Obsessive Compulsive Disorder: the influence of increased general uncertainty on checking behaviour

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Abstract

Patients with OCD respond to clinical uncertainty with perseverative checking. Research showed that this checking behavior is a very counter productive activity, only enhancing uncertainty instead of decreasing it. These patients also display *general subclinical* uncertainty, which may lead vulnerable individuals to seek reassurance by perseverative checking in response to a mild uncertainty that is superimposed on this increased *general* uncertainty. The present study was developed to investigate whether mild uncertainty indeed causes checking behavior and which role intolerance of uncertainty plays in this. A subclinical population consisting of 68 participants, who either scored high on OCD tendencies (OC+, $n = 34$) or low on OCD tendencies (OC-, $n = 34$) on a self-report measurement of OC symptoms, was given a Visual Search Task. The task consisted of 50 search fields for which the participant indicated whether the target was 'present' or 'absent'. Decisions in target present trials induced little uncertainty, but decisions in target absent trials were more ambiguous because participants relied on not having overlooked the target. Results revealed no significant Group x Condition interaction in number of eye fixations and reaction time (RT). Sufficient evidence to make a conclusive statement lacks. Further research within a clinical population is strongly recommended.

Introduction

Ever wondered if you locked your door or if you maybe forgot to close the window? These are questions most of us ask ourselves every once in a while. A common reaction to these questions is checking the door again to make sure it is locked and continuing our daily routine. But not everyone is able to rely on oneself. For someone with Obsessive-Compulsive Disorder (OCD) for example, checking once if a door is locked is not sufficient. This has to be checked over and over again before they feel safe to leave the house. OCD is an anxiety disorder characterized by obsessions (i.e. repetitive intrusive thoughts, impulses, or images about frightening prospects, for instance causing a traffic accident) and/or compulsions (repeated behavior used to decrease/prevent negative thoughts or events; American Psychiatric Association, 2000).

One of the most frequently reported compulsions that individuals with OCD engage in is perseverative checking. Despite the fact that checking is also something healthy persons would do, people with OCD tend to react much more strongly to uncertain situations. Their obsessions have a longer duration, happen more frequently, are more intense and have bigger consequences for them and often others (Rachman & De Silva, 1978). Compulsions can be seen as neutralizing behavior: by giving in to their compulsions (for instance checking) they try to suppress their obsessions and prevent possible harm from happening (Rachman & De Silva, 1978). For a short period of time anxiety decreases, however, always returning shortly after. Often individuals know that their obsessions and compulsions are irrational, but they cannot find a way to stop it (Harkin & Kessler, 2009). Empirical research demonstrated that beliefs about responsibility play an important role in checking behavior (Alcado & Radomsky, 2011)

Another factor that plays a big role in checking is intolerance of uncertainty (Gentes & Ruscio, 2011). Intolerance of uncertainty is defined as a type of response to an uncertain situation. Freeston, Rhéaume, Letarte, Dugas, and Ladoceur (1994) described this type of response as "behavioral attempts to control the future and avoid uncertainty, inhibition of action based on uncertainty, emotional reactions such as frustration and stress, and cognitive interpretations that being uncertain reflects badly on a person". Because this pattern entails negative cognitive, emotive and behavioral responses it causes ruminations and obsessions. For example, due to an uncertain situation someone feels the need to check the stove to see if the gas is off, then, after checking, feels even more uncertain if it is truly off and has to check the stove again. This phenomenon is also known as pathological doubt (Tolin, Abramowitz, Brigidi & Foa, 2003). Compared to non-clinical individuals and individuals with a different type of anxiety disorder OCD patients and individuals high in checking behavior show strong intolerance of uncertainty (Steketee, Frost & Cohen, 1998). To avoid the uncertainty they cannot tolerate these individuals engage in checking behavior. Since this checking occurs for things that may possibly happen in the future, a preventive behavior, the checking has no natural terminus (Rachman, 2002). The checking must continue. Paradoxically, it has been shown that checking leads to even more uncertainty (Van den Hout & Kindt, 2003). Checkers report having low confidence in their memory, but without showing an actual memory deficit. For these reasons

checking is a very counterproductive activity, only increasing uncertainty instead of decreasing it (Tuna, Tekcan & Topcuoglu, 2003).

