Neuropsychological Changes Following Cognitive-Behavioral Treatment of Obsessive-Compulsive Disorder (OCD)

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Previous research has suggested that individuals with OCD show compromised performance on tests assessing visuospatial and executive processes. This study aimed to further examine such findings by investigating the relationship between OCD symptom improvement following cognitive-behavioral therapy and changes in neuropsychological performance in individuals with OCD ($n = 26$), compared to test-retest control participants ($n = 10$). Successful treatment of OCD led to improvements relative to the control group on neuropsychological tasks measuring spatial working memory. Neuroscientific models of OCD consider such findings to be consistent with possible cortical dysfunction in OCD. However, a significant limitation of the study is in its inability to discount alternative explanations for this finding, such as the influence of changes in beliefs. Implications are discussed.

Obsessive-Compulsive Disorder (OCD) is characterized by marked distress associated with recurrent, persistent, and intrusive ideas, thoughts, impulses, or images (obsessions), and/or repetitive or ritualized and often bizarre overt behaviors or mental acts (compulsions) aimed at neutralizing distress caused by obsessions (American Psychiatric Association [APA], 2000). The most debilitating of the anxiety disorders (Murray & Lopez, 1996), OCD causes great distress to those affected who, despite being aware...
of the often bizarre and repetitive nature of their symptoms, cannot rid themselves of the unwanted intrusions or doubts.

Various models have been proposed regarding the aetiology and maintenance of OCD. Predominant neuroscientific models have suggested that OCD is due to a dysfunction in the fronto-striatal brain regions (see Baxter et al., 1987, 1998). The activity in this region has been found to increase following symptom provocation (McGuire, Bench, Frith, Marks, Frakowiak, & Dolan, 1994; Rauch et al., 1994), while decreases in glucose metabolism in these brain regions have been noted following successful treatment (Baxter et al., 1992; Benkelfat, Nordahl, Semple, King, Murphy, & Cohen, 1990; Perani et al., 1995; Swedo et al., 1992). However, findings have not always been consistent (e.g., Martinot et al., 1990).

Patterns of compromised performance on neuropsychological tasks have been interpreted as further evidence for orbitofrontal-subcortical dysfunction in OCD (Purcell, Maruff, Kyrios, & Pantelis, 1998; Savage et al., 2000). While there have been inconsistencies (e.g., Moritz et al., 2005), the majority of research suggests mild cognitive deficits in higher-level visuospatial and executive functioning (for reviews see Greisberg & McKay, 2003; Kuelz, Hohagen, & Voderholzer, 2004). For example, using the Cambridge Automated Neuropsychological Test Battery (CANTAB), Purcell et al. (1998) found deficits in spatial working memory and spatial planning to be specific to an OCD cohort relative to a nonclinical cohort and to clinical controls with either panic disorder or major depression.

Further evidence for the importance of neuropsychological factors in OCD is provided by studies indicating a relationship between symptom amelioration and improved neurocognitive functioning. Research in this area has examined either differences between medicated and unmedicated OCD cohorts (Martinot et al., 1990; Zielinski, Taylor, & Juzwin, 1991), or has tracked changes in cognitive factors with treatment using either an SSRI (Kahn, Westenberg, & Jolles, 1984), behavior therapy (Bolton, Raven, Madronal-Luque, & Marks, 2000) or cognitive-behavior therapy (Kuelz et al., 2004). However, conclusions from such research have been limited by equivocal findings, which may be due to the limitations such as small sample sizes or relatively poor treatment outcomes. Sanz, Molina, Calcedo, Martin-Lloeches, and Rubia (2001) found OCD patients showed improvements on one of five indices of the Wisconsin Card Sorting Task following clomipramine treatment, suggesting improvements in their ability to discriminate relevant stimuli from distracters, although the authors acknowledged possible problems with small sample size, power, and direction of effect. Kim, Park, Shin, and Kwon (2002) examined visuospatial and executive functioning in 39 OCD patients undergoing SSRI treatment and found some improvement in performance among the OCD patients, although they were still impaired relative to nonclinical controls at the end of treatment. In both of these studies at least half of the patients were already receiving medication before the trial and were still symptomatic at the end of treatment. In a study where considerable symptom amelioration was observed, such amelioration was not associated with improvements on neuropsychological performance (Nielen and Den Boer, 2003). The authors suggested that the neuropsychological deficits may be indicative of more persistent trait-like deficits.

