Effects of Intensive Short-Term Dynamic Psychotherapy on Depressive Symptoms and Executive Functioning in Major Depression

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Abstract: This study examined the efficacy of intensive short-term dynamic psychotherapy (ISTDP) on depressive symptoms and executive functioning in patients with major depression. We examined pretest, posttest, and follow-up depression scores as well as pretest–posttest executive functioning scores between 16 participants receiving ISTDP and 16 allocated to wait-list control. Participants in each group were matched according to age, sex, and educational level. Mixed-models analyses demonstrated significant interaction effects of group and time on depression scores when the group ISTDP was compared with the wait-list control group; participants receiving ISTDP had significantly reduced depression severity both after treatment and at follow-up. Next, a series of hierarchical regression models demonstrated modest improvements on most tests of executive functioning in participants receiving ISTDP. Depressed patients receiving ISTDP show a sustained reduction in depression severity after treatment and after 12-month follow-up and improvements in executive functioning after treatment compared with a wait-list control.

Key Words: Depression, executive functions, intensive short-term dynamic psychotherapy (ISTDP)

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M ajor depressive disorder (MDD) is one of the most commonly occurring forms of mental illness having significant negative impact on an individual's educational, occupational, and interpersonal functioning (Andrade and Caraveo, 2003; Kessler et al., 2005). A common feature of MDD is cognitive impairment. As highlighted in a recent meta-analytic review (Snyder, 2013), there appear to be several theories about the nonspecific factors contributing to cognitive impairments in MDD, including slowed processing speed, limited availability of cognitive resources, and a motivation. However, there is also mounting evidence that in addition to these nonspecific factors, executive function may be particularly disrupted in individuals with MDD.

Executive function has been operationalized in many different ways. However, broadly speaking, executive function can be described as a collection of top-down control processes that preside over "lower level" sensory and motor processes in order to allow individuals to respond to environmental demands in an adaptive, flexible manner. That is, executive function is thought to include key processes for goal directed behaviors (*e.g.*, Friedman et al., 2008; Miyake et al., 2000; Nee et al., 2013).

The three-component model of executive function is an influential theoretical framework that proposes a "common" executive component (*i.e.*, a common resource) that is engaged, along with three distinct executive processes: (1) updating process—can add, delete, or manipulate information in working memory, (2) shifting process—can switch between tasks rules or stimulus sets, and (3) inhibiting process—can suppress prepotent responses and suppress the effects of goal-irrelevant distracters (Friedman et al., 2008; Miyake et al., 2000).

Reports on the effects of MDD on executive functioning have been mixed. To address these mixed findings, Snyder (2013) conducted a meta-analytic review to examine the effects of MDD on executive function. Synder's review used the three-component model to operationalize executive function and focused on the most commonly reported measures of each of the three aspects of executive function found in the literature. Updating ability was most commonly measured via the n-back task, in which individuals must determine whether a currently presented stimulus (usually letters or numbers) is a match to the stimulus presented *n* trials ago (where n is usually 1 or 2; Owen et al., 2005). Optimal performance of the task requires individuals to continuously update the contents of working memory to make correct matches. Problem solving and task switching were most commonly assessed by the Wisconsin Card Sorting Task (WCST), in which the individual must sort cards based on different properties that change as the test continues. Thus, successful completion of the task requires mental flexibility to shift between rules. Also, inhibition was most commonly measured by the Stroop task, in which individuals must name the color of the ink in which color words are printed while ignoring the word itself (*e.g.*, the correct response when confronted with the word *red* presented in green ink is *green*). Thus, successful completion of the Stroop task relies on the individual's ability to inhibit the prepotent response of reading the word to make the accurate evaluation of the ink color. The results Snyder's meta-analysis showed moderate effects sizes (Cohen, 1988) of MDD on all three aspects of executive function. That is, those with MDD performed worse on all aspects of executive function than healthy controls did.

At present, it is unclear to what extent the links between MDD and executive dysfunction are causal (*i.e.*, whether executive dysfunction is a result of depression or depression is a result of executive dysfunction) or correlative. Regardless of causal or correlative link and given the critical roles of executive function, it is important to further examine whether treatment of MDD may improve executive function.