In addition to this clinical uncertainty there seems to be an increased *general* subclinical uncertainty for individuals with OCD. Not only do they lack a general confidence regarding their memory, recent studies also showed that OCD individuals exhibited significantly less confidence in attention and perception compared to nonclinical controls. With this lack of confidence extending to more areas of cognitive functioning this increased uncertainty can possibly be seen as a more *general* characteristic of a person suffering from OCD (Hermans, Engelen, Grouwels, Joos, Lemmens & Pieters, 2008).

Therefore, it was proposed that a more *general* increased uncertainty, an uncertainty not dependent on a specific situation, could be related to OCD. This increased *general* uncertainty may lead to a vulnerability to experience uncertainty in a range of situations, leading individuals to seek reassurance by repeated checking in response to a mild uncertainty that is superimposed on this increased *general* uncertainty. This checking behavior is then maintained through a vicious cycle between increased checking and decreased state confidence (Nedeljkovic & Kyrios, 2007).

In this study we investigate if this increased *general* uncertainty indeed leads to more checking behavior in response to mildly uncertain situations for people with subclinical OCD. We chose non-clinical individuals, since cognitive-behavioral theories argue for a continuum between OCD patients and individuals without the disorder (Nedeljkovic & Kyrios, 2007). Examined is if individuals with high OCD tendencies (OC+) show more checking behavior than individuals with low OCD tendencies (OC-) when being placed in an uncertain situation as opposed to a more certain situation. For this we used a Visual Search Task where participants had to look for a target which was there only in half of the trials. For every trial the participant had to report if the target was present or absent.

The target absent trials placed the participant in an uncertain situation, since one had to rely on not having overlooked the target. The target present trials placed the participant in a more certain situation, since the target is present and their response could be based on the perception of the target. We expected OC+ individuals, having increased *general* uncertainty, to react differently to both these situations then healthy controls. It was hypothesized that OC+ individuals engage in more checking behavior

than healthy controls as shown in higher reaction times and a higher number of eye fixations in the target present trials due to their increased *general* uncertainty, leading them to seek reassurance by repeated checking. Even more substantial differences are expected between the OC+ group and healthy controls in the target absent trials, placing the OC+ individuals in an uncertain situation. We expect that intolerance of uncertainty plays an important role in this. It is hypothesized that OC+ individuals engage in checking behavior because, next to having a increased *general* uncertainty, they have intolerance of uncertainty, making them feel the urge to engage in more checking behavior in an attempt to gain control over the uncertain situation.

Methods

Participants

Participants were recruited at Utrecht University and received course credit or a small remuneration for their participation. A total of 449 individuals filled out the Obsessive-Compulsive Inventory Revised (OCI-R) questionnaire (Foa, Huppert, Leiberg, Lagner, Kihic, Hajcek & Salkovski, 2002), which measures the presence of obsessive-compulsive symptoms. This questionnaire was handed out during tutorials, lectures and the lunch break of students at Utrecht University. Based on the scores of the OCI-R participants were assigned to the OC+ group (scores ≥ 20) or OC- group (scores ≤ 5). Based on the inclusion criteria 165 individuals were invited to take part in the study leaving a total of sixty-eight ($n = 68$) actually participating. Thirty-four participants were assigned to the OC+ group and thirty-four to the OC- group. The mean age of the OC+ group was 20.38 ($SD = 2.08$) years old and consisted of 5 males and 29 females. The mean age of the OC- group was 21.09 ($SD = 2.14$) and consisted of 4 males and 30 females.

Material

Obsessive-Compulsive Inventory Revised: The OCI-R measured the presence of obsessive-compulsive symptoms. For this study we used the Dutch translation by Cordova-Middelbrink, Dek and Engelbarts (2007). The questionnaire consists of 18 items and 6 subscales: washing, obsessing, hoarding, ordering, checking and

neutralizing. Each item is measured on a 5-point Likert scale (e.g. *"I find it difficult to control my thoughts"*; 0 = not at all, 4 = extremely). The OCI-R demonstrates excellent internal consistency (α = .88) and good to excellent test-retest reliability (r = .70) (Hajcak, Huppert, Simons & Foa, 2004).

Intolerance of Uncertainty Scale: The IUS is a 27-item measure of intolerance of uncertainty developed by Freeston, Rheaume, Letarte, Dugas and Ladouceur (1994). For this study we used the Dutch translation (De Bruin, Rassin, van der Heiden, & Muris, 2006). It measures different aspects of intolerance of uncertainty, such as the idea that uncertainty is unacceptable. Participants rate the degree to which the different items apply to them on a 5-point Likert scale (e.g. *"Uncertainty stops me from having a firm opinion"*; 1 = not at all characteristic of me, 5 = entirely characteristic of me). The internal consistency of the scale is excellent (α = .91) and its the test-retest reliability good (r = .78) (Dugas, Freeston & Ladouceur, 1997).

