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Attention to Ugly Body Parts Is Increased in Women with Binge Eating Disorder

J. Svaldi, D. Caffier, B. Tuschen-Caffier

Department of Clinical Psychology and Psychotherapy, University of Freiburg, Freiburg, Germany

Body dissatisfaction is markedly increased in individuals with binge eating disorder (BED) [1–8]. Cognitive theories [9] suggest that body dissatisfaction results from the activation of maladaptive appearance schemata, which guide mental processes such as selective attention to shape-/weight-related information [10]. By attending selectively to schema-consistent information, body dissatisfaction in turn is supposed to be maintained. In eating disorders, empirical evidence for attentional biases for appearance cues has been found by means of the Stroop task [11–17], the visual dot probe task [18–20] and the visual search paradigm [21]. Newer studies utilize electro-oculography to assess attentional processes during confrontation with salient stimuli, e.g. the body. Thereby, increased attention to ugly and decreased attention to beautiful body parts was reported for eating-symptomatic women, while a more balanced distribution of eye movements was found in control participants [22]. Similarly, women with a high drive for thinness were found to allocate their attention mainly to regions associated with the assessment of changes in weight [23]. Because body dissatisfaction is considerably higher in binge eaters (BE) compared to overweight nonbinge eaters (NBE) [24], we hypothesized that BE would be characterized by increased visual attention to the most ugly body parts compared to NBE.

The female participants were 26 BE [25] and 18 overweight NBE. The groups did not differ in age (M = 44.2, SD = 9.56), years of education (M = 11.6, SD = 2.06), Fs < 1.81, ps > 0.186, monthly income and vocational status, χ^2s < 10.5, ps > 0.062. The BDI scores [26] were higher in BE (M = 16.8, SD = 10.2) compared to NBE (M = 2.91, SD = 1.81), F = 32.4, p = 0.001; BE also scored higher on the shape concern subscale of the Eating Disorder Examination Questionnaire [27, 28] (M = 5.36, SD = 1.21) than NBE (M = 3.25, SD = 1.75), F(1, 43) = 22.5, p = 0.001. Even though study inclusion required control participants to have a BMI >25, the BMI was higher in BE (M = 38.7, SD = 8.22) than NBE (M = 30.0, SD = 3.80), F(1, 43) = 18.0, p = 0.001.

In a bogus instruction, the participants were told that they were going to watch photographic depictions (omitted face) of themselves and of a control person, while the size of their pupils was going to be measured. After calibration of the eye tracking device, they started watching the pictures. The pictures were arranged in 2 blocks; each block contained 4 different body perspectives (front/left/right/back) of the self picture and 4 of a BMI-matched control picture. Each perspective was presented twice on the computer for 8 s each, once on the left and once on the right side of the screen. Thereby, left or right screen appearance and order of self/control picture were randomized within each block. After the experimental procedure, the participants had to identify the ugliest and most beautiful body part of the self/control picture. All pictures were presented from an eye distance of 57 cm. To minimize measurement errors by head movements, a chin support was used.

Eye movements were measured by means of a 240-Hz EyeLink® Eyetracker equipped with View software (Sensomotoric Instruments, Berlin, Germany). The mechanism is based on determination of the center of the pupil and the corneal reflection by which eye movements are assessed. It has an angular resolution of <0.5°. Measures of selective attention were defined by the duration of time (milliseconds) spent looking at a certain body part, which was determined by fixations >300 ms and saccades using the algorithm of BeGaze (SMI) [29]. In addition, the frequency of fixations for specific body regions was computed. Both duration and frequency for the ugliest and most beautiful body part of the self picture and of the control picture were considered for the analyses.

A 2 (group) × 2 (body: self picture/control picture) × 2 (zone: ugly/beautiful) × 2 (block: 1/2) ANOVA was computed separately for gaze duration and gaze frequency. When statistically justified, post hoc tests were computed. Both groups looked at the ugliest self and control body part longer and more frequently compared to the most beautiful self and control body part. However, in both blocks BE allocated their attention significantly longer and more often towards the ugliest self body part compared to NBE, Fs > 4.22, ps < 0.038. With respect to the ugliest control body part, a more heterogeneous pattern emerged: in block 1, BE looked at the ugliest control body part significantly longer and in block 2 significantly more often compared to NBE, Fs > 4.31, ps < 0.045. Gazes for the ugliest control body part were similar in the other conditions as well: attention allocation towards the ugliest control body part was longer in block 2 and more frequent in block 1 in BE than NBE; however, the differences slightly missed significance, Fs < 3.76, ps > 0.060. Because gazes for the ugliest self body part correlated significantly with BMI in blocks 1 and 2, moderator analyses were conducted following Baron and Kenny [30], separately for each of these variables. Thereby, the interaction term of group × BMI significantly predicted gaze duration and frequency for the ugliest self body part in block 1, βs > 0.389,

