



## Exploring metacognitive components of confidence and control in individuals with obsessive-compulsive tendencies

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### ABSTRACT

**Background and objectives:** Obsessive-compulsive (OC) patients typically display reduced metacognitive confidence, but findings regarding the scope of this phenomenon and factors that mediate it have been inconsistent. This study aimed to further the understanding of reduced metacognitive confidence in obsessive-compulsive disorder (OCD) by exploring the relationship between metacognitive processes and OC tendencies.

**Methods:** High and low OC participants answered a general-knowledge questionnaire, rated their confidence in each answer, and decided whether or not to report each answer.

**Results:** High and low OC participants did not differ either in their performance (general knowledge) or in their subjective estimations or confidence regarding their performance. The two groups also did not differ in the effectiveness of their metacognitive monitoring or in the relationship between monitoring and report-control decisions (control sensitivity). However, the two groups did differ in response criterion, with high OC participants less willing to report answers held with low-to-medium levels of subjective confidence.

**Limitations:** The study was conducted with non-clinical participants, which limits generalization to OCD.

**Conclusions:** These results suggest that conservative response criterion among OC individuals might be the critical factor underlying feelings of doubt and uncertainty endemic in OCD.

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### 1. Introduction

One of the most common compulsions in obsessive-compulsive disorder (OCD) is repeated checking. It characterizes over 50% of OCD patients (Henderson & Pollard, 1988), and about 15% of the normal population show sub-clinical checking compulsions (Stein, Forde, Anderson, & Walker, 1997). Checking compulsions are characterized by repeatedly making sure whether a certain act, such as locking the door, has been performed properly. OCD patients are tormented by intrusive and worrisome thoughts about the possibility that they forgot to do something or might have done it wrong. They worry that a mistake might cause harm to themselves or to others and thus feel obligated to check whether the task at hand was indeed completed in a satisfactory manner (Müller & Roberts, 2005). For example, they might worry whether they forgot to turn off the oven before leaving home and to think that a fire might start because of that. As a result they might feel

compelled to return home and make sure that the oven is indeed turned off (Cuttler & Graf, 2009).

In an attempt to explain checking compulsions, some researchers suggested that OCD patients suffer from a memory deficit. It was assumed that this memory deficit prevents OCD patients from feeling sure that they have just performed a certain act in a satisfactory, right or safe manner, leading to repeated checking (Sher, Frost, & Otto, 1983). Numerous studies examining this hypothesis have been conducted, yielding contradicting results (Müller & Roberts, 2005). While some studies found the performance of checkers in memory tasks to be impaired in comparison to non-checkers (e.g., Deckersbach, Otto, Savage, Baer, & Jenike, 2000; Sher, Mann, & Frost, 1984; Zitterl et al., 2001) others did not (e.g., Christensen, Kim, Dyksen, & Hoover, 1992; Dirson, Bouvard, Cottraux, & Martin, 1992; Moritz, Jacobsen, Willenborg, Jelinek, & Fricke, 2007; Radomsky & Rachman, 1999).

Motivated by these contradicting results, Woods, Vevea, Chambless, and Bayen (2002) conducted a meta-analysis of studies aimed at examining the memory deficit hypothesis in OCD. The analysis did reveal certain memory tasks that checkers performed less favorably compared to non-checkers, but the effect

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sizes found in these studies were only medium to small. The researchers concluded that this modest memory impairment in itself was not significant enough to account for OC checking. They suggested that a third factor might influence both memory functioning and checking behavior. For example, it might be that the less favorable performance in memory tasks was only a secondary effect of other OCD symptoms, such as distraction due to obsessional thoughts.

In contrast to the inconsistent findings regarding memory deficits in OCD, numerous studies have shown that OCD patients or compulsive checkers tend to be less confident regarding their memory than non-checkers (e.g., Hermans et al., 2008; Hermans, Martens, De Cort, Pieters, & Eelen, 2003; Karadag, Oguzhanoglu, Ozdel, Atesci, & Amuk, 2005; Sher et al., 1983; Tuna, Tekcan, & Topçuoğlu, 2005; Zitterl et al., 2001). This tendency has been found to exist also in the absence of any real memory deficit among checkers (e.g., Brown, Kosslyn, Breiter, Baer, & Jenike, 1994; Cogle, Salkovskis, & Wahl, 2007; Dar, 2004; Dar, Rish, Hermesh, Fux, & Taub, 2000; MacDonald, Antony, MacLeod, & Richter, 1997; McNally & Kohlbeck, 1993). Notably, this finding is not unconditionally replicated. Moritz et al. have published several studies in which OCD did not display differences in memory confidence relative to controls (Moritz, Jacobsen, Willenborg, Jelinek, & Fricke, 2006; Moritz, Kloss, von Eckstaedt, & Jelinek, 2009; Moritz, Rietschel, Jelinek, & Bäuml, 2011; Moritz, Ruhe, Jelinek, & Naber, 2009) except under conditions that trigger inflated responsibility (Moritz et al., 2007).

