The Influence of Confidence in Memory on Checking Behaviours

Hayley Jennings  
Faculty of Life and Social Sciences  
Swinburne University of Technology, Hawthorn VIC 3122 Australia

Maja Nedeljkovic  
Faculty of Life and Social Sciences  
Swinburne University of Technology, Hawthorn VIC 3122 Australia

Richard Moulding  
Faculty of Life and Social Sciences  
Swinburne University of Technology, Hawthorn VIC 3122 Australia

Abstract
Recent theories of Obsessive Compulsive Disorder have suggested that meta-cognitive beliefs, particular confidence in memory, may relate to the maintenance of symptoms. For example, individuals who worry that their memory is deficient may check in order to ensure that the doors are locked, regardless of their actual memory ability. While studies have related meta-memory beliefs to OCD symptoms, and have found that memory is affected by checking behaviours; to date, no experimental literature has attempted to ascertain whether lowered confidence in memory directly leads to greater checking behaviours. In the current study 46 non-clinical participants completed a battery of questionnaires measuring these constructs, before undertaking a “memory task” designed to manipulate their level of confidence in their memory. The effect of the manipulation on the level of checking on a visuomemory task was subsequently assessed. The questionnaires indicated that cognitive confidence predicted variation in obsessive-compulsive symptoms over-and-above the influence of depressive symptoms and other OCD-related beliefs. However, while confidence in memory was successfully manipulated, the group with increased memory confidence was not found to have lower checking behaviours. Limitations of the study are discussed and directions for further research are suggested.

Keywords: Obsessive Compulsive Disorder; Cognition; Memory.

Introduction
Obsessive-compulsive disorder (OCD) as a leading cause of disability, impacting on the individual, their family and the community (World Health Organization; 2001). It has a lifetime prevalence of approximately 2.8% in Australia (Australian Bureau of Statistics [ABS], 2008), a figure largely consistent across cultures (Nedeljkovic, Moulding, Foroughi, Kyrios & Doron, in press). Various models relating to cognitive-behavioural theories have been developed to explain the aetiology and maintenance of OCD (e.g., Salkovskis, 1985; Wells, 2008; for a review see Abramowitz, 2005). The general assumption of these models is that normal intrusive thoughts are misinterpreted as being of significance, leading to the development of clinical obsessions (Salkovskis, 1985). Negative appraisals are believed to result from various dysfunctional beliefs such as excessive levels of personal responsibility (Salkovskis, 1985). Recent cognitive-behavioural models have implicated meta-cognitive beliefs as an essential factor in OCD (Wells, 2008; Wells & Matthews, 1994), encompassing the knowledge and understanding one holds of their own cognitive processes and the appraisals of these processes (Flavell, 1979; Wells, 2008). It is suggested that individuals with OCD beliefs have negative beliefs regarding their memory and thinking capabilities, for example they may have reduced confidence in memory or general cognition (Wells, 2008).

There is now considerable empirical support for the role of memory confidence and compulsive checking in both OCD patients and OCD symptoms in non-clinical samples (i.e., MacDonald et al., 1997; Nedeljkovic & Kyrios, 2007; Nedeljkovic, Moulding, Kyrios & Doron, 2009; Radomsky et al., 2001; Tolin et al., 2001, van den Hout & Kindt, 2003). Confidence in memory may particularly relate to OCD checking-symptoms, with decreased confidence leading to increased checking (“I’m not sure - so I must check”) but with checking behaviours themselves reducing confidence (“I’ve checked it so many times I’m not sure anymore whether the last check was correct”; see e.g., van den Hout & Kindt, 2003). For example, MacDonald and colleagues found that OCD patients who engaged in checking behaviour reported decreased memory confidence relative to those of OCD patients without checking.
behaviours and non-clinical patients, regardless of their actual performance on a memory task. Nedeljkovic and Kyrios found cognitive confidence to comprise of four separable aspects: confidence in decision-making, high standards in relation to cognitive performance, confidence in concentration and attention, and confidence in general memory. They found all four of these aspects to relate to OCD symptoms in non-clinical samples (Nedeljkovic & Kyrios, 2007; Nedeljkovic et al., 2009) and to differ between OCD patients and non-clinical controls (Nedeljkovic & Kyrios, 2007).

