copeland, 1980).

Most of our participants were medicated at the beginning of the treatment (seven of the nine individuals of the hypnotherapy group and seven of the 10 individuals of the control group). Medication was required to be stabilized for three months before entry to study and there were only minor changes of medication during treatment. Therefore, the treatment improvement was clearly not related to medication. A benefit of the CBT in already medicated adults with ADHD has been previously shown (Rostain & Ramsay, 2006; Safren et al., 2005).

In self-report questionnaires, the treatment benefit was mainly seen in measures assessing ADHD symptoms but there were no changes in mood. This is similar to that found in the study of CBT in adults with ADHD (Virta et al., 2008) in which the improvement was manifested in BADDS and SCL-16 ratings but not in BDI-II and SCL-90 scores. However, in some other studies on CBT, a decrease in depression and/or anxiety was found as well (Rostain & Ramsay, 2006; Safren et al., 2005). In the quality of life measures, an increase in satisfaction was only found for the work/study subscale, not in other subscales or general activities. The improvement of satisfaction in work or study was to be expected, as it followed the improvement of ADHD symptoms. The absence of change in other subscales of Q-LES-Q is puzzling, however. It is perhaps possible that the Q-LES-Q scale is not sensitive enough for assessment of the adult ADHD population and new measures specifically tailored for adults with ADHD should be considered for future studies (Brod et al., 2006; Landgraf, 2007). Although the importance of assessing the quality of life in intervention

studies of ADHD has been emphasised (Weiss et al., 2008), to the best of our knowledge this is the first reported intervention study in adults with ADHD that measured the changes in the quality of life of subjects.

Measuring treatment benefit in terms of cognitive functioning has been done previously in two studies of adult ADHD (Hesslinger et al., 2002; Zylowska et al., 2008). In a study on mindfulness training (Zylowska et al., 2008), improvements in tasks measuring attention and cognitive inhibition were found. In a pilot study that used a structured skills training programme in a group setting (Hesslinger et al., 2002), neuropsychological testing was used at baseline and following treatment, and some tendency towards improvement was found. However, either the study had no control group (Zylowska et al., 2008) or if it did the control group did not undergo neuropsychological testing (Hesslinger et al., 2002), and therefore the practice effect cannot be ruled out. We did not find treatment-related improvement in cognitive functioning as measured by the CNCVS (that is, there was no more improvement for the hypnotherapy group than for the control group). In a study of Gualtieri and Johnson (2006b) the patients with ADHD were found to be impaired in measures of psychomotor speed, reaction time, cognitive flexibility, and attention measured by the CNSVS compared to normal controls. In our sample, some participants had difficulties in cognitive functioning measured by CNSVS whereas some others had no difficulties even though deficits had been reported in their previous neuropsychological examinations. The ceiling effect was also present in many participants in some of the tasks. Therefore other, perhaps more sensitive, measures of cognitive functioning may also be needed.

There were no statistically significant changes in independent evaluations (CGI and ASRS) although a tendency was found with CGI assessment. In general, it is well founded to use independent evaluator measures, but there are also some problems. An evaluator has only a short time to assess the severity of ADHD or its change. In some cases in our study, therapists evaluated the participants as being more severely ill than did the independent evaluator. This might be due to several reasons: the impairments may not be so clearly apparent in short discussions, or participants may want to give a better impression of themselves.

For Finnish norms (Kallio & Ihamuotila, 1999) the mean hypnotic susceptibility was 7.26 as measured by HGSHS:A (Shor & Orne, 1962). The mean susceptibility in our study was lower at 5.9. However, larger studies are needed for conclusions on the hypnotic susceptibility of ADHD adults.

The reported results are part of a larger randomized controlled study where participants were assigned to one of four groups: hypnotherapy, individual cognitive-behavioural therapy (CBT), computerized cognitive training (CT), and control group. Results of the CBT and CT are under review elsewhere together with a full description of the treatments (Virta et al., forthcoming). However, it is worth investigating whether the hypnotherapy was different from the two other treatments in its efficacy. A two-way ANOVA, with one between-factor, group (hypnotherapy vs. CBT and hypnotherapy vs. CT), and one within-factor, time (T1 vs. T2) was performed. There were no significant interactions in any dependent variables between the hypnotherapy and short 10 session CBT (N = 10) (all ps > 0.1). For hypnotherapy vs. CT comparison, there was a significant interaction in SCL-16 [$F(1,16) = 7.38$, $p = 0.01$, $\eta_p^2 = 0.32$], CNS Vital Signs attention domain [$F(1,16) = 6.61$, $p < 0.05$, $\eta_p^2 = 0.29$], and a trend in SCL-90 [$F(1,16) = 4.43$, $p = 0.05$, $\eta_p^2 = 0.22$] (mean±SD in the CT group 20.9±8.1, 67.6±31.4, and 98.7±16.6 in T1 and 22.9±9.2, 68.0±34.0, and 98.1±15.9 in T2 respectively;

in the hypnotherapy group CNS attention 89.7±12.7 in T1 and 101.4±10.8 in T2) with greater improvement taking place in the hypnosis group. According to the 'improved' vs. 'not-improved' classifications, there was no clear difference between the hypnosis and CBT group (78% vs. 60%) whereas the hypnosis and CT group did differ (78% vs. 20%). A similar pattern was found in the independent evaluators' CGI ratings (67% were improved in hypnosis group, 70% in CBT, and 22% in CT). Thus it seems that in our sample, hypnotherapy was more effective than CT but did not significantly differ from CBT in its effectiveness.

Our approach was that of cognitive hypnotherapy. This was chosen as there is no uniform theory of hypnotherapy. The base theory of cognitive hypnotherapy is derived from CBT and the methods are derived from CBT and hypnotherapy (Alladin, 2008; Alladin, 2009). However, only hypnotherapy methods were used in this study. There is evidence that cognitive hypnotherapy is more effective in treating depression than CBT alone (Alladin & Alibhai, 2007) and CBT has yielded good results in treating ADHD (Rostain & Ramsay, 2006; Safren et al., 2005; Salakari et al., 2010; Wilens et al., 1999; Virta et al., 2008). In our study, there was no difference between hypnotherapy and short CBT. More research is needed to compare the effects of relaxation training, hypnosis, CBT, and cognitive hypnotherapy.

There are some limitations of the study that should be considered when interpreting the results. First, the sample sizes had only nine participants in the hypnotherapy group and 10 in the control group, which is small. Thus, the results must be considered with caution. Second, although the participants were randomly assigned to either the control or active treatment groups, the participants and the therapist knew whether they were receiving active therapy or not. Even so, blinded or sham treatments would be almost impossible to carry out reliably in this study setting considering the nature of the treatment. The third limitation is the severity of the ADHD symptoms of the participants. In CGI, participants were rated mildly to markedly ill, thus leaving the most extreme cases missing. Also, the recruitment of the participants may have caused some bias to the more motivated and less severely disabled ADHD adults to participate in the study. Thus, the results cannot be generalized to the whole ADHD population.

Despite these limitations, our study has many strengths. The diagnoses were made by a specialist and duly verified, outcome measures were wide-ranged (self-report questionnaires, independent evaluations, and computerized neurocognitive testing), and we also used control group and randomization in the study's methodology. Treatment benefits were obtained, though most of the participants were already receiving medication. In general, the findings of this study indicate the effectiveness of hypnotherapy as a potential treatment for adults with ADHD. This is the first controlled trial on hypnotherapy for treating ADHD in adults, and further studies with larger sample sizes and longer treatments are needed.

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