Visual Search Task: Using the computer program MATLAB (Cornelissen, Peters & Palmer, 2002) the participants performed a Visual Search Task. This task was specifically designed for this research. An eye tracker was connected to the computer to track the eye movements and fixations of the participant during every trial of the task. The Visual Search task consists of six practice trials and 50 individual search displays (trials), containing a grey screen on which 25 elements are presented in the form of a white square with an opening on one of the four sides (Fig. 1). In half of the search displays a closed white square (target) is also present. The participant is instructed to report whether the target is present or absent. The participants do not know how often the target will be present. The sequence of target present and target absent trials is randomized for every participant. When the target is present the participant is instructed to press the left arrow key. When the target is absent it is instructed to press the right key arrow. In between the different trials a fixation cross is presented. When the participant feels ready for the (next) search field he or she is instructed to press the space bar.
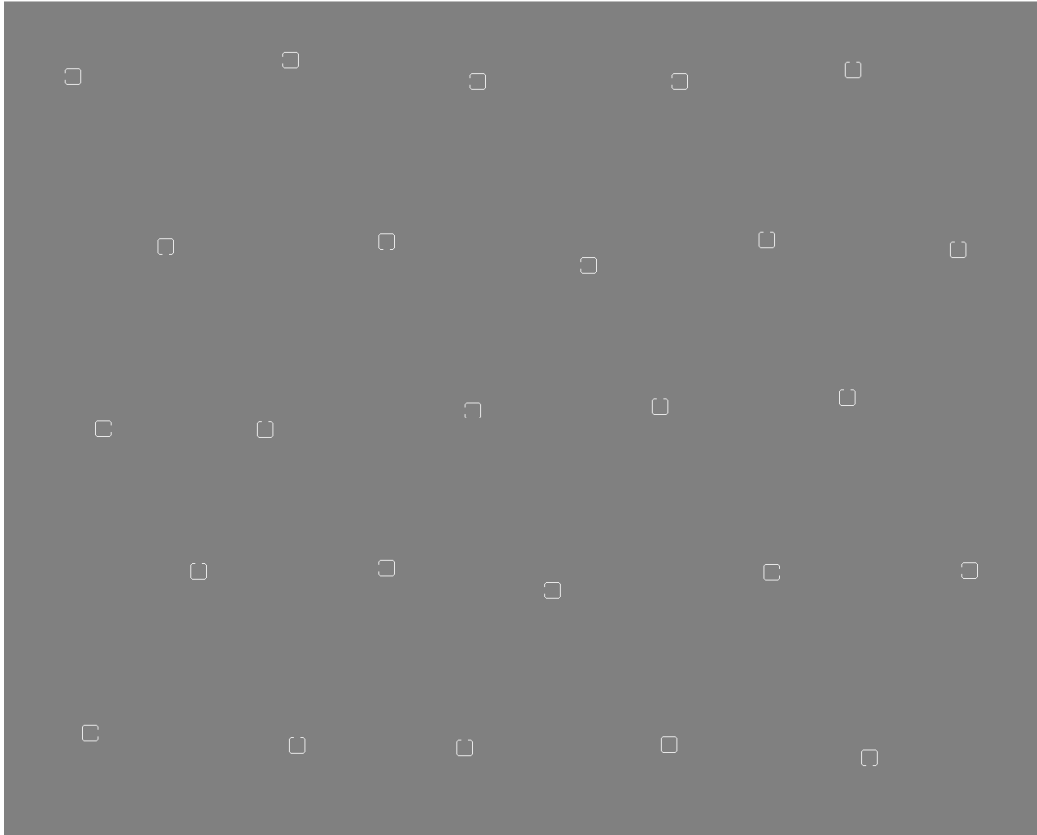
Fig. 1. Example target present trial; the target is the closed symbol at the bottom of the search field.

During this task participants are also asked to answer a few questions on a ten point Likert-scale (0 = totally unmotivated, 9 = very motivated). Questions asked were how sure the participant was that he or she correctly detected the target being present or absent and how motivated they were to perform this task.