To our knowledge, only a limited amount of research currently exists that examines the relationship between changes in executive functioning in depressed people after short-term psychotherapy. For instance, preliminary evidence suggests that depressed people undergoing cognitive behavioral therapy (CBT) may show improved cognitive functioning (*e.g.*, Alexopoulos, 2005) and 8 weeks of a mindfulness-based approach can improve ability to concentrate and maintain attention in depressed patients (Bostanov et al., 2012). Most recently, Groves et al. (2015) found that both CBT and metacognitive therapy (MCT) produced positive changes in neuropsychological functioning and that MCT provided greater improvement in executive functioning

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(specifically related to attention and spatial memory). The relationship between executive functioning and treatment for depression with short-term psychodynamic treatment has not yet been investigated.

Davanloo's (2000, 2005) intensive short-term dynamic psychotherapy (ISTDP) model is commonly delivered as a weekly individual talking therapy, averaging less than 40 sessions. During this therapy, patients are enabled to experience and tolerate painful affects associated to traumatic attachment experiences. Recent meta-analytic studies of the ISTDP approach demonstrate large sustained effects when treating a broad range of common mental disorders (Abbass et al., 2012; Town and Driessen, 2013). This is consistent with the broader efficacy of short-term psychodynamic therapy models specifically in major depression (Driessen et al., 2015).

In the present study, we sought to examine whether a short course of ISTDP might produce significant changes in both self-reported symptoms of depression and executive function. Although we do not postulate a causal link, we hypothesized that with improved mood, aspects of executive function, specifically inhibition, and shifting would also improve.

METHODS

Design

Using a randomized controlled design, participants meeting *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (*DSM-IV*) criteria for major depressive episode were allocated by random to either the control group (wait-list) or experimental group (ISTDP). A clinic secretary, who had no other involvement in the design or implementation of the research procedure, was aware of the allocation sequence and conducted the randomization procedure. Patients and therapists were aware of allocation status. The first 20 patient names drawn from a hat were allocated to receive ISTDP, and the remaining patients, to the wait-list group. Participants' depression severity and executive functioning were assessed at two time points, baseline (before allocation) and after the experimental/control intervention to compare group differences. Additional depression severity scores were obtained at a 12-month follow-up.

Participants

Consecutive referrals, aged 19–40 years, in 2011 who were referred to a mental health outpatient psychotherapy clinic in Tehran, Iran, were screened for inclusion in the study. Participants were evaluated by a clinical psychologist and were included if they met *DSM-IV* criteria for current major depressive episode, had a depression severity score of over 20 on the Beck Depression Inventory (BDI-II), were not currently receiving antidepressant treatment, and provided informed written consent. Participants were excluded if they had bipolar disorder, psychosis, eating disorder, drug abuse, or severe suicidality. In total, 40 participants were included and allocated to a group (Fig. 1).

Treatment

The ISTDP treatment process in patients with major depression begins with an extended trial therapy to evaluate psychic capacities (unconscious anxiety discharge pathways and defensive patterns) and capacity to respond to treatment. The process then focuses on building the necessary capacities to tolerate anxiety and emotional experiences through a graded process of emotion activation and intellectual reflection. When the patient has developed capacity, complex, unprocessed feelings about recent and past traumatic events are mobilized and focused on to help the patient experience these emotions directly. Each such focus is followed by recapitulation of what was learned, to encourage emotional awareness and weaken the patient's avoidance of emotional experiences and interpersonal closeness. Common emphases of

ISTDP in depression tend to be working through grief about losses and the experience and processing of buried rage and guilt about rage related to attachment trauma in childhood. The experience of guilt about rage appears to reduce drives to avoid closeness, to reduce self-harm and to overcome repression of feelings related to these relational traumatic events. This allows working through of grief related to losses and termination in a relatively short treatment course (Abbass, 2015).

The length of treatment was not determined at the onset of therapy. Termination was determined by the therapist and patient based on treatment progress. The average number of sessions in this trial was 15. The first session was the trial therapy, lasting 90 minutes, and the remaining sessions were 60 minutes in length. Therapists were two registered psychologists with between 2 and 4 years of supervision in ISTDP at the time of the trial. Treatment sessions were recorded and reviewed regularly with an experienced supervisor to ensure treatment adherence.

Outcome Measures

Measure of Depression: BDI-II

This 21-item self-report survey is one of the most commonly used measures of depressive symptoms and assesses both the type and severity of negative cognitions associated with depression. Fata et al. (2003) has reported the correlation coefficient between BDI-II and the Hamilton Depression Rating Scale in Iranian subjects as 0.66. Reliability and validity of the test in normal and clinical populations have been found to be acceptable (Kaviani et al., 2001).