These findings point to the relevance of beliefs about memory and cognition to OCD symptoms, rather than deficits in memory per se. Recently, Fitzgerald, Nedeljkovic, Moulding and Kyrios (in press) examined whether confidence in memory may impact directly on neuropsychological tests of memory in non-clinical participants, thereby perhaps accounting for neuropsychological differences found between OCD groups and normal controls. In this study, an experimental group received positive feedback on a memory task, regardless of their actual performance, while the control group were not provided with any feedback. The task was a visuo-spatial “memory measure” modelled on a common memory game, in which participants were shown 30 unique symbols simultaneously on a computer screen, and were subsequently presented with one symbol at a time and asked whether it was presented in the original display.

FitzGerald and colleagues (in press) proposed that increasing memory confidence would lead to improved neuropsychological performance, which should then impact the frequency of checking. While memory confidence was successfully increased, this manipulation was not shown to have a statistically significant effect on neuropsychological performance. However, the authors note that there were trends that, unlike participants with high levels of OC symptoms, participants with low levels of OC symptoms were more likely to improve if they were assigned to the experimental condition. These trends suggest that high levels of OC symptoms may interfere with improvement on neuropsychological performance with repeated trials.

The study did not however, directly examine the effect of increased confidence in memory on obsessive-compulsive behaviours, and such a causal link has yet to be empirically established within the literature. Establishing such a relationship would further highlight the importance of cognitive confidence in OCD and help elucidate the nature of the relationship between cognitive confidence and obsessive-compulsive behaviours. Therefore, the present study adopted an experimental approach in non-clinical participants, aimed at investigating whether manipulating memory confidence in non-clinical controls would alter the number of times participants felt compelled to check their behaviour. In particular, the experimental manipulation of Fitzgerald et al. (in press) was utilized in order to alter individual’s perceptions of their memory. Participants were then given a visuo-spatial task previously used as an analogue of OCD-checking behaviours (Mancini, D’Olimpio & Cieri, 2004). The study also examined the relationship between trait measures of these constructs.

Based on findings by Nedeljkovic and Kyrios (2007), it was predicted that cognitive confidence, as assessed by questionnaires, would be associated with greater indications of obsessive-compulsive symptoms as well as higher levels of obsessive-compulsive beliefs. Additionally, it was expected that cognitive confidence would predict obsessive-compulsive symptoms after accounting for depression and other obsessive-compulsive beliefs. It was hypothesised that receiving positive feedback in a memory confidence task would result in an increased level of memory confidence for the experimental group compared to a control group not provided with any feedback. Following successful increases in memory confidence, it was hypothesised that this would result in a decreased number of checking behaviours and hesitations as measured by the visuospatial Memory (VSM) task, modelled on that used by Mancini and colleagues (2004), as well as a decreased amount of time taken to complete the VSM task.

**Method**

**Participants**

The sample consisted of 46 participants, the majority of whom were first year psychology students volunteering in exchange for course credit, along with a convenience sample of community participants. Thirty-two females aged between 18 and 52 (\(M = 22.59, SD = 1.41\)) and 14 males aged between 18 and 49 (\(M = 22.71, SD = 2.06\)) participated in the study. Of the 46 participants, 73.9% had just finished high school, while the remainder had previously completed an undergraduate (21.7%) or postgraduate degree (4.3%). Although only a small number of participants (8.7%) were currently experiencing some sort of anxiety or depression, an additional 17.4% had experienced anxiety and/or depression in the past. The scores from two participants were within the clinical range of obsessive-compulsive symptoms as measured by the OCI-R (Foa et al., 2002), with the remaining participants presenting with subclinical...
levels of obsessive-compulsive symptoms. Partially completed data, consisting only of questionnaire results, was collected for a further 9 participants and is utilised in the correlational and regression analyses.