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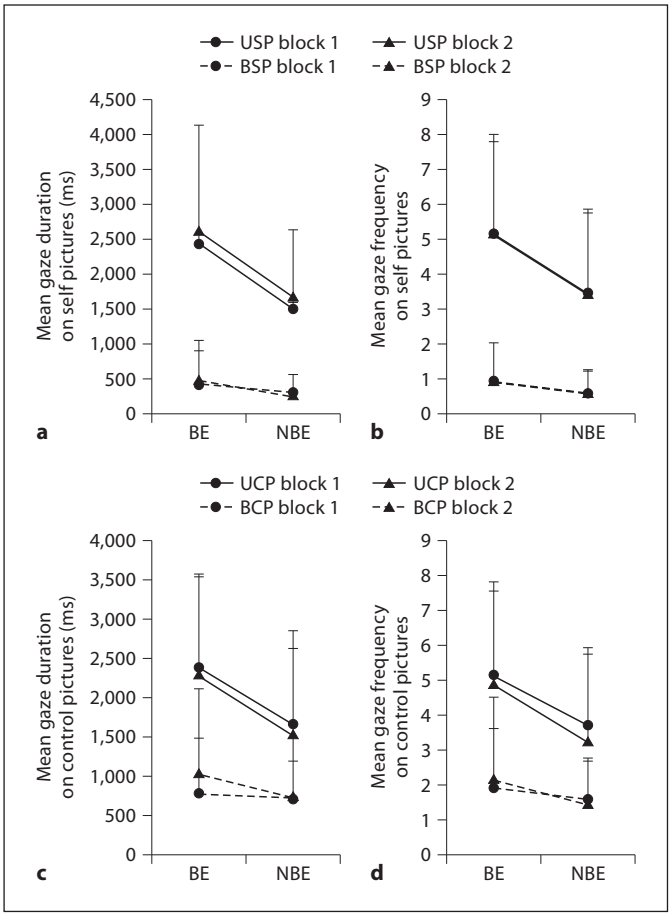

Fig. 1. Mean gaze duration (**a**) and mean gaze frequency (**b**) on the most ugly body part of self pictures (USP) and on the most beautiful body part of self pictures (BSP) as well as mean gaze duration (**c**) and mean gaze frequency (**d**) on the most ugly body part of the control pictures (UCP) and on the most beautiful body part of control pictures (BCP) in block 1 and block 2.

ps < 0.009, while group and BMI did not explain further variance, βs < 0.262, ps > 0.217. By contrast, for block 2 BMI significantly predicted gaze frequency and duration of the ugliest self body part, βs > 0.425, ps < 0.005, while group and group × BMI did not explain further variance. A subsequent ANCOVA for BMI revealed no significant main effect of BMI as a covariate, Fs > 1.86, ps > 0.181, but a significant interaction of zone × BMI, F = 5.04, p = 0.030, for duration and F = 5.87, p = 0.020, for frequency, while the interaction of group × zone failed significance, F = 1.027, p = 0.317 (duration), F = 0.287, p = 0.595 (frequency). The ANCOVA conducted for age yielded no significant main effects or interactions of age as a covariate. When controlling for age, the reported interactions of group × zone still remained significant, F > 4.15, p < 0.048.

We found evidence that both BE and NBE have a bias towards ugly body parts, which might explain overweight individuals' body dissatisfaction. More importantly, though, we found that BE look at ugly body parts even longer and more often than NBE. This effect is more consistent for self pictures compared to control pictures. As gaze duration and frequency for self pictures in block 1 were moderated by the interaction of group × BMI and by BMI in block 2, future studies should further test the role weight has in BE with regard to selective attention to beautiful and ugly body parts. On the background of the ANCOVA results, it is possible that our findings are more related to obesity than BED. To fully understand the influence of BMI and fully exclude its role as a possible confounder, replication with highly overweight and normal weight healthy controls would be necessary. It also remains unclear whether the bias found is a cause of BE's (or obese individuals') higher body dissatisfaction [24] or whether BE's (or obese individuals') higher body dissatisfaction leads to the increased bias towards ugly body parts. Further analyses concerning attention allocation to body parts should also consider the degree of psychopathology of BED in addition to the diagnostic criterion of BED and BMI as causal variables.

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Jennifer Svaldi
Department of Clinical Psychology and Psychotherapy
University of Freiburg, Engelbergerstrasse 41
DE–79106 Freiburg (Germany)
Tel. +49 761 203 9413, Fax +49 761 203 3022
E-Mail jennifer.svaldi@psychologie.uni-freiburg.de