Only a small number of studies have examined changes in neuropsychological functioning with behavioral and CBT treatments, despite evidence that CBT is effective in reducing OCD symptoms (for review see Abramowitz, 1998; Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa, & Marín-Martínez, 2008). Bolton, Raven, Madronal-
Luque, and Marks (2000) found small improvements on neuropsychological performance and neurological soft signs among their OCD patients undergoing behavioral treatment, although these improvements were not correlated with symptom changes. In the absence of a control group it is difficult to discount possible practice effects on the results. In another study, Moritz and colleagues (1999) examined the neuropsychological performance of 30 nonclinical controls and 21 OCD patients undergoing behavioral treatment, demonstrating treatment-related improvements among patients with OCD, with only nonresponders showing impairments on executive functioning following treatment. However, Mortiz and colleagues (2005) also indicated that cognitive deficits were associated with depressive symptoms rather than OCD symptoms. More recently, Keulz et al. (2006) examined the performance of 30 OCD patients before and after CBT with that of 39 matched controls tested twice over the same period. While the OCD participants showed significant impairments on most of the tasks at baseline, in contrast to Nielen & Den Boer (2003), their performance was not significantly different from that of nonclinical controls following treatment. However, the Kuelz et al. study was poorly controlled, with some OCD patients receiving medication while others were administered CBT after the initial assessment.

In addition, there has been little empirical examination of the predictive utility of neuropsychological factors in relation to treatment outcomes. The few studies that have investigated potential neuropsychological predictors of outcome have returned conflicting results. For example treatment nonresponders have been found to perform worse on tests of semantic memory (Sieg, Leplow, & Hand, 1999) and have greater difficulty solving a task sensitive to orbitofrontal dysfunction (Cavedini et al., 2002). However, Bolton et al., found no relationship between neurocognitive factors and outcome following behavior therapy. This was consistent with a more recent study by Moritz et al. (2005), on 138 OCD patients, which found little evidence for the predictive utility of neuropsychological factors. Therefore, it is unclear if and which neuropsychological factors have prognostic utility for response to treatment for OCD.

Overall, the research findings in the area have not yet provided a clear picture of the role of neuropsychological factors in OCD symptoms. While changes in neuropsychological performance have sometimes been demonstrated with symptom amelioration, such changes have not always correlated with the symptom changes. Such inconsistencies have underscored the need for further examination of changes in specific neuropsychological functions following a controlled treatment condition relative to a retest control group. In addition, the predictive utility of possible neurocognitive impairment is yet to be established. According to Moritz et al. (2005) neurocognitive impairment may interfere with patients’ ability to engage in psychotherapeutic interventions and generalize skills learned in therapy to everyday life.

The present study examined the neuropsychological performance of OCD patients, before and after administration of manualized individual CBT treatment. Individuals without the disorder were also examined over the same timeframe to control for practice effects. Neuropsychological performance was examined using selected tests from CANTAB, which have previously been demonstrated to be of particular relevance to OCD (e.g., Purcell et al., 1998). The study also investigated which tasks are predictive of better treatment outcome.

It was hypothesized that OCD patients would show impaired performance in spatial planning and working memory relative to community controls at baseline. Further it was anticipated that there should be an interaction effect over time, such that
clinical OCD participants would show greater improvements over time relative to the nonclinical group tested over the same time period.

METHOD

Participants

Thirty patients with a primary diagnosis of OCD were recruited through the specialist research treatment program for OCD at the University of Melbourne Psychology Clinic. The age of the participants ranged from 19 to 62, with mean of 38. The Y-BOCS scores were within the subclinical to extreme range (Y-BOCS = 13-43), with most participants reporting both obsessional and compulsive symptoms. The exceptions were two participants who reported only obsessional phenomena.

Participants were diagnosed by trained clinicians following a detailed initial clinical assessment interview and administration of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994) on a separate occasion to confirm the OCD diagnosis and the presence of any other Axis I disorders. No discrepancies were noted between the diagnoses obtained through each method. The presence of another depressive or anxiety disorder did not constitute an exclusion criterion if OCD was the primary diagnosis and the other disorder was not in the severe range. Patients with substance abuse problems, psychotic disorders, and neurological disorders were to be excluded from the study, but no such cases were identified. Patients with substance abuse problems, psychotic disorders, and neurological disorders were to be excluded from the study, but no such cases were identified. Nineteen of the participants reported receiving medication at assessment. These participants were allowed to remain in the study as long as they had been receiving the medication for at least one month and there were no changes in medication type or dosage over the duration of the study. Participation was voluntary, and no financial reimbursement was provided for those who participated. Four participants were not included in the final analyses as they did not complete treatment (3) or provided incomplete data (1).