Measure of Shifting: WCST

The computer-based version of the WCST was used in this study. As described above, successful completion of the task requires mental flexibility to shift between rules. Individuals must sort cards based on different properties that change as the test continues. Outcome measures from this test include total number of categories achieved (maximum of 6) and number of preservative errors (*i.e.*, how often does the individual persist with the old rule set before adjusting to the new rule set).

Measure of Inhibition: Stroop Task

The computer-based version of the Stroop task was used in the current study. As described above, successful completion of the task requires the individual to inhibit prepotent responses (i.e., reading the color word) in favor of naming the color of the ink the word in printed in. Thus, it is considered a measure of inhibition. Outcome measures from this test include number of false alarms (*i.e.*, incorrect responses in which the word was read) and total response time.

Measure of Psychomotor Speed: Stroop Task

The typical Stroop task consists of two additional conditions: color ink naming (no words) and word reading (black ink). Both of these conditions offer measures of psychomotor speed (*i.e.*, ability to say the ink colors or words out loud) in the absence of executive processes and consist of both number of errors and total response time.

Statistical Analysis

As a pilot study, sample size calculations were not performed. Statistical analyses were carried using SPSS for Windows 20.0, and all tests were performed with a two-sided $p = 0.05$ unless otherwise indicated. Analyses were conducted on the per protocol sample due to missing data preventing the option of an intention-to-treat analysis. Initially, differences between groups on demographic and baseline measurement data were examined using t and chi-square tests.

We used linear mixed-effects models for repeated-measures data to examine within-group changes in depression symptoms at
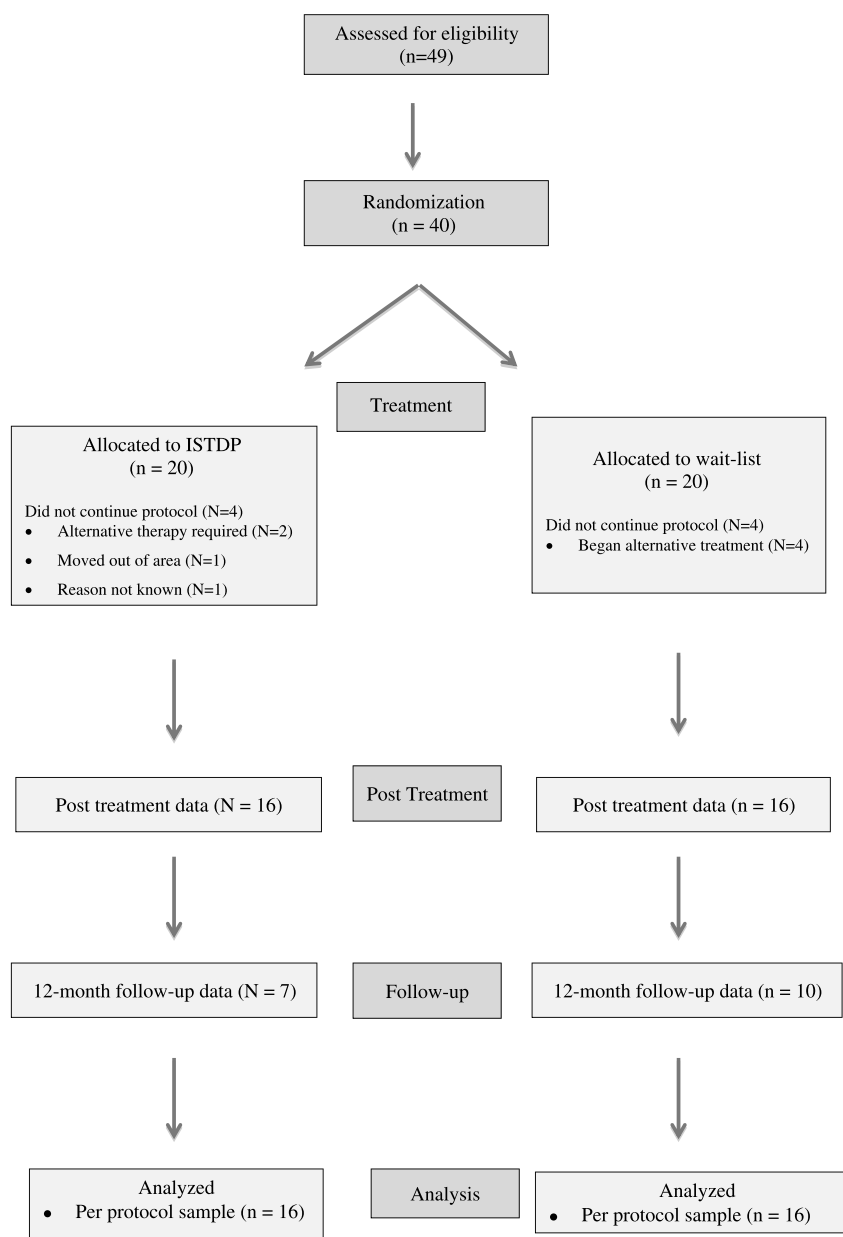
FIGURE 1. Consolidated Standards of Reporting Trials diagram of participants in the clinical trial.

