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When does it hurt to try? Effort as a mediator of the links between anxiety symptoms and the frequency and duration of unwanted thought recurrence

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ABSTRACT

Evidence is mixed regarding the circumstances in which anxiety predicts more versus less unwanted thought recurrence. This study examined subjective, self-reported suppression effort as a mediator of the relationship between anxiety symptoms and both the *frequency* and *duration* of unwanted thought recurrence during a thought suppression paradigm. Additionally, a moderated mediation model examined whether initial instructions to suppress versus monitor thoughts, and state and trait differences in cognitive resources, moderated the mediating effects of effort. Amazon Mechanical Turk volunteers ($N = 939$) were instructed to either suppress or monitor an emotionally aversive thought for a one-minute period, followed by a second period during which all participants monitored. Trait cognitive resources were measured at baseline via a working memory task, and state cognitive resources were manipulated between-subjects via a depleting Stroop task. Results indicated that self-reported effort mediated the relationship between anxiety symptoms and both the frequency and duration of thought recurrence, but in opposite directions—such that anxious individuals' greater effort predicted *higher* frequency (i.e., more initial activation) but *lower* duration (i.e., faster override) of the target thought. No moderation effects were found. Implications for the role of self-reported suppression effort as a "double-edged sword" in the context of anxiety are discussed.

1. Introduction

Perceived difficulty controlling the occurrence of negative unwanted thoughts (such as thoughts of harm to oneself or loved ones) has been identified as a causal and/or maintaining factor for many emotional disorders, including obsessive compulsive disorder (OCD), generalized anxiety disorder, posttraumatic stress disorder, and depression (see Purdon, 1999). One of the most widely used laboratory procedures for evaluating these difficulties is the "white-bear" thought suppression paradigm (originated by Wegner, Schneider, Carter, & White, 1987), in which participants are randomly assigned to either suppress (keep out of mind) or monitor the occurrence of a given thought, followed by a second period during which all participants are instructed to simply monitor the thought. Traditionally, participants are asked to indicate whenever the target thought recurs during either period (e.g., by pressing a button), thus providing an index of thought recurrence frequency. Wegner et al.'s (1987) classic study, which has since been widely replicated, showed that those instructed to suppress (versus monitor) during the first period experienced a "rebound" effect, in the form of more frequent thought recurrence, during the second period.

Despite its popularity as a measure of thought suppression difficulty in anxious samples, this paradigm has yielded very mixed findings, with high (versus low) anxious individuals sometimes reporting greater difficulty suppressing negative thoughts (e.g., Harvey & Bryant, 1998), sometimes reporting relatively *enhanced* thought suppression performance (e.g., Purdon & Clark, 2000), and sometimes showing no differences (see Magee, Harden, & Teachman, 2012, for a review). While it is possible that limitations of the task may partly account for the mixed findings (e.g., asking people to self-report the occurrence of a thought may itself increase the thought's occurrence), it is also likely that the traditional methods of conceptualizing and analyzing the task have partially contributed to these discrepant findings.

In particular, traditional versions of the "white-bear" paradigm have failed to distinguish between two potentially distinct thought suppression outcomes: 1) duration of thought recurrence (i.e., the average length of time a person spends engaging with the thought while it is activated), and 2) frequency of thought recurrence (i.e., how often the thought becomes consciously activated in the first place). These two outcomes closely parallel the two interrelated cognitive processes that have been theorized to underlie the classic "rebound" effect (Wegner et al., 1987): a consciously controlled "operating" process that actively attempts to suppress or disengage from the unwanted thought (e.g., by generating unrelated distractor thoughts), and an unconscious, automatic "monitoring" process that continuously scans for the to-be-

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suppressed thought, and alerts consciousness to its presence (and thus the need to reengage the "operating" process) whenever the thought is detected (Wegner, 1994). According to this framework, the "operating" process is relatively more effortful and taxing on cognitive resources, and thus gets gradually depleted with ongoing suppression efforts, making these efforts less successful over time. By contrast, the "monitoring" process is relatively more efficient, and remains on "high alert" for the to-be-suppressed target thought regardless of diminishing cognitive resources. Moreover, Wegner posits, it is precisely the conscious effort of suppressing a given thought that makes the "monitoring" process more sensitive to that thought (by signaling to it, in effect, "this is a very important target to search and destroy!"), thus increasing the frequency with which that thought is automatically re-activated.

Of note, anxiety symptoms could plausibly exacerbate either or both of these interrelated "rebound" mechanisms: the decreased inhibitory effectiveness of the "operating" process due to cognitive depletion, which can follow from being anxious (e.g., Eysenck, Derakshan, Santos, & Calvo, 2007), and/or the increased salience and accessibility of the unwanted thought by the "monitoring" process due to heightened threat vigilance, which is heightened in anxious samples (see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). With respect to the former, anxiety symptoms have often been linked to deficits in the inhibition of unwanted thoughts or stimuli (e.g., Berggren & Derakshan, 2013; Derakshan, Ansari, Hansard, Shoker, & Eysenck, 2009), likely reflecting a dearth of executive control resources due to high levels of worry and threat-related processing. With respect to the latter, there is considerable evidence that anxious individuals' heightened threat vigilance extends not only to external stimuli, but also to unwanted, internally generated thoughts (e.g.Purdon, 2008, Salkovskis, 1999). This hypervigilance, in turn, tends to prime the very thoughts one is attempting to avoid, such that they are more likely to become spontaneously activated (e.g. Tolin, Abramowitz, Przeworski, & Foa, 2002, Wenzlaff & Wegner, 2000).

