Commentary

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Neural Signature of Reappraisal: Tendency Versus Capacity

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Over the past decades it has been widely established that cognitive reappraisal (CR) is one of the most efficient emotional regulation strategies to lower the experience of negative affect (1) and has been further shown to be deficient in affective disorders such as major depressive disorder. Most of our understanding of CR stems from instructing individuals to reappraise negative stimuli, i.e., negative pictures, contrasted with conditions of instructing individuals to simply look or immerse in the experience (absence of cognitive reappraisal). These studies have helped characterize the effect of emotion regulation on the subjective affective experience and their underlying neural responses when explicitly instructed to do so. However, in real life, emotion regulation mostly occurs without explicit instructions from others. Instead, it is driven and initiated intrinsically, guided by an individual's internal goals, emotional awareness, and situational demands. This highlights the need to investigate emotion regulation processes in more naturalistic and self-initiated contexts to better understand how they operate in real-world settings and how they are implicated in mental well-being (2).

In the current issue of *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, Herzog *et al.* (3) address this gap with a unique study design that tracks spontaneous usage of CR with functional magnetic resonance imaging scans. Eighty-two individuals with MDD first provided 8 personal negative memories of events that had occurred within the last 6 months, together with 2 to 4 words, each used as cues to elicit associated memories during the experiment in the scanner. The objective of the study was to link the spontaneous use of CR in the scanner to real-life negative affect and suicidal ideation (SI) under the presence or absence of stressors through ecological momentary assessment probed throughout the day. Each trial in the scanner started with an unstructured recall condition, where cue words associated with the memory were presented for 10 seconds. The instruction was to recall the event naturally as it happened (unstructured condition). After that, the cues faded, and participants entered either a distanced or immersed recall for another 10 seconds. The instruction was either to recall the event as if they were observing themselves from a third-person perspective (distanced recall) or to recall the event as if they were experiencing the event from a first-person perspective firsthand (immersed recall). After each recall period (immersed or distanced), there was a 15-second period rating vividness and emotional intensity of their memory, followed by a perceptual baseline task, to obtain a condition that was nonemotional and did not involve recall. To unobtrusively track CR capacity, Herzog *et al.* leveraged a neural signature output for CR obtained from a previous study that instructed individuals to either reappraise or simply look at negative pictures. Using multivoxel pattern analysis, the authors obtained a signature output for CR that was then used to track CR during the present experiment.

Interestingly, Herzog *et al.* (3) found that the degree of CR during the spontaneous recall condition correlated positively with real-life SI under the presence of stressors, whereas explicitly instructing participants to use CR (distanced recall) did not. The opposite association was the case for real-life negative affect, where higher signature output during distanced recall was related to lower negative affect, but signature output during spontaneous recall was unrelated. The authors discuss this double dissociation in the context of individuals' capacity to regulate emotions (when instructed to do so) versus their tendency to do so. That is, higher reactivity to a negative stimulus (word cues linked to negative memory) may signal a higher need for CR, which in turn could be indicative of the degree of stress reactivity in real life. Herzog *et al.* refer to literature (4) discussing SI as a way to "…attempt at coping with psychological pain or problem-solving difficult circumstances." Herzog *et al.* argue that SI may be a form of stress regulation attempt and that individuals do not necessarily experience this stress with stronger negative emotions. Thus, this could explain why the tendency for CR resulted in higher stress-related SI in the absence of elevated negative emotions. In summary, the findings of this study suggest that CR capacity in depressed individuals may reflect stress coping ability, whereas higher reactivity to negative stimuli may signal higher need for CR, which in turn could be an indication for stress-related coping attempts through SI.

This study has unique merit in that it aims at differentiating the tendency of emotion regulation from the capacity of emotion regulation within the same experiment. Simultaneously, it bridges simulated naturalistic experiences in the scanner with real-life emotional experiences of stress-related emotions and SI. This approach opens new avenues in assessing real-life relevance of emotion regulation. For instance, unobtrusive assessments of dynamics of emotion regulation may advance our understanding of how emotional reactivity and regulation unfold over seconds to minutes as individuals experience and regulate emotions. This will require new thinking about how neural signature outputs can be developed that track these temporal dynamics (5) and what neural signatures differentially capture capacity and tendency of emotion regulation. This study by Herzog *et al.*

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(3) has the significant potential to stimulate a new line of research to study real-life relevance of emotion regulation and mental well-being.

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Article Information

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