In addition, 10 community participants (6 females) were recruited through the use of flyers and word-of-mouth. The age of the community participants was similar to that of the clinical cohort (age range = 19–59). Demographic characteristics for both samples are discussed in the results section.

MEASURES

Neuropsychological Assessment

Neuropsychological performance was assessed using selected tasks from the Cambridge Neuropsychological Test Automated Battery (CANTAB; Morris, Evendon, Sahakian, & Robbins, 1987). The CANTAB consists of a series of computerized tests presented on a high-resolution touch-screen monitor. On the basis of previous studies indicating the importance of spatial working memory and planning tasks in OCD (Purcell et al., 1998), particularly with respect to predicting treatment response (Kyrios, Wainwright, Purcell Puntelis, & Maruff, 1999), two tasks assessing these processes
were used in the current study: Spatial Working Memory (SWM) and Stockings of Cambridge (SOC).

The SWM task requires participants to locate the blue “token” under a number of boxes displayed on the screen, and use these to fill up a column on the right hand side of the screen. The token under each box will only appear once under that box, so the maximum number of tokens that needs to be collected in each sequence corresponds with the number of boxes displayed. Participants were instructed not to return to the boxes where blue tokens had been found previously in the particular trial. Participants completed a total of 20 trials, with four trials with each of two, three, four, six, and eight boxes. The color and position of the boxes were changed between trials to discourage stereotyped search strategies. Two key variables were measured: the “between search errors” committed when a participant returned to a box under which a token had previously been located in the sequence; and a “strategy” score, measuring how frequently a participant initiated the search from the same box during each trial, reflecting the ability to employ a systematic search strategy. The strategy score was calculated on the basis of participant’s performance during the more complex trials of six and eight boxes and was on a scale from 1-37 with higher numbers indicating an inefficient strategy.

SOC is a spatial planning task derived from the “Tower of London” task developed by Shallice and McCarthy (Shallice, 1982). The display screen in this task was divided into two sections each containing three colored balls, stacked in various arrangements. During the “copying” phase, participants were required to rearrange the balls in the bottom half of the screen, to match the target arrangement presented in the top half of the screen. The number of minimum moves required to reach the solution was ranged from two to five across all trials. The minimum number of moves was presented visually on the screen as well as emphasized verbally at the start of each trial. Twelve trials were initially presented with two trials for each of the two- and three-move solutions and four trials for the four- and five-move solutions. Measures taken included “initial thinking latency” (i.e., time taken to initiate first movement) and “subsequent thinking latency” (i.e., time taken to execute the rest of the task), the latter two measures providing estimates of cognitive speed (Purcell et al., 1998). For each of the “copying” trials, a control “following” condition was employed to estimate motor initiation and execution times independent of thinking times. In this condition, participants were presented with a sequence of moves executed by the computer in the top half of the screen, which they were instructed to follow by moving the corresponding balls in the bottom-half display. The sequence of moves corresponded to the sequence of moves made by each participant for the relevant trial in the “copying” condition. Two measurements were taken in the “following” condition, including “initial movement latency” and “subsequent movement latency” providing estimates of motor speed. Participants were instructed to make the moves as quickly as possible.

**OCD and Depressive Symptoms**

The self-report Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman, Price, Rasmussen, & Mazure, 1989) was used as a measure of OCD symptoms. The self-report version of the Y-BOCS contains 12 items that measure the severity of OCD symptoms (Baer, Brown-Beasley, Source, & Henriques, 1993). Five of the items refer to obsessions, five refer to compulsions with the two remaining questions measuring
distress and neutralization efforts associated with the symptoms. Severity ratings for each item are indicated on a 0-4 point scale representing “no symptoms” through to “extreme symptoms.” Subtotals can be calculated for obsessions (sum of items 1-5) or compulsions (6-10). The scale has demonstrated reliability and validity and compares favorably to interview measures used to assess OCD symptoms in treatment outcome research (Stekete, Frost, & Bogart, 1996).