Thus, it is particularly important to distinguish between the frequency with which participants become initially aware of the unwanted thought, on the one hand, and the length of time it takes for them to disengage from that thought, on the other hand. Assuming the latter is indeed partly a conscious, strategically controlled process, as Wegner (1994) posits, it should be possible for participants to report when they have successfully enacted it (e.g., by strategically shifting their attention to a distractor thought), even if some peripheral awareness of the target thought remains (as it initially must, for participants to be able to report that they are "no longer engaging" with that thought).

Yet only a few studies to date have separately examined both of these outcomes within a single thought suppression paradigm (e.g. Lambert, Hu, Magee, Beadel, & Teachman, 2014, Magee, Smyth, & Teachman, 2014). In this modified version of the classic task, participants are instructed to press a button whenever the negative thought occurs, and to release the button when they think about something else—thus allowing for separate indices of "frequency" and "duration" to be computed. Using this new format, Lambert et al. (2014) found that the frequency and duration of thought recurrence followed distinct patterns of change over the two thought periods that aligned with the purportedly automatic, uncontrolled nature of frequency and the more controlled, effortful nature of duration. Likewise, Magee et al. (2014) found that thought duration, but not frequency, was lower among participants who were given "suppress" (versus "monitor") instructions, consistent with the idea that duration reflects a relatively more controlled, intentional process. No prior studies to our knowledge, however, have directly examined the link between anxiety symptoms and both the frequency and duration of unwanted thought recurrence.

Thus, to better understand the link between anxiety and thought recurrence, the present study tested whether individual differences in anxiety symptoms would predict the reported frequency and/or duration of negative thought recurrence during this modified "white-bear" thought suppression paradigm. The study also examined a theoretically-derived mediator of the anxiety-thought recurrence link: namely the self-reported effort to suppress, or keep out of mind, the unwanted thought (see Magee et al., 2012).

1.1. Mediation by self-reported suppression effort

Self-reported suppression effort was examined as a mediator of the link between anxiety and thought recurrence given that high (versus low) anxious individuals are likely to exert greater effort to suppress negative thoughts (e.g., due to beliefs about the unacceptability of such thoughts; Purdon & Clark, 2000). Critically, theoretical and empirical evidence suggests greater efforts to suppress intrusive thoughts are initially successful but become less effective over time (Abramowitz, Tolin, & Street, 2001; Magee et al., 2012). This leads to some competing hypotheses about the link between anxiety and thought recurrence.

On the one hand, given evidence for both enhanced activation of, and delayed disengagement from, negative cues as risk and maintaining factors in anxiety (see Bar-Haim et al., 2007), it is plausible that greater anxiety symptoms should predict greater frequency (reflecting enhanced activation) and/or duration (reflecting delayed disengagement) of negative thought recurrence. On the other hand, if anxious individuals do indeed exert greater effort to suppress negative thoughts, this heightened effort may translate into *more* successful thought suppression—at least with respect to outcomes that can be effortfully controlled. This suggests that anxiety symptoms should predict *lesser* duration (but not frequency) of negative thought recurrence, given that continued engagement with a thought is presumably more susceptible to effortful override than is its initial activation (Lambert et al., 2014).

We did not have *a priori* predictions regarding the differential prediction of thought recurrence by anxiety across the two periods of the thought suppression paradigm, given the mixed findings to date (see Magee et al., 2012). However, given evidence that self-reported suppression effort may be initially successful but then fail over continued suppression attempts, we expected that the mediating effect of effort would be stronger for Period 1 (the initial one-minute suppression/monitoring period) than Period 2 (the second one-minute monitoring period). Further, to test the possibility that greater initial suppression effort "backfires" in the form of larger rebound effects later on (e.g., Wenzlaff & Wegner, 2000), we also examined whether suppression effort during Period 1 mediates the link between anxiety symptoms and Period 2 thought recurrence, even when controlling for Period 2 suppression effort.

1.2. Suppression instructions and cognitive resources as potential moderators

Additionally, to clarify the boundary conditions of effort mediating the anxiety—thought recurrence relationship, we also conducted a moderated mediation analysis. It is possible that any anxiety-related differences in the effort to suppress negative thoughts may be amplified by the explicit instruction to suppress (versus monitor) a negative thought during the paradigm, to the extent this instruction heightens suppression effort. Thus, we examined whether the "anxiety-to-effort" pathway of the mediation model was stronger among those assigned to "suppress" (versus "monitor") instructions in Period 1. Of note, it is also plausible that effort may mediate the link between "suppress" versus "monitor" instructions and thought suppression outcomes, and that the "instructions-to-effort" pathway may, in turn, be moderated by anxiety. However, we chose to model anxiety as the independent predictor given the theoretical focus of the study, extensive prior work examining anxiety symptoms as a predictor of thought suppression outcomes (see Magee et al., 2012) that we wanted to extend, and past research suggesting that anxious individuals may be naturally