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Emotion Regulation Choice and Cognitive Control

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Background

With empirical data suggesting a positive relationship between emotion regulation and psychological well-being [1], our research aims to identify the cognitive abilities that support emotion regulation. One potential candidate is cognitive control [2], the higher-order processes and abilities which enable flexible and goal-oriented behavior in different contexts [3]. Both cognitive control and successful emotion regulation represent goal-oriented regulatory processes allowing the adaptation to changing environments [4]. Research suggests three cognitive control components: inhibition, updating, and shifting [5].

Whereas some empirical findings indicate a relationship between emotion regulation and all three domains of cognitive control [6-10] (e.g., for inhibition [6, 7], updating [8, 9] and shifting [8, 10]), other results do not corroborate these relationships [11-14]. As a result, findings on the association between cognitive control and emotion regulation abilities are heterogeneous and there are still relatively few studies that employ broadly-based assessments of cognitive control and emotion regulation with large samples.

In addition, research has mainly concentrated on the *implementation* of emotion regulation strategies, a process that might not require a high level of cognitive control [4]. The contribution of cognitive control to emotion regulation might be even more substantial for context-dependent emotion regulation choice [4, 15]. However, cognitive control and context-dependent emotion regulation choice [4] have so far not been investigated in conjunction.

Methods

To address this research gap, we conducted two studies investigating the relation of individual differences in cognitive control and the effective application of predetermined or self-selected emotion regulation strategies in response to emotionally negative pictures.

Cognitive control was investigated multidimensionally, including the three components – inhibition, working memory updating and shifting (see Fig. 1).

Emotion regulation was assessed multimodally:

- in the laboratory (see Fig. 2) using the emotion eliciting pictures of the International Affective Picture System (IAPS) [16],
- with questionnaires [17] to investigate habitual aspects and
- in everyday life using the EmoTrack app (ecological momentary assessment, EMA; see Fig. 3).

Additionally, we assessed the influence of contextual factors, e.g., controllability, in the laboratory session of study 2 and the EMA part of both studies.

In study 1, participants regulated their emotions by implementing predetermined emotion regulation strategies. In study 2, participants were asked to implement either predetermined or self-selected regulation strategies. The emotion regulation strategies acceptance, suppression, and reappraisal were used in both studies.

Outlook

A preliminary analysis of 173 participants for study 1 and 124 participants for study 2 indicates correlations between cognitive control and emotion regulation effectiveness that were small or close to zero if participants implemented a predetermined strategy (study 1 and 2), and small to medium if participants implemented a self-selected strategy (study 2). These initial findings do not support an important role for cognitive control during the implementation of predetermined emotion regulation strategies, corroborating some previous studies [11-14]. In addition, the observed results indicate that cognitive control could be partially involved in context-dependent emotion regulation choice [4].

Multidimensional assessment of cognitive control

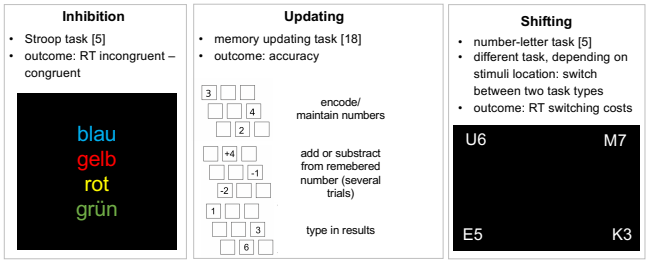

Fig. 1: Cognitive control was assessed using the Stroop task (only study 1), the memory updating task and the number-letter task