The Padua Inventory–Revised (PI-R; Burns, Keortge, Formea, & Sternberger, 1996; Sanavio, 1988) is a 39-item self-report measure of distress associated with obsessions and compulsions, developed from the original 60-item version (Sanavio, 1988). The PI-R scale consists of five subscales, including: (1) obsessional thoughts about harm to oneself and/or others; (2) obsessional impulses to harm oneself and/or others; (3) contamination obsessions and washing compulsions; (4) checking compulsions; and (5) dressing/grooming compulsions. Each item, rated on a 5-point scale (0 = “not at all,” 4 = “very much”) measures the degree of disturbance caused by the thought or behavior. Previous research has demonstrated that each subscale has good internal consistency (α = 0.77 to 0.88), test-retest stability over a 7-month interval (r = 0.61 to 0.84) and discriminative validity from the other subscales (Burns et al., 1996). The PI-R has also been demonstrated to have increased discriminate validity with respect to worry and anxiety relative to the original PI (Burns et al., 1996; Sanavio, 1988). Within the current sample the total scale and all subscales exhibited adequate internal consistency (α = 0.76 to 0.88).

The Beck Depression Inventory-II (BDI; Beck, Steer, & Garbin, 1988) is a 21-item self-report measure assessing the presence of depressive symptoms in accordance with DSM-IV criteria, over the two week period preceding the assessment. The items in the BDI are rated on a 4-point scale ranging from 0 to 3, with a possible total score between 0 and 63. The BDI has demonstrated criterion validity with patients with mood disorders obtaining higher scores than patients with anxiety, adjustment or other disorders (Beck, Steer, & Brown, 1996). The measure has been shown to have high internal consistency in clinical (α = 0.92) and nonclinical student samples (α = 0.93), as well as good test-retest reliability at 1 week period (r = 0.93; Beck et al., 1996). In line with previous findings, the BDI exhibited high internal consistency in the current sample (α = 0.90).

**PROCEDURE**

Participants received written information about the purpose of the study, their rights, and obligations. All participants gave written consent before participating in the study. Questionnaire and neuropsychological assessments were undertaken before commencement of therapy and then again 16 weeks later following the last treatment session. Participants attended weekly one hour sessions as part of a 16-week individual manualized CBT treatment program administered by appropriately trained and supervised senior doctoral students and doctoral graduates at the clinic. The program included psychoeducation about anxiety, depression, and OCD; anxiety management; graded exposure and response prevention; behavioral experiments; cognitive restructuring and relapse prevention. Previously, it has been found that this treatment package leads to a mean posttreatment Y-BOCS score in the nonclinical range (mean Y-BOCS = 10; Kyrios, Hordern, & Bhar, 2001) which compares favorably with both the CBT and pharmacotherapy outcome literature (Abramowitz, 1998). The community controls
RESULTS

Data Screening and Demographics Characteristics

Initial data screening revealed incomplete data at retest for four of the OCD participants. The missing data related to the neuropsychological tasks, was considerable and was not randomly distributed (i.e., participants failed to complete some of the neuropsychological testing). These participants were excluded from the repeated measures analyses, but were retained for the analyses not including these measures.

The data was then screened for normality and possible presence of univariate and multivariate outliers separately in the two samples. Logarithmic transformation of the time latencies of the SOC task was performed to correct for significant positive skew in both samples.

There were no significant differences on gender, age, education level, or marital status between the OCD and community samples. As expected, compared to community controls, OCD participants recorded significantly higher levels of OCD and depressive symptoms (see Table 1). Correlational analyses indicated no significant correlations between depressive symptoms and performance on any of the neuropsychological tests, at either baseline or posttreatment, $r < 0.310, p > 0.05$.

Neuropsychological Performance and OCD Symptoms

At baseline, relative to the nonclinical controls, the OCD patients recorded more between search errors, $t(26.69) = -4.254, p < 0.05$, and poorer strategy scores on the SWM task, $t(34) = -2.327, p < 0.05$. On the SOC task, OCD patients recorded
slower response latencies on initial movement, \( t(34) = -2.790, p < 0.05 \), and on subsequent movement, \( t(31.76) = -3.733, p < 0.05 \). OCD patients also reported slower initial and subsequent thought on the SOC task, \( t(34) = -1.695, p < 0.05 \), and \( t(34) = -2.223, p < 0.05 \) (see Table 2 for group means). Within the OCD group there was no significant association between OCD symptoms and neuropsychological performance.

