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## Correspondence

### What underlies the effect of sleep disruption? The role of alertness in obsessive-compulsive disorder (OCD)

Several recent investigations report a correlation between shorter sleep duration and obsessive-compulsive disorder (OCD) symptoms. In a recent study, [Nota, Schubert, and Coles \(2016\)](#) investigated the potential underlying mechanism of this correlation and found that shorter sleep duration was associated with worse inhibitory performance on a go/no-go task (only in individuals with more severe OCD symptoms). As the authors describe, the relationship between deficient inhibition and OCD symptoms was established in several previous studies. [Nota et al. \(2016\)](#) concluded that a lack of proper sleep makes it harder to inhibit repetitive thoughts and behaviors. If so, the question then becomes why. Here, we propose that alertness, not sleeping per-se, may drive the impaired inhibition and OCD symptoms.

Alertness is a low-level system, dominated by norepinephrine-containing locus coeruleus neurons, which designate the internal feeling of wakefulness or arousal ([Aston-Jones & Cohen, 2005](#)). A high level of alertness is known to impact the cognitive system, for example by increasing response readiness and by inducing more globally-biased spatial processing ([Weinbach & Henik, 2011](#)). Using the stop-signal task, we recently found that alerting cues, presented prior to trials in which participants were required to inhibit a response, resulted in more efficient inhibitory control ([Weinbach, Kalanthroff, Avnit, Henik, 2015](#)).

One might think that alertness and sleep are two sides of the same coin. Indeed, poor sleep quality has been shown to have a detrimental effect on alertness. However, alertness is a broader construct, affected by numerous factors including physical exercise, exposure to light, alcohol and drugs, caffeine, mood, certain medications, and even circadian rhythm. Furthermore, alertness could also be low due to an internal mechanistic impairment – as was documented in certain psychiatric and neurological conditions, such as ADHD.

Thus, we hypothesize that disrupted alertness (specifically aberrant activation of the locus coeruleus), and not sleep disruption per se, may contribute to elevated OCD symptoms by impairing the ability to control repetitive thoughts and behaviors. This suggestion is indirectly supported by the finding that caffeine (which elevates alertness while obstructing sleep duration) can reduce OCD symptoms (e.g. [Koran, Aboujaoude, & Gamel, 2009](#)). This does not imply that alertness is impaired in all OCD patients, but rather that low levels of alertness may aggravate existing

symptoms and should then be associated with more severe OCD symptoms.

[Nota et al. \(2016\)](#) suggest that their results might have important clinical implications. We agree. If alertness is the underlying mechanism for how poor sleep may lead to impaired response inhibition, focusing on alertness may open yet new avenues for expanding these implications and for finding novel treatment targets.

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