



Diminished confidence in prospective memory causes doubts and urges to check



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ABSTRACT

Background and Objectives: Correlational research has demonstrated links between prospective memory and checking compulsions. These findings suggest that negative beliefs and diminished confidence in prospective memory may contribute to intrusive doubts that tasks were not completed and ultimately to checking behavior. The present study represents the first experimental test of the hypothesis that diminished confidence in prospective memory causes increased doubt and urges to check.

Methods: Participants completed several tests and questionnaires assessing prospective memory. Participants were randomly assigned to receive either false positive or false negative feedback about their prospective memory. They subsequently completed additional prospective memory tests and their doubts and urges to check that each of those tests was properly performed were assessed.

Results: Participants who received false negative feedback about their prospective memory reported significantly higher levels of doubt and urges to check compared to those who received false positive feedback.

Limitations: A non-clinical sample was used and participants with severe levels of depression and anxiety were excused before the feedback phase to avoid causing them further distress.

Conclusions: The results provide further support for memory confidence models of checking compulsions by indicating that diminished confidence in prospective memory can cause increased doubt and urges to check.

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The most common symptom of Obsessive-Compulsive Disorder (OCD) is checking compulsions (Henderson & Pollard, 1988; Stein, Forde, Anderson, & Walker, 1997). Individuals with these compulsions have intrusive doubts that they failed to perform a task or failed to perform it properly, and they subsequently feel compelled to check repeatedly that the task was performed properly (Rachman, 2002). Contemporary cognitive models focus on the role of dysfunctional beliefs (e.g., overestimation of threat and responsibility; OCCWG, 1997; Rachman, 2002; Salkovskis, 1985) in the etiology and maintenance of checking compulsions. While dysfunctional beliefs about memory have long been speculated to play a role in these compulsions (Freud, 1909/1955; Janet, 1903; Sher, Frost, & Otto, 1983), only one contemporary cognitive model

has incorporated beliefs about memory as a contributing factor to checking compulsions (Rachman, 2002).

Research on the relationship between memory beliefs/confidence and checking has focused almost exclusively on retrospective memory, which is the ability to recall previous experiences and events. This focus stems, in part, from the assumption that when individuals experience intrusive doubts that a task was not completed, they attempt to recall performing the task in question and diminished confidence in their recollection fuels the compulsion to check (Sher et al., 1983). While neuropsychological investigations utilizing various tests of retrospective memory (e.g., visual, verbal, action, source) have produced inconsistent results, research pertaining to beliefs about, and confidence in, memory has been more fruitful (for reviews see Cuttler & Graf, 2009a; Müller & Roberts, 2005; Woods, Vevea, Chambless, & Bayen, 2002).

Perhaps the most compelling demonstration of the influence of confidence in memory on the compulsion to check comes from a recent experiment conducted by Alcolado and Radomsky (2011). Participants in this experiment received false positive or negative

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feedback about their performance on a battery of retrospective memory tests. They then completed additional tasks, and rated their urges to check the proper completion of those tasks. Participants who were led to believe that their memory was poor reported greater urges to check, compared to those led to believe their memory was good. Additional experimental research shows that the act of checking paradoxically further diminishes confidence in memory (Coles, Radomsky, & Horng, 2006; Radomsky, Gilchrist, & Dussault, 2006; Van den Hout & Kindt, 2003, 2004), and that the use of behavioral experiments illustrating this phenomenon is a promising intervention in the treatment of these compulsions (Radomsky, Shafraan, Coughtrey, & Rachman, 2010).

A growing body of research suggests that other forms of memory, particularly prospective memory, may play an important role in the etiology and maintenance of checking compulsions. Prospective memory refers to the ability to remember to execute tasks at a later moment (Meacham & Dumitru, 1976). So while retrospective memory is required to remember whether or not a door was locked earlier this morning, prospective memory is required to remember to lock the door in the first place. One benefit of focusing on prospective memory is that problems in this domain may help to account for the intrusive doubts that typically instigate checking (Cuttler & Graf, 2009a). Specifically, it has been suggested that diminished confidence in prospective memory may lead to the intrusive doubts that tasks were not completed (e.g., the door was not locked), that ultimately fuel the compulsion to check (Cuttler & Graf, 2007; Cuttler & Taylor, 2012). In other words, if one has low confidence in his/her ability to remember to perform tasks, s/he may begin to have intrusive doubts concerning the proper execution of other tasks that ultimately instigate the compulsion to check.