### Changes with Treatment

Following cognitive-behavioral treatment, OCD patients showed significant decrease in overall OCD symptoms, \( t(25) = 6.074, p < 0.001 \); including both obsessions, \( t(25) = 15.520, p < 0.001 \) and compulsions \( t(25) = 4.947, p < 0.05 \). The posttreatment mean Y-BOCS score for the overall OCD symptoms was \( M = 16.96, SD = 7.49 \), with similar posttreatment Y-BOCS mean scores for obsessions (\( M = 8.38, SD = 3.52 \)) and compulsions (\( M = 8.58, SD = 4.47 \)).

Participants with OCD showed significant improvement on all neuropsychological tasks at posttreatment, although a series of 2(Group) x 2(Time) split-plot ANOVAs indicated significant interaction effects only for the SWM task (Table 2). Examination of means indicated that only the OCD group improved with time.

Correlations between changes in scores on the neuropsychological tasks and changes in OCD symptoms were examined in the OCD sample only. No significant correlations were noted between difference scores for the neuropsychological tasks and symptom amelioration (all \( r < 0.286, p > 0.05 \)), although concerns have been expressed about the reliability of unadjusted change scores (Walz, Strickland, & Lenz, 2005).

### TABLE 2. Performance on the Neuropsychological Tasks Pre- and Posttreatment in OCD Patients and Healthy Controls (HC)

<table>
<thead>
<tr>
<th>Variable</th>
<th>OCD (n = 27)</th>
<th>HC (n = 10)</th>
<th>( F ) (Group x Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YBOCS total scores</td>
<td>Pre: 26.38 (7.66)</td>
<td>Post: 16.96 (7.49)</td>
<td>—</td>
</tr>
<tr>
<td>YBOCS Obsessions</td>
<td>Pre: 13.23 (3.18)</td>
<td>Post: 8.38 (3.52)</td>
<td>—</td>
</tr>
<tr>
<td>YBOCS Compulsions</td>
<td>Pre: 13.15 (5.43)</td>
<td>Post: 8.58 (4.47)</td>
<td>—</td>
</tr>
<tr>
<td>Spatial Working Memory</td>
<td>Between Search Errors Pre: 35.92 (21.55) Post: 28.46 (18.85)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Strategy</td>
<td>Pre: 16.23 (5.81)</td>
<td>Post: 12.31 (5.68)</td>
<td>—</td>
</tr>
<tr>
<td>Stockings of Cambridge Latencies</td>
<td>Initial Movement Pre: 3.15 (0.14) Post: 3.10 (0.17)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Subsequent Movement Pre: 3.81 (0.15) Post: 3.78 (0.15)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Initial Thought Pre: 3.61 (0.22) Post: 3.47 (0.26)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Subsequent Thought Pre: 3.66 (0.61) Post: 3.31 (0.83)</td>
<td>—</td>
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</table>

Note. *\( p < .05 \).
Subsequently, a two-step hierarchical regression was conducted to examine the predictive utility of neuropsychological performance in relation to posttreatment OCD severity. To control for initial symptom severity the baseline Y-BOCS scores were entered in Step 1, with the neuropsychological tasks entered at Step 2. The dependent variable was the end-of-treatment OCD severity (i.e., posttreatment Y-BOCS scores). All predictors together accounted for 39% of the variance in the posttreatment Y-BOCS scores, with lower initial movement latency of the SOC planning task as the only significant predictor of the posttreatment Y-BOCS after the final step (Table 3).

### DISCUSSION

The present study examined initial and posttreatment differences in the neuropsychological functioning of individuals diagnosed with OCD relative to that of test-retest nonclinical controls; the relationship between improvements in neuropsychological performance and OCD symptoms; and the changes in neuropsychological functioning as a result of a 16-week course of cognitive-behavioral therapy. There was significantly impaired neuropsychological performance on spatial working memory and planning tasks in the OCD patients relative to nonclinical controls at baseline, with significant improvements only in the OCD group by posttreatment. However, changes in neuropsychological factors did not correlate with improvements in symptoms in the OCD group. In light of concerns about the reliability of unadjusted change scores (Walz et al., 2005), hierarchical regression was used to predict posttreatment outcome controlling for pretreatment severity. Unexpectedly, lower initial movement latencies on a planning task predicted worst posttreatment outcome.