The tendency of OCD patients to doubt their judgments is not restricted to memory. Hermans et al. (2008) found that OCD patients tend to mistrust not only their memory but also their perception and attention, and others have found this to be the case in regard to reality monitoring (Cogle, Salkovskis, & Thorpe, 2008; Hermans et al., 2003; McNally & Kohlbeck, 1993; Sher et al., 1983). Dar et al. (2000) demonstrated that OCD patients also doubt their general knowledge in comparison to normal individuals. In their study, participants were asked to answer general knowledge questions and to provide a confidence rating as to the correctness of their answers. Participants with OCD with primary checking compulsions were compared to panic disorder and matched control participants. Although OC checkers' actual performance on the test did not differ from that of the control participants, they were significantly less confident in their answers as evident in both their mean confidence ratings and their estimation of the number of answers they had answered correctly. In addition, confidence ratings were negatively correlated with severity of obsessive symptoms in the OCD sample.

The findings relating distrust of memory, perception, attention and decision ability to OCD are in line with clinical descriptions of this disorder, which emphasize pathological doubt, lack of conviction, indecisiveness, and uncertainty as central characteristics of OC experience (e.g., Berríos, 1989; Reed, 1985; Shapiro, 1965). Taken together, they suggest that it might be beneficial to understand OC phenomena in terms of metacognitive difficulties instead of cognitive ones. *Metacognition* is often described as “knowing about knowing,” referring to people's subjective knowledge of their own cognitive processes and how this knowledge is utilized to guide performance (Koren, Seidman, Goldsmith, & Harvey, 2006; Nelson & Narens, 1990, 1994). Thus, the term metacognition implies a differentiation between the individual's actual cognitive abilities, performance and knowledge from what he or she knows, thinks, and does about them. Metacognitive abilities can be independent of cognitive ones and may be just as important. An individual who suffers from a cognitive deficit and recognizes that her cognitive abilities are not reliable would function better than an individual with the same cognitive deficit who is unaware of her cognitive

deficits (Koren et al., 2006). A good example is the individual who knows that he tends to forget birthdays, and hence writes the dates down and checks them every month in advance in order to remember them properly. OCD might represent the opposite case, that is, of people whose cognitive abilities are largely intact but whose functioning is compromised by maladaptive metacognitive processes. For example, an OCD patient who has just turned off the stove might have a correct memory representation of that action, but doubt concerning the reliability of that representation might lead to repetitive and maladaptive checking. In this case, low subjective confidence in one's memory representations has the same behavioral consequence as a “real” memory deficit—both result in the same maladaptive checking behavior (Hermans et al., 2008).

Metacognitive processes include two important aspects: Monitoring and control (Nelson, 1996; Nelson & Narens, 1990): *Monitoring* refers to the individual's subjective assessment of her own cognitive functioning. *Control* refers to the manner in which that subjective assessment is used to guide ongoing or subsequent behavior. To use our previous example, doubting one's memory of turning off the stove relates to the metacognitive monitoring process. The checking behavior that might follow the monitoring process would represent a metacognitive control process. Metacognitive control is generally based on the person's monitoring output, but there may be situational influences or individual differences in control processes and strategies. For example, doubting the reliability of his memory, the person in our earlier example chose to check the stove. Given the same subjective monitoring assessment (and actual memory), a different person might choose to move on without checking the stove and to live with the doubt about whether or not he had turned it off. There are good reasons to believe that metacognitive monitoring and control processes play a substantial role in daily functioning (Koren et al., 2006; Koriat & Goldsmith, 1996a; Perfect & Schwartz, 2002). Yet, many theories and experimental paradigms have not considered that role sufficiently (Nelson & Narens, 1994).

The current study used the paradigm proposed by Koriat and Goldsmith (1996b), which combines the logic of signal-detection theory (Green & Swets, 1966) with concepts and measures from metacognitive research. A key aspect of this paradigm is the distinction between forced and free responding. Under conditions of forced responding, participants must provide an answer to each and every question. The standard measures of performance in such cases (e.g., percent correct) reflect the efficiency of memory encoding and retrieval processes under the specified conditions. Under free responding, participants are given the option to choose whether to report or withhold each retrieved answer. Under these conditions, the person uses a monitoring process to evaluate the subjective correctness of his or her best-candidate answer, and a control process to decide whether or not to overtly report that answer. The control process operates as a response criterion on the monitoring output: the answer is reported if subjective confidence is high enough (passing the criterion); otherwise the answer is withheld. Thus, by this model, the quantity and accuracy of information provided under free-report conditions depends not only on the efficiency of memory per se (i.e., memory encoding and retrieval), but also on the operation and effectiveness of the metacognitive monitoring and control processes that are used in the attempt to avoid making wrong responses.

The Koriat and Goldsmith framework was developed together with a special experimental paradigm and procedure that combines free and forced reporting with the elicitation of confidence judgments, which can be used to isolate and assess the postulated cognitive and metacognitive components (for further details, see Goldsmith & Koriat, 2008). In this paradigm, participants are presented with a series of questions, and for each question they are

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