



# Does habituation really happen? Investigation of psycho-biological responses to body exposure in bulimia nervosa



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## ABSTRACT

**Background:** Body exposure is a common and effective treatment for body image disturbance in bulimia nervosa (BN). However, little is known about treatment mechanisms. Based on models of emotional processing and neurovisceral integration, we expected to observe a) initial activation and b) habituation of cognitive-affective and autonomic responding within one and between two standardized body exposure sessions.

**Methods:** A group of 13 women with BN and 13 healthy controls (HC) were repeatedly exposed to their bodies. Prior to and after treatment with three individualized mirror exposure sessions participants received a session of standardized exposure to videographic recordings of their body. Subjective ratings of body-related emotions and thoughts were assessed repeatedly throughout the standardized exposure sessions and autonomic responses were recorded continuously.

**Results:** Subjective and sympathetic responses were activated initially in both groups. Cognitive-affective responses habituated within the standardized sessions in both groups, whereas between the standardized sessions habituation was only found in women with BN. Increasing sympathetic responses were found within the sessions in both groups.

**Conclusions:** The results support cognitive-affective habituation during body exposure in BN and to a lesser extent in HC. Autonomic responses however did not show a corresponding pattern and did not distinguish between groups. Implications for body exposure research and practice are discussed.

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## 1. Introduction

Body image disturbance is a diagnostic criterion of bulimia nervosa (BN) (American Psychiatric Association [APA], 2013). When confronted with their body, women with BN have been shown to react with distress (Laberg, Wilson, Eldredge, & Nordby, 1991; Ortega-Roldan, Rodriguez-Ruiz, Perakakis, Fernandez-Santaella, & Vila, 2014; Tuschen-Caffier, Vögele, Bracht, & Hilbert, 2003). Following the exposure principle, exposure-based interventions by mirror (e.g., Delinsky & Wilson, 2006; Hilbert & Tuschen-Caffier, 2004; Hildebrandt, Loeb, Troupe, & Delinsky, 2012; Morgan, Lazaro, Schelhase, & Saeidi, 2014; Trentowska, Bender, & Tuschen-Caffier, 2013; Trentowska, Svaldi, & Tuschen-Caffier, 2014;

Trottier, Carter, MacDonald, McFarlane, & Olmsted, 2014) or video (Fernandez & Vandereycken, 1995; Rushford & Ostermeyer, 1997) have been shown to be effective with regard to the improvement of body dissatisfaction, body checking and avoidance in women with various eating disorders.

While exposure-based techniques have been shown to be effective with regard to body image treatment, the underlying mechanisms are largely unclear. Knowledge about the underlying mechanisms could help to enhance the efficacy of body exposure, e.g. especially for patients who do not show a strong reduction in their symptoms.

The emotional processing model (EPM; Foa & Kozak, 1986) postulates that changes in cognitive-affective schemas require the integration of information that is incompatible with a dysfunctional schema. Exposure-based therapy is thought to facilitate this process by (a) initial schema activation indicated by an increase in cognitive-affective responses; (b) decrease in cognitive-affective responses within one session (within-habituation); and (c)

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decrease in cognitive-affective responses from one session to the next (between-habituation). It is notable that with regard to exposure-based body-image treatment these principles have rarely been investigated.

Furthermore, neurovisceral models of emotion (dys)regulation elucidate the interplay between neurobiological and mental reactions and their impact on psychopathology of mental diseases (Thayer & Brosschot, 2005; Thayer & Lane, 2000). Experiential emotional responses and activation in the sympathetic and parasympathetic branches of the autonomic nervous system (ANS) are closely associated with each other in order to support dynamic physiological adaptations during emotional reactivity and recovery in a changing environment (Hagemann, Waldstein, & Thayer, 2003). This flexibility might be compromised in eating disorders, as sympathetic activity measured by electrodermal activity (non-specific fluctuations of skin conductance) has been shown to be elevated during confrontation with a body-related film clip in patients with binge eating disorder (Svaldi, Caffier, Blechert, & Tuschen-Caffier, 2009).

In anxiety disorders few premises of habituation as described by the EPM have been detected and shown to predict symptom reduction (see Craske et al., 2008). Therefore, Craske et al. (2008) conclude that the EPM is weakly supported for anxiety disorders. However, studies in the domain of eating disorders are still required since preliminary findings on body exposure support some of the assumptions postulated by the EPM. When looking at one's own body, distress, negative feelings and thoughts increase in individuals with eating disorders (Cooper & Fairburn, 1992a; Hilbert & Tuschen-Caffier, 2005; Hilbert, Tuschen-Caffier, & Voegelé, 2002; Vocks, Legenbauer, Wachter, Wucherer, & Kosfelder, 2007; Vocks, Wachter, Wucherer, & Kosfelder, 2008) suggesting initial activation. Within one prolonged Mirror Exposure (ME) session (Trentowska et al., 2013; Vocks et al., 2007) and in a treatment with repeated sessions (Delinsky & Wilson, 2010; Hilbert et al., 2002; Trentowska et al., 2013), distress and negative cognitive-affective responses decreased suggesting within and between session habituation processes. Furthermore, there are studies suggesting that body exposure interventions improve symptoms of body image disturbance and eating disorders (Hilbert & Tuschen-Caffier, 2004; Legenbauer, Schütt-Stromel, Hiller, & Vocks, 2011; Trentowska et al., 2014).