Individuals with OCD in this study showed a specific pattern of cognitive deficits related to spatial working memory and motor initiation and execution, with improvements in spatial working memory over treatment. Such findings are consistent with the existing literature suggesting a prominent role of higher-order visuospatial and organizational deficits in OCD (e.g., Purcell et al., 1998; Veale, Sahakian, Owen, & Marks, 1996), and with findings of functional impairments in brain regions regulating...
these functions in OCD. Specifically, compared to nonclinical controls, OCD patients showed difficulties in the SWM task, which involves holding and manipulating increasing amounts of spatial information, and also showed a decreased ability to approach the search in an organized and systematic manner. Consistent with Purcell et al. (1998), by adopting a less strategic approach to the task, OCD patients could be more likely to rely on short-term memory capacity, which would inevitably lead to decreased performance as task demands increase. Also consistent with previous findings, OCD patients were slower than nonclinical controls in initiating and executing movements on the planning task, supporting suggestions that OCD is related to a decreased ability to initiate and sustain a series of ongoing movements.

Furthermore, the present study indicated significant improvements in performance on all neuropsychological tasks following symptom amelioration, although the possible influence of practice could only be excluded for spatial working memory. Improvements in executive and strategic processes such as those assessed by the SWM may reflect individuals learning increased flexibility in approaches to thinking and problem solving through the CBT treatment. This is consistent with Kuelz et al. (2006), who found that CBT or combined CBT/SSRI led to improvements in neuropsychological functioning on tasks involving flexibility and organization.

Moreover, the neuropsychological performance on these tasks did not appear to be associated with increased initial depressive symptoms, and the groups did not differ on demographic variables (e.g., age, educational level, marital status), indicating that neuropsychological impairments are more likely to be associated with the clinical features of OCD, rather than patient demographics or comorbid depression.

However, it should be noted that the degree of change in neuropsychological performance was not related to the magnitude of symptom change, although it is difficult to draw too much from this finding given the limitations of unadjusted change scores. While neuropsychological changes were observed in the OCD group, over-and-above a retest control group, such changes may not be associated with symptomatic amelioration. Neuropsychological deficits may be due to the presence of the disorder itself (e.g., intrusive thoughts or checking symptoms may have led to poorer performance in the pretreatment phase). Alternatively, a third variable may have led to changes on both neuropsychological tasks, and on treatment outcome. In particular, metamemory is increasingly seen to be important in OCD, particularly the checking subtypes, whereby individuals with lower memory confidence feel the need to repeatedly check so as to ensure that situations are safe. Individuals with poorer confidence in memory may experience greater interference during neuropsychological tasks, such as on performance indicators where confidence is an important influence (e.g., movement latencies on the Stockings of Cambridge), or on tasks where individuals require confidence in their internal representations of the world (e.g., spatial working memory). Improvements in confidence over treatment is an alternative plausible factor that could have led to both improvement in symptoms and on neuropsychological tasks. Future studies should examine how neuropsychological and cognitive factors interact in performance on such tasks.

Further, the current study provides only little evidence for prognostic utility of the neuropsychological tasks examined. Initial movement latency was the only significant predictor of treatment outcome in the current sample, with lower latencies predictive of worst outcome. While slowed reaction times on a range of neuropsychological tasks have been found consistently among OCD patients (Hymas et al., 1991; Martinot et al., 1990; Purcell et al., 1998), impulsivity (faster reaction times) may be predictive
of poorer outcomes following psychological treatment. Alternatively, the association may be a result of suppression effects of the other variables which are highly correlated with initial movement latency (e.g., subsequent movement and initial and subsequent thought), given the nonsignificant zero-order correlation before these variables were entered in the regression. It is important to note that the study had a relatively small sample and may have not been sufficiently powered to detect predictors reliably. Future research on larger samples should examine the role of neuropsychological factors in predicting treatment, while also accounting for possible effects due to symptoms or beliefs.

In summary, this study examined the relationship between treatment for OCD and changes in neuropsychological performance, in individuals with OCD and control participants. Consistent with literature indicating dysfunction in visuospatial and executive processes in OCD, it was found that successful treatment of OCD led to improvements relative to the control group on neuropsychological tasks measuring spatial working memory. Future research should exclude other possible explanations for these findings, such as changes in cognitive factors.

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