The use of non-clinical populations within research on OCD is an accepted practice, based on findings that non-clinical populations experience similar intrusive thoughts to clinical populations, albeit at a lower frequency and with less resulting distress (Rachman & de Silva, 1978). Two recent taxometric studies have also suggested that OCD-related beliefs and OCD symptoms, with the possible exception of hoarding symptoms, are dimensional rather than categorical (Haslam, Williams, Kyrios, McKay & Taylor, 2005; Olaf, Williams, Haslam, Abramowitz, & Tolin, 2008). On balance, these results are consistent with a dimensional model of beliefs and symptoms in OCD and support the appropriateness of studying OCD-related phenomena in non-clinical subjects.

Materials

The Memory and Cognitive Confidence Scale (MACCS; Nedeljkovic & Kyrios, 2007) is a multifaceted measure used to assess confidence in general memory, confidence in decision-making/planning abilities, confidence in concentration and, cognitive perfectionism. The total MACCS as well as each individual subscale have demonstrated sufficient reliability and validity (Nedeljkovic & Kyrios, 2007).

The Obsessive Beliefs Questionnaire-Revised (OBQ-44; Obsessive-Compulsive Cognitions Working Group [OCCWG], 2005) assesses beliefs associated with OCD, specifically beliefs regarding responsibility and threat estimation, perfectionism and certainty and, the importance and control of thoughts. The total OBQ-44 and each of the three subscales have demonstrated satisfactory psychometric properties (OCCWG, 2005).

The Obsessive-Compulsive Inventory-Revised (OCI-R; Foa et al., 2002) is a measure of the severity of clinical OCD symptoms, specifically assessing instances of washing, checking, ordering, obsessing, hoarding and neutralising. The OCI-R has shown acceptable test re-test reliability and internal consistency (Foa et al., 2002).

The Depression Anxiety Stress Scales-Revised (DASS-21; Lovibond & Lovibond, 1995) separately assesses levels of depression, anxiety and stress recently experienced by respondents. Each subscale has been independently established as having excellent internal consistency, convergent and discriminant validity (Henry & Crawford, 2005).

The Visuo-spatial Memory (VSM) Task was based upon a task used in previous research (Mancini, D'Olimpio & Cieri, 2004) measuring aspects of obsessive-compulsive behaviour. Specifically, data gathered from each of the nine trials include the number of times the participants check the original configuration, the number of mouse clicks made when placing the objects into position, the time taken to complete the trial and the number of errors made.

For each of the 9 trials, eight items were presented on a computer screen in a target configuration. The items could be either eight different coloured stars, eight different objects, or eight squares each containing a different pattern of small blackened squares. Each set of items are presented three times throughout the task, in a varied configuration each time. Trials begin with the target configuration being presented for 12 seconds, followed by the items being automatically placed in a row at the top of the screen. Subsequently, the items were to be rearranged to exactly match the previously shown target configuration by dragging and dropping each item into place using a computer mouse. The instructions given at the beginning of the task emphasised the importance of placing each item in its exact original position.

No time limits were applied and a ‘show’ button was available, enabling participants to review the target configuration for an additional 3 seconds as often as required. When satisfied with the placement of the objects, participants were required to click the “continue” button to proceed to the next trial. Participants were notified prior to completing the task that the number of mistakes made and the number of times the original target configuration is checked will be recorded.

The Memory Confidence Manipulation (MCM) Task aims to temporarily alter the levels of confidence one holds of their own memory, and has been found to be successful in previous research (FitzGerald et al., in press). The task is presented to participants purely as a memory task in order to conceal its actual aims. Participants were shown a block of 30 unique abstract images for a brief period of time. A series of individual images were then presented sequentially for 5 seconds each and participants were asked to indicate whether or not the particular image on screen had been included in the previous display block of 30 images.