Thus far, only one study (Vocks et al., 2007) has assessed both cognitive-affective and autonomic responses during one session of ME in a sample of women with heterogeneous eating disorders and healthy controls (HC). In this study, an initial activation of negative cognitive-affective responses were followed by a decrease in both groups within the session, as well as significantly higher negative thoughts and emotions in the eating disordered group throughout the session. Autonomic responses remained stable throughout the task and did not differ between groups, apart from an increase in sympathetic activation from baseline to initial ME.

Several key questions though remain unanswered. First, Vocks et al. (2007) recruited a heterogeneous eating-disordered sample, but as recently found, body-related attention differs between participants with Anorexia Nervosa und BN (Blechert, Ansorge, Beckmann, & Tuschen-Caffier, 2011). Second, standing upright for an extended time period - as during ME - increases tonic blood pressure and heart rate and might therefore limit the range of additional phasic increases during exposure. To complicate matters, orthostatic cardiac regulation might in itself be compromised in eating disorders (Murialdo et al., 2007). Therefore, it is advisable to test under conditions of minimal orthostatic effort and changes to body posture. As sitting down during ME would severely limit the procedure, a compromise would be a videotaped full-size body image exposure while seated. Third, Vocks et al. (2007)

administered ME with two possible visual distractors: a) physiological assessment instruments, attached to the participants' bodies and b) inclusion of the participants' head and face. A videotaped body image shown during exposure would avoid visual distraction by assessment instruments. Furthermore, as the most distressing body areas for eating disordered women include the waist, hips, stomach and upper legs (Hewig et al., 2008; Jansen, Nederkoorn, & Mulkens, 2005; Tuschen-Caffier et al., 2015), body exposure should focus on these body areas and limit distraction by less rejected body parts in order to enhance maximal cognitive-affective reactivity. Fourth, little is known regarding long-term effects of body exposure. The only study to have investigated this (Vocks et al., 2008) demonstrated decreased entrance levels of negative thoughts and emotions in a second standardized body exposure session after group CBT for body image disturbance.

The present study investigated within and between-habituation during standardized body exposure in cognitive-affective as well as autonomic domains in females with BN and HC. In a former study we showed that body dissatisfaction seems to be common among women in general and decreases in cognitive-affective distress during mirror exposure occur not only in subclinical eating disordered women but also in HC (Trentowska et al., 2013). Therefore, it is reasonable to investigate habituation processes in eating disorders such as BN and additionally to investigate whether processes in subclinical groups are comparable to clinical groups. Also, it is important to include HC to investigate whether specific changes pertain to BN only, or whether they occur in general.

We predicted based on previous research (a) an increase in cognitive-affective and autonomic responses, especially in sympathetically mediated skin conductance level (SCL; see Svaldi et al., 2009) and certain parameters of heart rate variability (HRV; see Vocks et al., 2007) at the beginning of body exposure (*initial reactivity*), (b) a decrease within the sessions of repeated exposure (*within session habituation*) and (c) decreased initial responding in a second session (*between-session habituation*). We further explored parameters of the parasympathetic branch and indicators of sympatho-vagal balance based on their known relationship with autonomic responding during stressful exposure (Thayer & Brosschot, 2005; Thayer & Lane, 2000). The correlations between the cognitive-affective and the physiological parameters are of particular interest to test the suggested relationship between subjective and autonomic responding. We also predicted that initial activation, within and between habituation processes would always be stronger in BN than in HC.

## 2. Methods

### 2.1. Participants

Participants were recruited by announcements in newspapers and in outpatient clinics. The study was announced as a treatment for body dissatisfaction and disturbance and a 35€ reward was offered to the participants. The inclusion criterion for the BN group ( $n = 13$ ) was the presence of BN according to DSM-IV criteria. Exclusion criteria were the presence of substance abuse or addiction, current or past psychosis, schizophrenia, bipolar disorder, severe symptoms of a post-traumatic stress disorder, current suicidal ideation, risky or life threatening behavior, regular use of medication that may inhibit response to exposure (e.g. benzodiazepines), pregnancy or lactation as well as current receipt of therapy for body image or past therapy using ME. Participants were asked not to undertake any body image interventions during participation in this study. Inclusion criteria for the HC group ( $n = 13$ ) were the absence of a current and lifetime eating disorder, other mental disorders, pregnancy or lactation. HC women were

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