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Emotion Suppression but Not Reappraisal Increases Desire to Binge in Women with Binge Eating Disorder

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Several studies have suggested that negative emotions may have a causal impact on the occurrence of binge eating [1–5] in binge eating disorder (BED). Furthermore, emotion regulation (ER) is known to influence the course of emotional experience [6, 7], and there is some evidence of ER deficits in BED patients [8, 9]. We therefore tested the causal role of ER as a mediator in the link between negative emotions and desire to binge (DTB).

The experimental group (EG) consisted of 27 women with a DSM-IV [10] diagnosis of BED, and the control group (HC) consisted of 25 healthy overweight women [for exclusion and inclusion criteria, see 11]. Groups did not differ significantly on age (means ± SD; EG: 42.7 ± 11.6 years, HC: 38.3 ± 13.8 years; $F_{1, 51} = 1.57$, n.s.), but the EG had a significantly higher BMI (EG: 36.7 ± 3.89, HC: 33.8 ± 6.53; $F_{1, 51} = 14.5$, $p < 0.000$) and Beck Depression Inventory (BDI) score (EG: 14.7 ± 7.80, HC: 3.0 ± 2.70; $F_{1,51} = 50.6$, $p < 0.000$). Women in the EG had 4.00 ± 2.61 binges per week over the past 6 months.

Participants watched 3 sadness-inducing film clips [12], each preceded by a different instruction: (1) watch the clip; (2) watch the clip and suppress; (3) watch the clip reappraise upcoming emotions [13]. DTB was computed by the sum of the items: 'At the moment, I would really like to eat something; I could not resist a savory meal; I am hungry; I would eat more than I usually do' (Cronbach's $\alpha \geq 0.84$). Sadness and DTB were rated on a Likert scale ranging from 1 (not at all) to 8 (extremely). Cardiac interbeat interval (ms), skin conductance level, finger pulse transit time, high-frequency heart rate variability (HF-HRV), and low-frequency HRV (LF-HRV) were assessed continuously.

After each instruction (60 s), participants rated levels of sadness and DTB. After watching the clip, they re-rated sadness and then watched a still image of the last scene of the clip for 2 min. Then they rated DTB again. After a 2-min interval in front of a black screen, participants received the next instruction followed by the next clip. Corresponding to the assessments of DTB, the physiological baseline was computed by averaging measurement taken over the time before the instructions (in minutes), and post-film physiology by the averaged first and second half of the still film images. Habitual ER strategies were assessed by the Emotion Regulation Questionnaire (ERQ) [14] and the Toronto Alexithymia Scale [TAS; 15].

For each dependent variable, a 2 (group) × 3 (instruction) × 2 (time) repeated-measures ANCOVA with BMI as a covariate was computed. When statistically justified, additional 2 (group) × 2 (time) ANCOVAs for each instruction were computed. All clips significantly increased sadness ratings (all $F > 62.2$ and $p < 0.01$). DTB increased from baseline to post-film in the EG after watch and suppress instructions, but not after the reappraise instruction. For HC, no changes occurred. Even when controlling for BDI, the 3-way interaction remained significant ($F_{2, 88} = 3.96$, $p = 0.023$). Regarding parasympathetic activation, HF-HRV decreased in the EG in response to the watch and the suppress instruction, while under these conditions there was an increase in the HC. Under the reappraise instruction, no changes in HF-HRV occurred, but LF-HRV decreased in HC and slightly increased in the EG. No substantial results were found on the sympathetic branch (cardiac interbeat interval, skin conductance level, finger pulse transit time; table 1). Compared to HC, the EG scored significantly lower on $ERQ_{reappraisal}$ ($F_{1, 48} = 5.63$, $p = 0.022$; EG: 3.89 ± 0.27, HC: 4.88 ± 0.27) and significantly higher on $ERQ_{suppression}$ ($F_{1, 48} = 13.1$, $p = 0.001$; EG: 3.57 ± 0.27, HC: 2.09 ± 0.27), TAS_{global}, ($F_{1, 48} = 18.3$, $p < 0.000$; EG: 49.3 ± 10.1, HC: 39.3 ± 5.95), $TAS_{identification}$ ($F_{1, 48} = 15.6$, $p < 0.000$; EG: 18.1 ± 1.17, HC: 11.1 ± 1.19) and $TAS_{describing}$ ($F_{1, 48} = 12.2$, $p = 0.001$; EG: 15.2 ± 0.66, HC: 11.7 ± 0.67). There were no significant differences on the $TAS_{thinking}$ ($F_{1, 48} = 0.992$, $p = 0.324$; EG: 16.7 ± 0.70, HC: 15.7 ± 0.72) and no significant correlations of self-report questionnaires with DTB.