In support of this idea, correlational research has demonstrated links between prospective memory failures and checking compulsions. Specifically, sub-clinical checking compulsions have been associated with increased reports of experiencing a variety of different types of prospective memory failures in everyday life and with diminished performance on objective prospective memory tests (Cuttler & Graf, 2007, 2008, 2009b). As predicted, the effects have been shown to be specific to checkers; that is, individuals with sub-clinical washing compulsions do not exhibit the same problems with prospective memory (Cuttler & Graf, 2009a; Cuttler & Taylor, 2012). Further, the diminished performance on objective prospective memory tests has been shown to be independent of the elevations in depression and anxiety commonly associated with checking compulsions (Cuttler & Graf, 2008, 2009b). Findings linking prospective memory and checking compulsions have also been extended to a clinical sample of OCD patients with checking compulsions, who showed diminished performance on objective prospective memory tests relative to healthy controls (Harris, Vaccaro, Jones, & Boots, 2010). Moreover, prospective memory failures are related to the intrusive doubts that tend to instigate the compulsion to check and further these intrusive doubts have been shown to mediate the links between prospective memory and checking compulsions (Cuttler & Taylor, 2012; Cuttler, Alcolado, & Taylor, *in press*).

The results of studies linking checking compulsions and intrusive doubts with prospective memory failures have been used to suggest that diminished confidence in prospective memory may lead to the intrusive doubts that ultimately instigate checking behaviors (e.g., Cuttler & Graf, 2007; Cuttler & Taylor, 2012). However, to date all research examining this link has been correlational, precluding the ability to make causal conclusions. Thus, these promising findings provide a rationale for conducting studies using experimental designs, which provide a stronger basis for inferring causal relationships between prospective memory, doubt and

checking. To our knowledge, the present is the first experimental test of the hypothesis that diminished confidence in prospective memory increases doubt and urges to check.

1. Method

Treatment of participants complied with APA ethical standards and all procedures were carried out with approval from the Concordia University Human Research Ethics Committee. One hundred and ninety-nine undergraduate students participated in exchange for credit in psychology courses. Participants ranged from 18 to 48 years of age with a mean of 22.39 years ($SD = 4.57$). The number of years of postsecondary education that participants had completed ranged from 0 to 8 with a mean of 1.68 years ($SD = 1.73$). Twenty-nine (19.60%) of the participants were male and 119 (80.40%) were female. Ninety-seven (65.50%) of the participants spoke English as a first language, however all participants spoke and read English fluently.

Participants were tested individually in a quiet room. Each was assigned a number of prospective memory tests as well as an online survey, administered using SurveyMonkey. As described below, the experiment consisted of three phases: pre-feedback, feedback, post-feedback.

1.1. Pre-feedback phase

1.1.1. Pre-feedback prospective memory tests

The pre-feedback phase began with the assignment of three prospective memory tests. For the 'when test' participants were instructed to ring a desk bell each time they heard or read the target word 'when'. This word was spoken by the experimenter twice and appeared in the survey 26 times. One point was recorded for each bell ring, thus scores could range from 0 to 28 with higher scores indicating better prospective memory test performance.

For the 'filler item test' participants were told that the last item on each page of the survey was a filler item and were instructed to respond to these items using the first response option available. Each item was constructed to appear as though it belonged to the questionnaire in which it was embedded and the first option for each of these items was prepared such that few, if any, people would use it to reflect their true experiences. The survey contained 14 filler items and one point was recorded for each successful response, thus scores could range from 0 to 14 with higher scores indicating better prospective memory test performance.

Finally, for the 'closing test' participants were told that immediately upon completing the online survey they should perform a series of simple tasks. Specifically they were instructed to ring the desk bell twice, minimize the browser window, push in their chair, turn the light off, exit the room and inform the experimenter of their memory score that would appear at the end of the survey. One point was recorded for each task they executed, thus scores could range from 0 to 6, with higher scores indicating better prospective memory test performance.

1.1.2. Survey

Once participants indicated they understood each of the prospective memory tests they completed an online survey. The survey included the following questionnaires. The Prospective and Retrospective Memory Questionnaire (PRMQ; Smith, Della Salla, Logie, & Maylor, 2000) was used to measure the frequency participants experience both prospective and retrospective memory failures in everyday life. The Prospective Memory Questionnaire (PMQ; Hannon, Adams, Harrington, Fries-Dias, & Gibson, 1995) was used to measure the frequency participants experience episodic prospective memory failures (i.e., failures on tasks that need to be

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