Throughout the initial practice phase, the difficulty of the task was automatically adjusted according to the participant’s performance ensuring that the task remained sufficiently challenging (a correct response rate of approximately 40-60%). The experimental group were provided with positive feedback (a predetermined rate of 95% level of correct answers, regardless of the actual responses made), while the control group were not provided with any feedback.
on their ongoing performance. Participants were asked to self-rate their memory confidence prior to, and following the task, the results of which form the Confidence in Memory (CIM) ratings. Furthermore, participants were told that the task was quite difficult, with an average correct response rate of 50%. Upon completion of the task, participants in the experimental group were presented with a predetermined graph displaying 95% correct overall, while the control group were shown a graph displaying their actual results (40-60%).

Procedure

Following informed consent, the first battery of questionnaires was completed (DASS-21, MACCS, OBQ-44, OCI-R), followed by the VSM task. The MCM task was then administered to both the experimental and control groups. Participants were asked to complete the VSM task for a second time. Upon conclusion of the experiment, a debriefing procedure was followed outlining the nature of the study and the necessity of involving deception to achieve varying levels of memory confidence.

Results

Data was analysed using SPSS 17.0. Missing values were replaced with the series mean in order to maintain the mean of the data distribution. Variables that were high positively skewed and/or leptokurtic were transformed to improve normality. One multivariate outlier was detected after transformations were completed (Mahalanobis’ Distance p < .05) and was subsequently removed from all regression analyses. Assumptions of linearity and homoscedasticity were satisfied.

Pearson’s correlations between OCD symptoms and cognitive confidence at baseline showed significant moderate correlations between cognitive confidence with both obsessive-compulsive symptoms (r=.45), and obsessive-compulsive beliefs, (r=.36), indicating that greater instances of obsessive-compulsive symptoms and beliefs are associated with lower levels of cognitive confidence (Table 1). A hierarchical regression was used to examine the prediction of OCD symptoms by cognitive confidence, after controlling for depression and other OCD-related beliefs. Cognitive confidence was a significant predictor - explaining an additional 5.2% of the variance (see Table 2).

Memory Confidence Manipulation

The effects of experimental manipulation on state memory confidence was examined using the single item assessing confidence in memory, before and after completion of the memory confidence manipulation. The results of a repeated-measures ANOVA revealed a significant interaction between time and group, $F (1, 53) = 52.65, p<.01, \eta^2 = .50, MSE =1.78$, indicating a significant difference in memory confidence between the control and experimental group following the MCM. Specifically, participants in the experimental condition demonstrated increased memory confidence, while participants in the control condition were found to experience reduced memory confidence (see Figure 1).

![Figure 1](image-url)  
*Figure 1. Effect of confidence manipulation on state confidence in memory, as measured by the CIM measure.*

While the manipulation was successful, the results illustrated that there was no significant effect of the manipulation on number of times participants checked the original pattern on the VSM task, $F (1, 44) = 0.21, p=.65, \eta^2 = .01$. Similarly, there were no significant effects of the memory confidence manipulation on the number of clicks made when placing the objects in position $F (1, 44) = 1.27, p=.27, \eta^2 = .03$, the length of time taken to complete the task $F (1, 44) = 0.08, p=.77, \eta^2 = .00$, or the number of errors made, $F (1, 44) = 0.54, p=.47, \eta^2 = .01$. There was a significant main effect of completion time $F (1, 44) = 40.25, p<.001, \eta^2 = .48$, with time falling for both groups.
Table 1