posttreatment and follow-up. An advantage of mixed models is its ability to take into account all available data from all randomized participants, thus enabling an intention-to-treat analysis (Singer and Willett, 2003).

Based on the presence of multiple interdependent measures of executive functioning, a multivariate analysis was deemed appropriate. To account for differences in baselines functioning on each dependent variable, study analyses examining the effects of treatment on executive functioning were carried out using multivariate analysis of covariance (MANCOVA). Baseline scores on each dependent variable were included in analyses as a covariate. Individual analyses of covariance (ANCOVAs) were then conducted on the dependent variables as follow-up tests to the MANCOVA to explore group effects on individual measures of executive functioning. The Bonferroni method was used to control for type I error across the multiple ANCOVAs. To examine the magnitude of the treatment effects, reflecting the proportion of

variance attributable to the dependent variable after controlling for other predictors, partial η^2 values are presented. Convention for interpreting an effect size estimate from partial η^2 report indicates a small effect as greater than 0.14, medium effect as greater than 0.36, and a large effect as greater than 0.51 (Leech et al., 2005).

RESULTS

Participants

From September 2011 to October 2012, participants were recruited from a mental health outpatient clinic. In total, 40 participants were included and allocated to either the treatment or control group. From this sample, four patients from each group dropped out of the study; therefore, final measures were not collected from these participants. The reason for dropout in the control group was that patients

preferred not to wait for treatment. In the ISTDP group, two patients were referred for alternative treatment after session 1 because of low psychological mindedness; one patient preferred antidepressant treatment; and one patient terminated because of a change in location; it was unclear why the final patient dropped out. The final completer sample was 32 ($n = 16$ ISTDP, $n = 16$ wait-list).

Baseline demographic and clinical characteristics of the two conditions were compared and no statistical differences were found (Table 1).

Depression Outcomes

A repeated-measures linear mixed-effects model, fitted with maximum likelihood estimation, was conducted specifying treatment group and the linear effects of time and their interactions as fixed predictors. Random intercepts were included in the model but not the change over time varying by participant (slope) because of insufficient power. The dependent variable was BDI-II scores collected at baseline, posttreatment, and 1-year follow-up. To examine the efficacy between the ISTDP group and the control group, the fixed interaction term of group and linear time was examined.

Mixed models analyses demonstrated significant effects for time, $F(1, 18.62) = 17.60$, $p = 0.0001$; treatment group, $F(1, 33.14) = 162.10$, $p < 0.001$; and the interaction of time and treatment group on BDI-II, $F(1, 17.91) = 11.03$, $p = 0.004$. This revealed that self-reported depression symptoms were significantly lower after ISTDP and in follow-up compared with the wait-list control group (Table 2).

Posttreatment Executive Functioning Outcomes: Psychomotor Speed

All four dependent variables were included in a MANCOVA and significant differences were found between the groups on the dependent measures, Wilks's $\Lambda = 0.58$, $F(4, 23) = 4.10$, $p = 0.012$. The multivariate $\eta^2 = 0.42$ demonstrates that 42% of the variance in the three measures of executive functioning was accounted for by treatment group.

Univariate ANCOVAs on the four measures of executive functioning were conducted using a Bonferroni adjustment (critical $\alpha = 0.0125$). The results showed that on the color naming (response

time [RT]) and word reading (RT) task, allocation to treatment group explained a significant proportion of the outcome variance independent of the effect of baseline functioning, $F(1, 29) = 18.15$, $p < 0.001$, and $F(1, 29) = 11.64$, $p = 0.002$, respectively. The ANCOVA on the color naming (accuracy rate [ACC]) and word reading (ACC) task was not significant. As can be seen in Table 3, individuals in the wait-list group were slower on both the color naming and word reading tasks at the posttreatment measurement compared with those in the treatment group.