Measures

Checking behavior was indicated by reaction times and the number of eye fixations. The reaction time is the time participants needed to scan the search field to detect if the target was present or not. An eye fixation is the maintaining of the visual gaze on a single location measured by the eye tracker.

Procedure

Participants received both verbal and written information about the study. They were individually tested in a dimly lit room at Utrecht University. It was explained what the stimuli and target looked like and how to react upon this target. Then they were asked to sign an informed consent. Participants were seated in front of the computer at a distance of approximately 58 cm in front of a 17-in. monitor. Head movements were restricted by the use of a chin and a forehead rest. The eye tracker was placed beneath the monitor, and after the eye tracker was calibrated the task started. Participants were presented with 25 target present and 25 target absent trials, randomized for every participant. When finished they were asked to fill out the IUS. After this participants received course credit or a small payment for participating in this study. It was also asked if they wanted a debriefing when the results of the study were available. Then the participant was thanked for taking part in the study.

Results

All the participants were included in the analysis, which consisted of 68 participants in total, 34 OC+ participants and 34 OC- participants. Results are presented in Figure 2 and 3. Preliminary analyses were performed to ensure no violation of the assumptions of normality and homogeneity of (co)variance. Repeated measures multivariate analyses of variance were used to compare the two groups on reaction time and number of eye fixations in both target absent and target present trials. There was a main effect of condition on search time; participants checked significantly longer in target absent trials ($M = 5.76$, $SD = 1.34$) than target present trials ($M = 3.71$, $SD = .83$), $F(1, 66) = 582.39$, $p < .001$, $\eta2 = .02$. No main effect of group was found; Overall, the OC+ group and OC- group did not differ significantly in reaction time, $F(1, 66) = .28$, $p = .60$. The crucial Group (OC+/ OC–) × Condition (absent/present) interaction was found not to be significant, $F(1, 66) = 1.23$, $p = .27$. A highly similar analysis-of-variance pattern occurred for the number of fixations. Here also a main effect of condition on number of eye fixations was found; participants made significantly more eye fixations in the target absent trials ($M =$

22.40, $SD = 5.18$) than in the target present trials ($M = 13.78$, $SD = 3.30$), $F(1, 66) = 668.31$, $p < .001$. No main effect of group was found; overall, the OC+ group and OC- group did not differ significantly in number of eye fixations, $F(1, 66) = .15$, $p = .70$. Finally, the crucial Group (OC+/ OC–) × Condition (absent/present) interaction was not significant, $F(1, 66) = 1.05$, $p = .31$.
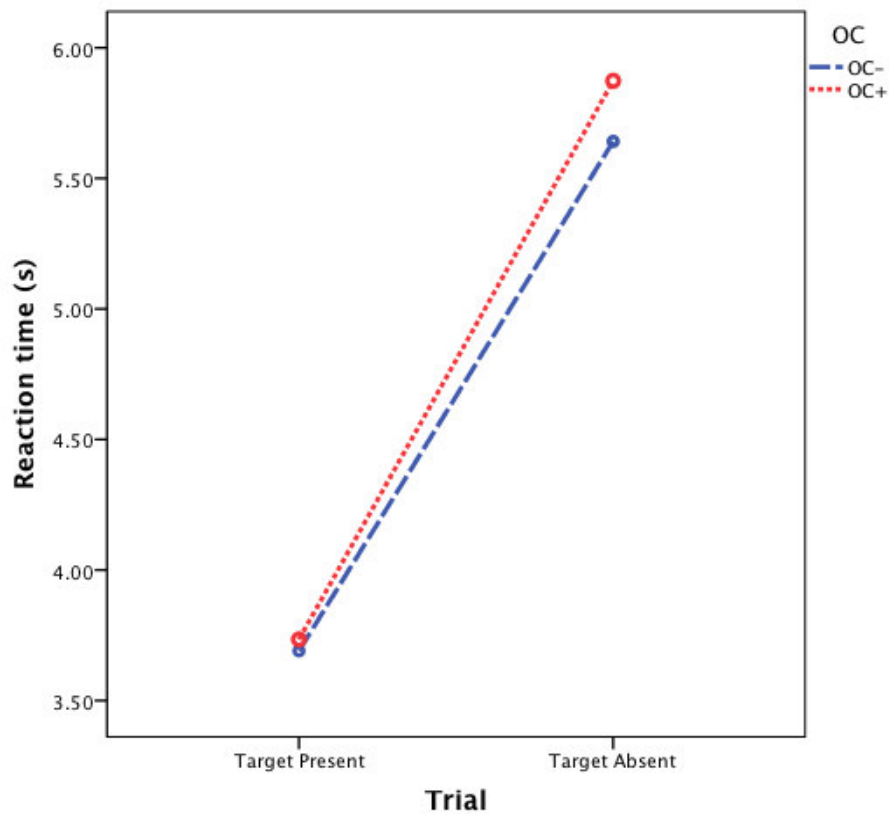