*Pearson Correlations between OCI-R, MACCS, DASS and OBQ-44 Subscales and Totals and VSM Measures*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. OCI-R</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. OBQ-44</td>
<td>.42**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. DASS – Depression</td>
<td>.44**</td>
<td>.05</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MACCS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Total score</td>
<td>.45**</td>
<td>.36**</td>
<td>.35**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. GEN subscale</td>
<td>.34**</td>
<td>.21</td>
<td>.22</td>
<td>.92**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. DEC subscale</td>
<td>.47**</td>
<td>.30*</td>
<td>.46**</td>
<td>.76**</td>
<td>.53**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. CON subscale</td>
<td>.29*</td>
<td>.09</td>
<td>.48**</td>
<td>.70**</td>
<td>.53**</td>
<td>.58**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. PER subscale</td>
<td>.21</td>
<td>.63**</td>
<td>- .05</td>
<td>.27*</td>
<td>.03</td>
<td>.24</td>
<td>.03</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VSM TASK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Time*</td>
<td>-.23</td>
<td>.03</td>
<td>-.12</td>
<td>-.17</td>
<td>-.05</td>
<td>-.21</td>
<td>-.33*</td>
<td>-.01</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Clicks*</td>
<td>-.12</td>
<td>.24</td>
<td>-.06</td>
<td>-.03</td>
<td>.01</td>
<td>-.06</td>
<td>-.13</td>
<td>.11</td>
<td>.86**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>11. Checks*</td>
<td>-.17</td>
<td>.03</td>
<td>-.01</td>
<td>-.09</td>
<td>-.04</td>
<td>-.14</td>
<td>-.22</td>
<td>.11</td>
<td>.81**</td>
<td>.65**</td>
<td>-</td>
</tr>
<tr>
<td>12. Errors*</td>
<td>.24</td>
<td>-.14</td>
<td>.01</td>
<td>.00</td>
<td>-.01</td>
<td>.09</td>
<td>-.06</td>
<td>-.18</td>
<td>-.68**</td>
<td>.66**</td>
<td>-.79**</td>
</tr>
</tbody>
</table>

*Note. N=46. *Values calculated using 46 participants. All measures are baseline measures taken at Time 1. OCI-R = Obsessive-Compulsive Inventory, Revised; OBQ-44 = Obsessive Beliefs Questionnaire, Revised; DASS- Depression = Depression Anxiety Stress Scale – Depression scale; MACCS = Memory and Cognitive Confidence Scale; GEN = General confidence in memory subscale of MACCS; DEC = Confidence in decision-making subscale of MACCS; CON = Confidence in concentration subscale of MACCS; PER = Cognitive Perfectionism subscale of MACCS. VSM = Visuo-spatial memory task.*
Table 2

<table>
<thead>
<tr>
<th>Step</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>adjusted $R^2$</th>
<th>$R^2_{change}$</th>
<th>$F_{change}$</th>
<th>$sr^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td>.17</td>
<td>.18</td>
<td>11.60**</td>
<td></td>
<td>.18</td>
</tr>
<tr>
<td></td>
<td>DASS Dep</td>
<td>.87</td>
<td>.26</td>
<td>.43**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td>.17</td>
<td>.33</td>
<td>13.49**</td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>DASS Dep</td>
<td>.79</td>
<td>.38</td>
<td>.38**</td>
<td>.37</td>
<td>4.40*</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>OBQ-44</td>
<td>.04</td>
<td>.42</td>
<td>.42**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td>.37</td>
<td>.05</td>
<td></td>
<td></td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>DASS Dep</td>
<td>.56</td>
<td>.27</td>
<td>.27*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OBQ-44</td>
<td>.04</td>
<td>.39</td>
<td>.34**</td>
<td>.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MACCS</td>
<td>.05</td>
<td>.27</td>
<td>.27*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N=54. DASS Dep = Depression subscale of DASS-21; OBQ-44= OBQ-44 Total score; MACCS = Baseline measure of MACCS Total score. *p<.05, **p<.01.

**Discussion**

The present study supports the association between cognitive confidence and checking behaviour. Specifically, trait cognitive confidence predicted obsessive-compulsive symptoms over-and-above depression and other obsessive-compulsive beliefs. Memory confidence in the experimental group was found to be successfully increased by means of the memory confidence manipulation. Despite this however, increased confidence in memory was not found to significantly influence checking behaviour or hesitations during completion of the visuospatial memory task.