Posttreatment Executive Functioning Outcomes: Inhibition

A MANCOVA was conducted to determine the effects of treatment group on the two measures of inhibition, Stroop interference (RT) and Stroop interference (ACC). Significant differences were found between the groups on the dependent measures, Wilks's $\Lambda = 0.67$, $F(2, 27) = 6.73$, $p = 0.004$. The multivariate $\eta^2 = 0.33$ demonstrates that 33% of the variance in the three measures of executive functioning was accounted for by treatment group.

Individual ANCOVAs on the two measures of executive functioning inhibition were conducted using a Bonferroni adjustment (critical $\alpha = 0.025$). The results showed that on both the Stroop interference (RT) and Stroop interference (ACC) task, allocation to treatment group explained a significant proportion of the outcome variance independent of the effect of baseline functioning, $F(1, 29) = 7.27$, $p = 0.012$, and $F(1, 29) = 5.91$, $p = 0.022$, respectively. Table 3 demonstrates that whereas participants in the wait-list group showed minimal changes in functioning over time, participants in the treatment group had significant improvements on both tests of executive functioning.

Posttreatment Executive Functioning Outcomes: Shifting

Analyses were conducted to examine the effect of allocation to treatment group (ISTDP or wait-list) on the three dependent variables, number of preservative errors made, the number of categories completed, and the number of correct response made for the WCST. All three dependent variables were included in a MANCOVA and significant differences were found between the groups on the dependent measures, Wilks's $\Lambda = 0.49$, $F(3, 25) = 10.29$, $p < 0.001$. The multivariate $\eta^2 = 0.55$ demonstrates that 55% of the variance in the three measures of executive functioning was accounted for by treatment group.

Univariate ANCOVA on the three measures of executive functioning were conducted using a Bonferroni adjustment (critical $\alpha = 0.017$). There were significant differences between the groups on scores for number of correct responses, number of categories, and preservative errors, $F(1, 29) = 31.43$, 23.18, and 7.84 respectively. Participants in the treatment group experienced a significant improvement on all three of these measures of executive functioning compared with those in the wait-list group. Mean group data can be seen in Table 3.

DISCUSSION

Consistent with previous research in short-term psychodynamic psychotherapy of major depression, the ISTDP treatment arm produced treatment effects greater than controls that are maintained or increase over time (Abbass et al., 2011; Driessen et al., 2015). This preliminary result is important given that the treatment is brief and relatively cost-effective. Considering how common major depression is and how challenging it is for governments to fund publicly available psychotherapy services, such brief methods need to be developed (Lazar, 2014).

The primary objective of this pilot study was to examine the extent to which the treatment of depression using psychodynamic therapy, specifically ISTDP, might alter executive functioning. Consistent with our original hypotheses, our results indicate that modest

TABLE 1. Descriptive Statistics of Demographic Variables

	Control Group		Experimental Group	
	n	*%*	*n*	*%*
Sex				
Male	13	81.3	10	62.5
Female	3	18.8	6	37.5
Age, yrs				
<20	0	0	1	6.3
20–24	12	75	6	37.5
25–29	2	12.5	6	37.5
30–34	1	6.3	2	12.5
35–39	1	6.3	1	6.3
Education				
High school	2	12.5	3	18.8
Bachelor	14	87.5	10	62.5
Master	0	0	2	12.5
PhD	0	0	1	6.3
Marital status				
Single	11	68.8	12	75
Married	4	25	2	12.5
Divorced	1	6.3	2	12.5

TABLE 2. Means, SDs, and Effect Sizes (Cohen's *d*) for Measures of Depression

Measure and Group (BDI)	Mean (SD)			Effect Size			
	Pretreatment	Posttreatment	1-yr Follow-up	Between Group, Posttreatment–Follow-up	Within Group, Pretreatment–Posttreatment	Within Group, Pretreatment–1 yr Follow-up	Between Group, 1-yr Follow-up
ISTDP group	29.06 (8.24)	17.94 (9.29)	18.06 (9.31)	−0.83 (−1.53 to −0.08)	−1. 27 (−2.34 to −0.19)	−1.65 (−2.66 to −0.64)	−1.50 (−2.24 to −0.68)
Control group	26.69 (6.79)	25.38 (8.71)	27.94 (6.34)		−0.17 (−1.15 to −0.81)	−0.44 (−1.26 to 0.39)	

Note: The confidence intervals (in parentheses) were calculated using the standard error and an alpha level of 0.05. A confidence interval that does not overlap 0 indicates a significance of *p* < 0.05.

improvements were observed on most tests of executive functioning. Relative to wait-list controls, participants in the treatment group were found to have improved scores, when compared with baseline, on measures of psychomotor speed (color naming and word reading), ability to inhibit prepotent responses (Stroop task), and novel problem solving and set shifting (WCST). The largest gains (*i.e.*, effect sizes) were found on measures of psychomotor speed (word reading) and set shifting (WCST), both of which showed moderate effect sizes.

