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Take a look at the bright side: Effects of positive body exposure on selective visual attention in women with high body dissatisfaction

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Running head: EFFECT OF BODY EXPOSURE ON VISUAL ATTENTION

Abstract

Women with high body dissatisfaction look less at their ‘beautiful’ body parts than their ‘ugly’ body parts. This study tested the robustness of this selective viewing pattern and examined the influence of positive body exposure on body-dissatisfied women’s attention for ‘ugly’ and ‘beautiful’ body parts. In women with high body dissatisfaction ($N = 28$) and women with low body dissatisfaction ($N = 14$) eye-tracking was used to assess visual attention towards pictures of their own and other women’s bodies. Participants with high body dissatisfaction were randomly assigned to 5 weeks positive body exposure ($n = 15$) or a no-treatment condition ($n = 13$). Attention bias was assessed again after 5 weeks. Body-dissatisfied women looked longer at ‘ugly’ than ‘beautiful’ body parts of themselves and others, while participants with low body dissatisfaction attended equally long to own/others’ ‘beautiful’ and ‘ugly’ body parts. Although positive body exposure was very effective in improving participants’ body satisfaction, it did not systematically change participants’ viewing pattern. The tendency to preferentially allocate attention towards one’s ‘ugly’ body parts seems a robust phenomenon in women with body dissatisfaction. Yet, modifying this selective viewing pattern seems not a prerequisite for successfully improving body satisfaction via positive body exposure.

Keywords: body dissatisfaction, mirror exposure, visual attention, eye-tracking

Highlights

- Women with high body dissatisfaction looked relatively long at ‘ugly’ body parts.
- This selective viewing pattern remained unaffected by positive body exposure.
- Positive body exposure successfully enhanced body satisfaction.

Take a look at the bright side: Effects of positive body exposure on selective visual attention in women with high body dissatisfaction

Body dissatisfaction is considered a key factor underlying the development, maintenance, and relapse of eating disorders (e.g., Johnson & Wardle, 2005; Stice & Shaw, 2002). Consequently, addressing body dissatisfaction seems a crucial starting point for prevention, treatment, and long-term recovery of eating disorders. A critical question is how exactly body satisfaction can be effectively enhanced (e.g., Alleva, Sheeran, Webb, Martijn & Miles, 2015; Jarry & Berardi, 2004). To develop effective interventions, it seems important to unravel the underlying processes maintaining body dissatisfaction and to directly tackle these processes in treatment. One of the processes that has been proposed to be critically involved in the persistence of body dissatisfaction is the tendency to preferentially allocate attention to one's 'ugly' body parts (e.g., Jansen, Nederkoorn & Mulkens, 2005; Smeets, Jansen & Roefs, 2011). The major aim of the current study is to test whether this selective viewing pattern can be successfully modified by means of a positive mirror exposure intervention (Jansen et al., 2016; Smeets et al., 2011).

Although not all findings are consistent (von Wietersheim et al., 2012), overall, the available evidence converge to the conclusion that women high in body dissatisfaction tend to look less at their 'beautiful' body parts and more at their 'ugly' body parts compared to women with low body dissatisfaction (Janelle, Hausenblas, Ellis, Coombes & Duley, 2009; Jansen, et al., 2005; Roefs et al., 2008). Such a selective viewing pattern might maintain or even increase a negative evaluation of one's body. The potentially detrimental influence of selective visual attention on people's body satisfaction has been elegantly demonstrated in an experimental study in which healthy female students were trained for 20 minutes to look at either their unattractive or their attractive body parts on a computer screen. Participants became more dissatisfied with

their bodies only in the condition where they were trained to look at their unattractive body parts (Smeets et al., 2011). In line with the idea that selective viewing patterns towards one's body contribute to the persistence of body dissatisfaction, it was proposed that treatment for eating disorder patients might benefit from training patients to attend more to their 'beautiful' body parts (cf. Jansen et al., 2016; Smeets, et al., 2011).

A class of interventions that seems to most directly target the way in which individuals look at their body is mirror exposure. Several studies already showed positive effects of mirror exposure on body satisfaction (Delinsky & Wilson, 2006; Díaz-Ferrer, Rodríguez-Ruiz, Ortega-Roldán, Moreno-Domínguez & Fernández-Santaella, 2015; Hilbert, Tuschen-Caffier, & Vogele, 2002; Hildebrandt, Loeb, Troupe, & Delinsky, 2012; Jansen et al., 2008, 2016; Key et al., 2002; Luethcke, McDaniel & Bekker, 2011; Moreno-Domínguez et al., 2012; Trentowska, Svaldi & Tuschen-Caffier, 2014). However, it is still unknown how mirror exposure exactly works and whether a change in biased spontaneous viewing patterns is indeed an important mechanism of action driving the effects of mirror exposure. Therefore, the main goal of the present study is to investigate whether the efficacy of multiple session mirror exposure to improve body satisfaction in body-dissatisfied women is associated with its efficacy to modify their tendency to preferentially allocate attention to 'ugly' body parts in the context of a free-viewing task. In the present study we employ mirror exposure in the context of so-called positive body exposure (cf. Jansen et al., 2016). In positive body exposure, individuals are specifically trained to look at their attractive body parts.