The results of the ERQ revealed that women with BED dispositionally suppress more and reappraise their emotions less than HC. As experimental data shows, contrary to reappraisal, suppression leads to increased food craving and a decrease in parasympathetic activation in women with BED. When instructed to watch or suppress, the HC reacted with an increase in parasympathetic activation, which may function as an adaptive reaction to the sadness-evoking film [16]. Such adaptation does not seem to be necessary during execution of reappraisal, which already aims at a shift of attention. By contrast, reappraisal makes some cognitive demands upon women with BED, as shown in the sympathetic increase (LF-HRV) from baseline to post-film. This could be due to the fact that it may be difficult to reappraise emotions without recognizing the link with sadness itself, as indicated by BED women's higher alexithymia scores.

A possible criticism is the lack of randomization of the film clips and instructions. Randomization of clips would have produced loss of statistical power due to the production of very heterogeneous physiological data. However, empirical data showed that these film clips were able to induce sadness on a comparable level [17]. Instructions were presented in a fixed order because we reasoned that participants would not indulge in suppression once they had experienced the alleviating effect of reappraisal. A further limitation concerns the assessment of control emotions. While results remained unaffected when controlling for BDI

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Table 1. Subjective and physiological responses for women with BED (EG) and healthy controls (HC)

		EG		HC		Statistics			
		baseline	post-film	baseline	post-film	3-way ANCOVA	effects	F	p
WI	SAD	1.28 (0.00)	5.80 (0.49)	1.28 (0.00)	5.37 (0.50)	DTB	G × I × T	5.11	0.008*
	DTB	9.59 (0.00)	11.6 (0.877)	9.52 (0.00)	8.68 (0.86)	HF	G × I × T	3.24	0.044*
	IBI	847 (25.5)	842 (22.1)	799 (26.7)	789 (23.1)	LF	G × I × T	5.72	0.004*
	HF	6.43 (0.27)	6.31 (0.27)	6.02 (0.33)	6.27 (0.32)	IBI	I	4.70	0.024*
	LF	7.58 (0.29)	8.03 (0.22)	6.93 (0.31)	7.64 (0.23)	SCL, PTT		<1.60	>0.852
						2-way ANCOVA	effects	F	p
SI	SAD	1.30 (0.13)	6.64 (0.47)	1.45 (0.13)	5.45 (0.49)	WI DTB	G × T	4.73	0.035*
	DTB	10.3 (0.836)	12.6 (1.06)	9.37 (0.82)	8.30 (1.03)	WI HF	G × T	3.14	0.083
	IBI	843 (22.9)	826 (22.0)	795 (23.9)	793 (23.0)	WI LF	G × T	0.692	0.410
	HF	6.44 (0.28)	6.18 (0.27)	6.28 (0.33)	6.44 (0.32)	SI DTB	G × T	0.894	0.005*
	LF	8.41 (0.89)	8.04 (0.26)	7.68 (0.31)	7.79 (0.27)	SI HF	G × T	9.56	0.003*
RI	SAD	1.47 (0.16)	4.83 (0.49)	1.55 (0.17)	4.22 (0.50)	SI LF	G × T	2.65	0.110
	DTB	13.1 (1.09)	12.6 (1.29)	8.98 (1.07)	9.37 (1.26)	RI DTB	G × T	2.24	0.141
	IBI	830 (22.6)	836 (23.2)	796 (24.2)	794 (24.8)	RI HF	G × T	0.573	0.453
	HF	6.34 (0.28)	6.19 (0.26)	6.49 (0.33)	6.20 (0.31)	RI LF	G × T	5.81	0.020*
	LF	8.01 (0.26)	8.23 (0.20)	8.04 (0.28)	7.60 (0.22)				

Data are means with SE in parentheses. WI = Watch instruction; SI = suppress instruction; RI = reappraise instruction; SAD = ratings of sadness; IBI = cardiac interbeat interval; SCL = skin conductance level; PTT = pulse transit time to the finger; G = group; I = instruction; T = time. * $p < 0.05$.

scores, other emotions such as anger could have influenced the BED women's reactions to the clips [3]. Finally, the generalizability of the DTB to the actual occurrence of binge eating is debatable. Even though food cravings are a central part of eating pathology in bulimia nervosa, in BED craving does not always lead to binge eating [18]. On the other hand, urge to binge is higher before bingeing than on non-binge days [19].

To our knowledge, this is the first study to identify suppression as a critical mediator between negative emotions and DTB. Our results propose the therapeutic integration of a module that conceptualizes binge eating as a maladaptive emotion-regulation strategy, and thus focuses on the mediation of more adaptive affect-regulation skills. In fact, similarly to cognitive-behavioral therapy [20–23] and interpersonal psychotherapy [20, 24], dialectical behavior therapy adapted for BED has proven to be effective in the reduction of binge episodes [25–27].

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