Fig. 2. Mean reaction time (s) per trial in target-absent and target-present trials for OC+ and OC– participants (i.e., high and low obsessive-compulsive tendencies, respectively).

Fig. 3. Number of eye fixations per trial in target-absent and target-present trials for OC+ and OC– participants (i.e., high and low obsessive-compulsive tendencies, respectively).
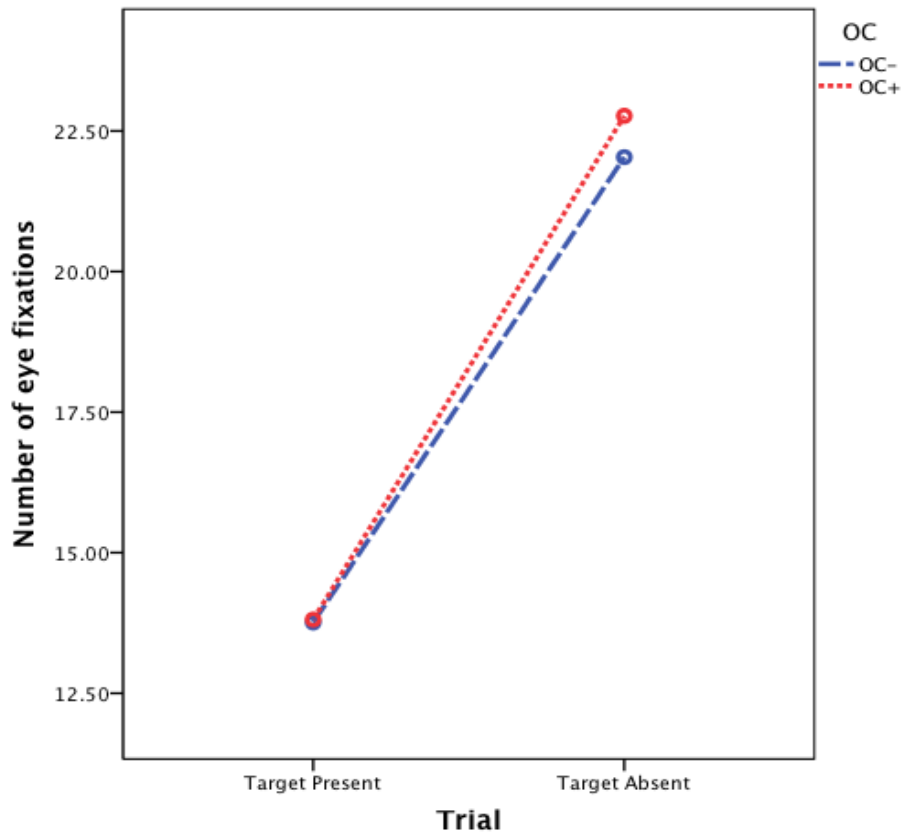
Exploratory data analysis was used to explore the relationship between the OCI-R and IUS using Pearson product-moment correlation coefficient. There was a strong, positive correlation between scores on the OCI-R and the IUS, $r = .63$ $n = 68$, $p < .001$, with high scores on the OCI-R associated with high scores on the IUS. Control questions that were asked during the Visual Search Task were checked for abnormalities. In response to the question about how certain the participant was that he or she correctly detected that the target was present there was a tendency towards a significant result between the OC+ group and the OC- group, $F(1, 66) = 3.77$, $p = .06$, with the OC+ group ($M = 8.21$, $SD = .73$) being more sure that they correctly detected the target was present compared to the OC- group ($M = 7.52$, $SD = 1.94$). In response to the question how sure they were they correctly detected that the target was absent there was no significant difference between the OC+ group ($M = 6.44$, $SD = 1.66$) and

OC- group (M = 5.97, SD = 1.90), $F(1, 66)$ = 1.18, p = .28. Finally, there was no difference in the number of errors made during the task between OC+ participants (M = 3.82, SD = 2.67) and OC- participants (M = 4.32, SD = 2.20), $F(1, 67)$ = .711, p = .40.