**Cognitive Confidence and Obsessive-Compulsive Phenomena**

The questionnaire findings are consistent with literature purporting that trait cognitive confidence is associated with increased obsessive-compulsive symptoms (e.g., MacDonald et al., 1997; Nedeljkovic & Kyrios, 2007; van den Hout & Kindt, 2003). Thus, these results support the inclusion of cognitive confidence when discussing the manifestation of obsessive-compulsive symptoms. Some research suggests that reduced memory confidence is a product of an OCD diagnosis rather than symptoms (Tuna et al., 2005). The current findings however, demonstrate consistency with cognitive models of OCD which emphasise the role of decreased cognitive confidence in obsessive-compulsive behaviours (Rachman, 2002).

The experimental manipulation of memory confidence was successful. Specifically, as expected, individuals in the experimental group reported increases in their memory confidence due to the positive feedback received during the task. Interestingly however, participants assigned to the control group reported a significantly reduced level of memory confidence following the task. Having not received any feedback while completing the task, it is likely that those in the control group assumed themselves to be performing more poorly than they were in reality. Future research may examine whether this effect is more pronounced in those with OCD symptoms, given findings by Purcell, Maruff, Kyrios and Pantelis (1998) that OCD patients had poorer performance on a working memory task, which they suggested was due to individuals with OCD being sensitive to tasks that do not provide external validation of performance. The authors speculated that a weakened ability to accurately interpret one’s own performance in order to guide further behaviour may be associated with OCD. This suggests that ambiguous tasks such as used in the control condition may be differentially important for those with OCD.

Contrary to expectations, the memory manipulation did not change time, number of hesitations or number of movements in the VSM task. Interestingly, both groups demonstrated a dramatic decline in the time spent on each trial the second time that the VSM task was presented. This uniform decline across groups could be evidence of decreasing attention as the task continues. Although modelled on the validated visuospatial memory task developed by Mancini and colleagues (2004), the present findings imply that either boredom or practice effects were present. However, the possibility that memory confidence does not influence checking behaviour in its first instance cannot be ignored.

When interpreting the current results, some limitations should be considered. Firstly, the current version of the VSM task, while modelled on that by Mancini and colleagues (2004), has not been validated and initial correlations suggest there is little relationship between the task and other validated self-
Confidence in memory and checking

report measures of OCD. While providing a way to measure obsessive-compulsive symptoms in a more practical, and perhaps more ecologically meaningful manner than self-report measures, it is necessary that the task be further investigated. Additionally, it is possible that the VSM task was not sensitive enough to the experimentally increased memory confidence. Furthermore, it is necessary to consider the limited power of the study due to a small sample size. While the present study found a significant unique prediction of obsessive-compulsive symptoms by cognitive confidence, it was a weaker association than that found by previous research (Nedeljkovic & Kyrios, 2007) indicating that future research should aim to have a larger sample size, and to also include clinical groups.

Despite the limitations of the present study, the results have theoretical and practical implications. In particular, the results indicate that trait cognitive confidence uniquely contributes to the presence of obsessive-compulsive symptoms. Rachman’s (2002) cognitive theory of compulsive checking and Wells’ (2008) meta-cognitive theory of emotional disorders encompass cognitive confidence as a factor in the maintenance of OCD. Thus, reduced confidence in memory is thought to promote checking behaviours, thereby further decreasing memory confidence and resulting in a spiralling cycle contributing to obsessive-compulsive symptoms, especially checking compulsions. Given this, cognitive-behavioural therapy should aim to target memory confidence and other meta-memory processes in order to improve outcomes.

**Summary and Conclusions**

The present study replicates the only other known experimental manipulation of memory confidence. By demonstrating that state confidence in memory can be altered by a simple manipulation experiment, the present study further validates the experimental paradigm which may be useful for future research in the realm of OCD. The results also support the concept of reduced cognitive confidence as a trait characteristic which increases vulnerability to OCD, implying that low confidence may potentially lead to repeated checking. However given the lack of effects of the memory manipulation on OCD behaviours, further investigation is required to establish a causal link between these constructs.

**References**


to OCD symptoms. *Journal of Anxiety Disorders, 23*, 463-468.