Multimodal assessment of emotion regulation

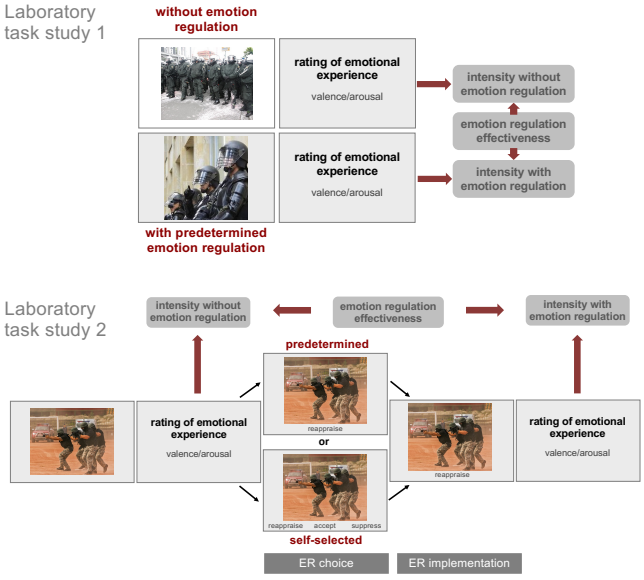

Fig. 2: Experimental paradigm for investigating the implementation of a predetermined emotion regulation strategy (study 1 and 2) and the implementation of a self-selected emotion regulation strategy (study 2). Participants were presented with emotion eliciting pictures [IAPS, 16]. Due to IAPS copyright restrictions we depict here similar pictures from the Open Affective Standardized Image Set (OASIS) [19].

Ecological momentary assessment studies 1 and 2

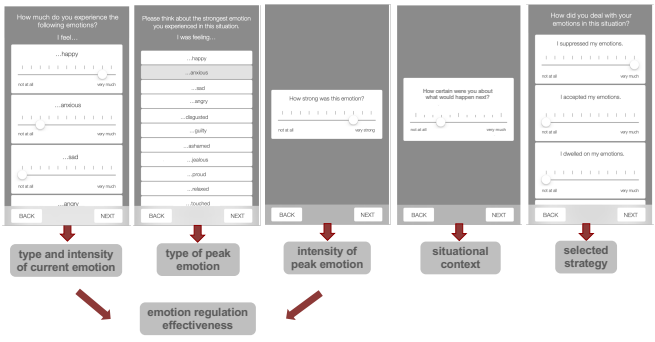

Fig. 3: Selected outcome variables of the EmoTrack app (EMA)

Literature

[1] Gross et al. (2019), https://doi.org/10.1002/wps.20618; [2] Schmeichel & Tang (2015), https://doi.org/10.1177/0963721414555178, [3] Jurado & Rosselli (2007), https://doi.org/10.1007/s11065-007-9040-z; [4] Pruessner et al. (2020), https://doi.org/10.1037/emo0000658, [5] Miyake et al. (2000), http://dx.doi.org/10.1006/cogp.1999.0734, [6] De Lissnyder et al. (2011), https://doi.org/10.1080/02699931.2010.514711, [7] Cohen & Mor (2018), https://doi.org/10.1177/2167702617731379, [8] Hendricks & Buchanan (2016), https://doi.org/10.1080/02699931.2015.1032893, [9] Schmeichel et al. (2008), https://doi.org/10.1037/a0013345, [10] Liang et al. (2017), https://doi.org/10.3389/fnbeh.2017.00027, [11] Aker et al. (2014), https://doi.org/10.1186/s12888-014-0334-4, [12] Malooly et al. (2013), http://dx.doi.org/10.1037/a0029980, [13] McRae et al. (2012), https://doi.org/10.1016/j.jrp.2011.10.003, [14] Whitmer & Gotlib (2012), https://doi.org/10.1037/a0027474, [15] Bonanno & Burton (2013), https://doi.org/10.1177/1745691613504116, [16] Lang et al. (2008). https://csea.phhp.ufl.edu/Media.html, [17] Izadpanah et al. (2017), https://doi.org/10.1177/1073191117720283, [18] Lewandowsky et al. (2010), https://doi.org/10.3758/BRM.42.2.571, [19] Kurdi et al. (2017), https://doi.org/10.3758/s13428-016-0715-3