These results are encouraging and, consistent with previous studies using other variants of psychotherapy such as CBT and MCT (*e.g.*, Bostanov et al., 2012; Groves et al., 2015), do suggest that treatment of underlying depression may improve cognitive processes such as attention and executive functioning. However, we must be cautious not to overinterpret the findings from this pilot study. Although the measures used here have a solid grounding in the neuropsychological literature with respect to measurement of executive processes, the relationship between these measures and real-world engagement in activities of daily living is not so clear. Our results are an important step in establishing links between depression, cognition, and an individual's ability to operate in the world and further support the far reaching effectiveness of talk therapy. Future studies should endeavor to include assessment of activities of daily living in addition to executive processing.

There is relatively sparse data on neurocognitive changes in patients receiving psychodynamic therapy and none specifically on

patients receiving the ISTDP model. The current findings are consistent with the cognitive improvements seen after long-term psychodynamic psychotherapy reported by Yazigi et al. (2011), which demonstrated increased attention capacity and processing speed in Wechsler neurological tests (Wechsler Adult Intelligence Scale). A second study of long-term psychodynamic psychotherapy (Bastos et al., 2013) also found wide-ranging changes in cognitive performance including attention, working memory, mental flexibility, psychomotor skills, visual processing speed, and executive function. Although the relative differences in treatment length between these psychodynamic therapies is notable, both consistently found positive changes posttreatment in neurocognitive functioning. Bastos et al. (2013) also found that treatment gains were maintained 1 year after treatment. Further research is necessary to examine whether long-term cognitive functional changes are also observed in short-term variants of psychodynamic therapy.

To the best of our knowledge, this is the first evaluation study of a short-term variant of psychodynamic therapy for major depression to include measurement of cognitive functioning. Strengths of the study include the use of a randomized control design, standardized evaluation of executive functioning before and after treatment, and implementation of a controlled trial within a naturalistic health setting such that results should have greater generalizability to routine practice. Notable limitations of this study include a small sample size and the lack of follow-up data to report on the maintenance of the observed cognitive improvements. Although there was regular independent review of recordings

TABLE 3. Outcome Scores on the BDI-II and Performance on Measures of Psychomotor Speed, Inhibition, Shifting, and Sustained Attention

	Controls				Experimental				MANCOVA	
	Pre		Post		Pre		Post			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*F*(1, 24)	Effect Size
Psychomotor speed										
Stroop color naming (ACC)	98.8	3.5	97.5	3.83	99.8	1	99.75	1	4.28*	0.13
Stroop color naming (RT)	1.05	1.25	1.22	0.27	1.12	0.2	0.92	1	18.15*	0.39
Stroop word reading (ACC)	100	0	97.5	3.83	99	1.8	99.75	1	3.98	0.12
Stroop word reading (RT)	0.94	0.12	1.09	0.21	1.02	0.2	0.9	0.09	11.64*	0.29
Inhibitory Control										
Stroop interference (ACC)	97.3	6.2	96.25	4.49	89.8	2.8	99.5	1.37	7.28**	0.2
Stroop interference (RT)	1.31	0.3	1.3	0.26	1.15	0.4	1.05	0.24	5.91**	0.17
Shifting										
Number of categories	3.5	0.5	3.25	0.68	3.6	0.9	4.31	0.6	23.18*	0.44
Preservative errors	11.6	4.5	11	3.98	10.8	4.6	7.5	2.75	7.84*	0.21
Correct response	39	5.8	37.94	6.8	39.9	8.4	48.56	6.05	31.43*	0.52

* *p* < 0.05.

** *p* < 0.01.

to verify adherence, formal adherence measures should be utilized in future studies.

Despite these limitations, the observed results remain consistent with existing research that point to improved cognitive functioning after psychodynamic psychotherapy therapy for depression. In line with these findings, future research that includes functional brain imaging before and after treatment alongside formal cognitive function assessment is warranted (Abbass et al., 2014).

DISCLOSURE

The authors declare no conflicts of interest.

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