Individuals With OCD Lack Unrealistic Optimism Bias in Threat Estimation

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Overestimating the occurrence of threatening events has been highlighted as a central cognitive factor in the maintenance of obsessive-compulsive disorder (OCD). The present study examined the different facets of this cognitive bias, its underlying mechanisms, and its specificity to OCD. For this purpose, threat estimation, probabilistic classification learning (PCL) and psychopathological measures were assessed in 23 participants with OCD, 30 participants with social phobia, and 31 healthy controls. Whereas healthy participants showed an optimistic expectation bias regarding positive and negative future events, OCD participants lacked such a bias. This lack of an optimistic expectation bias was not specific to OCD. Compared to healthy controls, OCD participants overestimated their *personal* risk for experiencing negative events, but did not differ from controls in their risk estimation regarding other people. Finally, OCD participants' biases in the prediction of checking-related events were associated with their impairments in learning probabilistic cue-outcome associations in a disorder-relevant context. In sum, the present results add to a growing body of research demonstrating that cognitive biases in OCD are context-dependent.

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PROMINENT PSYCHOLOGICAL MODELS of obsessive-compulsive disorder (OCD) highlight cognitive biases as a key factor in the development and maintenance of OCD (Salkovskis, 1985; Steketee & Frost, 2001). In this context, overestimating the occurrence of threatening events (overestimation of threat, OET) has emerged as an especially prominent cognitive bias (e.g., Adams, Riemann, Wetterneck, & Cisler, 2012; St. Clare, 2004). Rector and colleagues (Rector, Cassin, Richter, & Burroughs, 2009) found that even healthy relatives of OCD patients exhibited an elevated tendency to overestimate threat as compared to unrelated healthy controls. This indicates that OET might also be an important vulnerability factor for OCD.

Given these findings, surprisingly little research has been done to better understand the phenomenology of and mechanisms underlying OET in OCD. For example, it is not clear whether OCD patients generally overestimate the probability of negative events, whether they only overestimate the probability of OCD-relevant events, or whether they merely overestimate their *individual* risk for experiencing such events. Almost all prior studies in this field assessed OET using the overestimation of threat subscale of the Obsessive Beliefs Questionnaire (Steketee & Frost, 2001), which does not distinguish between the above-mentioned facets.

A positive exception has been one Web-based study aiming to delineate the above mentioned aspects of OET (Moritz & Jelinek, 2009). In this study, participants reporting OCD symptoms, participants reporting other anxiety symptoms, and healthy controls were asked to rate the likelihood with which positive, negative, or OCD-relevant events would happen to *themselves* in the future.

Participants subsequently rated the likelihood of these events happening to *another* person of the same sex and age and, finally, *directly* compared the likelihood that these events would happen to themselves as compared to another person. To control for differences in real-life experiences, participants also rated how often these events had happened to themselves or relatives in the past. Results demonstrated that participants reporting no OCD symptoms showed an unrealistic optimism bias (Gold, 2007; Weinstein, 1980). That is, they deemed negative events to happen *less* likely to themselves as compared to others, and positive events to happen *more* likely to themselves than others. In contrast, participants with OCD symptoms expected OCD-relevant events to happen more likely to themselves as compared to others and positive events to happen less likely to themselves than others (unrealistic pessimism). Interestingly, participants with OCD symptoms did not exhibit any bias when asked to *directly* compare event probabilities for themselves and others, which implies that the unrealistic pessimism bias may be mostly implicit. There were no group differences in past life experiences. However, given that the study by Moritz and Jelinek (2009) was implemented via the Internet, and symptoms were only assessed by self-report, the validity of the clinical diagnoses has been criticized. The first aim of the present study was thus to replicate the findings by Moritz and Jelinek (2009) in a carefully diagnosed sample of individuals with OCD, individuals with another anxiety disorder, namely social phobia (SP), and non disordered controls. Participants with SP were included as clinical control group since SP is an anxiety disorder with comparable gender and age distributions, and a comparable comorbidity pattern to OCD.

Another important question that is still elusive concerns the mechanisms underlying OCD participants' tendency to overestimate threat. Current neuropsychological models posit that dysfunctions in the orbitofrontal-striatal system are at the core of OCD (e.g., Melloni et al., 2012). The integrity of the orbitofrontal-striatal system, however, is necessary for feedback-based implicit learning processes, such as the acquisition of cue-outcome associations that are linked in a probabilistic manner (e.g., how likely it is to contract the flu when using public transportation; e.g., Seger & Cincotta, 2005). The authors (Exner, Zetsche, Lincoln, & Rief, 2014) have thus proposed that individuals with OCD may have problems in learning the association between certain (threatening) events and their antecedents in daily life, especially if antecedents and events are related in a probabilistic manner. They further suggested that this difficulty

might be a mechanism underlying OCD patients' tendency to overestimate negative event probabilities.

To this end, the present authors have recently assessed the ability to learn probabilistic cue outcome associations using a well-known probabilistic classification task (PCL; Knowlton, Squire, & Gluck, 1994). In this PCL task, participants gradually learn via feedback to predict two outcomes (e.g., sun or rain) based on the combination of one, two, or three out of four possible visual cues. The PCL task has been widely used to examine implicit learning deficits in patients with Parkinson's or Huntington's disease (e.g., Perretta, Pari, & Beninger, 2005), but has never been implemented in an OCD sample before. There is one study, however, showing that children with Tourette's syndrome exhibit impaired probabilistic classification learning (Kéri, Szlobodnyik, Benedek, Janka, & Gádoros, 2002). The present authors implemented two versions of the PCL task that only differed in the cover story. In the neutral task, participants had to predict sunshine or rain, and in the *OCD-specific* version, they had to predict the outbreak of a dangerous virus versus safety. In two recent publications based on the same sample as in the present study (Exner et al., 2014; Zetsche, Rief, Westermann, & Exner, 2015), the authors demonstrated that OCD participants as compared to controls were only impaired in the acquisition of cue-outcome contingencies if learning took place in a disorder-relevant context. Importantly, deficits in probabilistic classification learning in the OCD-relevant context were correlated with higher scores on the overestimation of threat subscale of the Obsessive Beliefs Questionnaire within the OCD group. This provides first evidence for the assumption that impaired learning of probabilistic cue-outcome associations may be a mechanism underlying biased threat estimation in OCD. In the present study, we wanted to extend these findings by examining whether the observed impairments in PCL may also be associated with a more elaborate measure of OET, such as the paradigm employed in the study by Moritz and Jelinek (2009).

To summarize, the first aim of the present study was to replicate the study by Moritz and Jelinek (2009) in a carefully diagnosed sample of participants with OCD, participants with social phobia, and healthy controls. In accordance with the results by Moritz and Jelinek, we expected that participants with OCD would show an inversion of the unrealistic optimism bias regarding positive and OCD-relevant events, that is, they would deem OCD-relevant events more likely to happen to themselves than to others and deem positive events happening more likely to others than to themselves. We further expected this unrealistic pessimism