Discussion

A risk factor that plays an important role in OCD is intolerance of uncertainty (Gentes & Ruscio, 2011). According to Van den Hout and Kindt (2003) individuals with OCD try to avoid uncertainty by perseverative checking. In this study we investigated this phenomenon; can induced uncertainty lead to checking behavior and what role does intolerance of uncertainty play in this? We expected OC+ individuals to experience more uncertainty than OC – individuals, resulting in more checking behavior when performing a Visual Search Task. This was tested by measuring RT and number of eye fixations in target present and target absent trials.

Hypothesized was that OC+ individuals would engage in more checking behavior than OC- individuals in the target present trials. Even more substantial differences were expected between OC+ and OC- individuals in the target absent trials, placing the participant in an uncertain, more ambiguous situation. The findings, however, are not in line with the proposed hypothesis since we found no significant interaction between group and condition in the target-present as well as in the target-absent trials. OC+ individuals did not engage in more checking behavior in the target-present condition nor in the target absent condition when performing the Visual Search Task.

Exploratory analysis resulted in findings that can possibly explain the lack of significant results. An important question is if participants experienced uncertainty, most importantly in the target absent condition, since this is necessary to provoke checking behavior (Rachman, 2002; Jaafari et al., 2011). We found a trend towards significance that suggests the contrary. In response to the question how certain participants were that they correctly detected that the target was present, OC+ individuals were being more certain than OC- individuals. In response to the question how certain participants were that they correctly detected that the target was absent, there was no significant difference between the responses of the OC+ and the OC- individuals. This could indicate that there was no dissimilarity between the groups in

degree of uncertainty, and that therefore the OC+ and OC- individuals did not react significantly different in the target present as well as the target absent trials. It is also possible that OC+ individuals did not interpret the target absent trial as an uncertain situation so that it did not provoke checking behavior as a result of intolerance of uncertainty. This could indicate that the eye-tracking paradigm did not evoke uncertainty. In a study performed by Toffolo et al. (2013) the same paradigm was used leading individuals to seek reassurance by repeated checking in response to mild uncertainty. These significant results suggest that the paradigm was effective, but it was not verified with the participants what caused their checking behavior, and therefore it remains unclear if the paradigm is suitable to elicit uncertainty.

Interesting also is the finding that, in this study, OC+ individuals are more certain than OC- individuals when making decisions. This speaks against most previous research where OC+ individuals have shown to be less confident about their actions and seem to have a relative deficit in feeling confident about their knowledge (Dar, Rish, Hermesh, Taub & Fux 2000). Only mild evidence is found that it could be the other way around. In a study done by Shachar, Lazarov, Goldsmith, Moran & Dar (2013) OC+ and OC- individuals were not differing with regard to confidence levels, overconfidence or overestimation.

Possibly, testing a subclinical population in this study could have influenced the results. It is expected that individuals within a clinical population would have extremer scores and less variance within groups than those in the subclinical population, and therefore differences in test results between the OC+ and OC- group would more easily show. It seems reasonable that individuals with OCD would generally be more uncertain and would engage in more checking behavior than controls. This is in accordance with previous research done by Rachman (2002) where patients with OCD showed heightened uncertainty compared to control groups. Also, the present group of participants was relatively small ($n = 68$), which leads to a largely spread sampling distribution. Increasing the sample size will lead to less variance within groups and more statistical power. Here effects of manipulations can be more clearly seen. A larger sample size will lead to increased precision when estimating unknown parameters of our interest, and therefore it could lead to a result that is in line with previous research. It also consisted almost exclusively of psychology students. These individuals probably have more extensive knowledge of clinical research than the general population, so it could be that the 'uncertain' target

absent situation had less effect, because they saw through this manipulation. This coherence in education makes the group extremely homogeneous. It may have had an influence on the results and also on the generalization of the results to the general population.

The findings suggest possibilities for further research. We propose using a clinical population. Comparing OCD patients with controls could possibly lead to finding significant differences when comparing them on checking behavior, since patients react stronger to uncertainty than a subclinical population. With more insight in the underlying mechanisms that are important to the development and maintenance of OCD better treatments could be developed for individuals with this disorder. For now, based on this research, it remains unclear which influence intolerance of uncertainty has on checking behavior and further research is recommended.

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