In the present study, a group of normal weight women with high body dissatisfaction and a comparison group of normal weight women with low body dissatisfaction were exposed to pictures of their own body and bodies of other women. Eye movement registration was used to

assess participants' spontaneous viewing behavior in the context of a free-viewing tasks. In line with previous studies, we examined differential viewing patterns for 'beautiful' and 'ugly' body parts (cf. Jansen et al., 2005). Then, body-dissatisfied women were randomly assigned to 5 weeks of positive body exposure (cf. Jansen et al., 2016) in which they were trained to look at their most attractive body parts in the mirror, or to a no-training control condition. After 5 weeks, both groups were assessed again. First, we will test whether we can replicate prior findings that before the training women with high body dissatisfaction will show a spontaneous tendency to look less at their 'beautiful' body parts and more at their 'ugly' body parts than women with low body dissatisfaction (cf. Jansen et al., 2005). Second, we will critically extend previous research by testing whether positive body exposure reduces body-dissatisfied women's preference for looking at their 'ugly' body parts, and whether such a change in viewing behavior would be related to an increase in body satisfaction.

METHOD

Participants

As part of an online survey, 252 first year female psychology students of the University of Groningen filled in the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008) as well as their length and weight. The 33% highest scoring participants and the 20% lowest scoring participants on the subscales weight and shape concerns of the EDE-Q and with a healthy weight ($BMI > 18.5$ and < 25) were invited to participate in the current study. Participants scoring high on the Beck Depression Inventory (BDI-II; Beck, Steer & Brown, 1996) were excluded from the study, because we expected that they might not be able to complete the whole study. Of the 45 interested participants, two dropped-out after the baseline assessment and 1 participant could not attend the body exposure training. The final sample

consisted of 28 women with high body dissatisfaction and a comparison group of 14 women with low body dissatisfaction. Participants with high body dissatisfaction were stratified according to their scores on the EDE-Q and subsequently randomly assigned to either the active intervention group that received positive body exposure ($n = 13$), or the no-training control group ($n = 15$).

Materials

Eating disorder pathology. Eating disorder symptoms were measured with the most recent version of the EDE-Q (EDE-Q 6.0; Fairburn & Beglin, 2008). The EDE-Q is the questionnaire version of the Eating Disorder Examination interview and is used to assess eating disorder psychopathology during the last 28 days. The scale consists of four subscales (range 0–6): restraint, eating concern, weight concern, and shape concern. The total EDE-Q score provides a global measure of the severity of eating disorder pathology. Items are answered on a scale between 0 (no days) and 6 (every day). The EDE-Q has demonstrated good internal consistency, temporal stability, and reliability (Berg, Peterson, Frazier, & Crow, 2012; Luce & Crowther, 1999). Also in the current sample the EDE-Q showed high internal consistency (restraint: $\alpha = 0.88$; eating concern: $\alpha = 0.83$; weight concern: $\alpha = 0.92$; shape concern: $\alpha = 0.96$).

Selective viewing pattern. We used a free-viewing task that was designed according to Jansen and colleagues (2005) to measure participants' spontaneous viewing behavior when exposed to images of one's own body and of other people's bodies. At the start of the task, participants were told that they would first see a picture of someone else's body ('control' body), then a picture of themselves, and then a picture of a different control body. The pictures were presented for 30 s each, during which the eye movements were registered. In between the pictures there was an interval of 5 s to give participants the opportunity to blink their eyes.

Equipment. Visual attention was measured with an EyeLink 1000 Desktop Mount eye tracking system (SR Research, Mississauga, Ontario, Canada). The camera was set at a sampling rate of 500 Hz and an illuminator power of 75%. Participants were seated on an adjustable chair with their head resting on a headrest that was placed 56 cm in front of the computer screen. Stimuli were displayed on a LED-LCD (24 inch Iiyama ProLite) monitor with a resolution of 1920 x 1080 pixels and the free-viewing task was programmed in E-prime 2.0 software (Psychology Software Tools, Pittsburgh, PA). Before the task started, the camera was focused on the dominant eye and a standardized 5-point calibration was conducted. Both the percentage dwell time and the number of fixations (> 100 ms; cf. Janelle et al., 2009) were registered.

Stimuli. Participants were photographed in a photo studio. The background color of the pictures was “lagoon blue” and all participants wore similar skin-colored underwear which was provided by the researchers. Participants were photographed from the front with their arms loosely beside their body and their face outside the picture. During the free-viewing task these pictures were used as own stimulus and as control stimuli for other participants. When participants were recognizable for example because of tattoos or scars, these pictures were not used as control stimuli.

Body evaluation. After the free-viewing task we asked the participants to indicate on each of the three pictures which area they considered most beautiful and which area they considered most ugly, because we wanted to distinguish their attention towards relatively positively evaluated body parts from their attention towards relatively negatively evaluated body parts. These areas were used as regions of interest in the data-analysis (see also *Data reduction*). In addition, participants were asked to rate this most beautiful/ugly body part on a scale from 0 (not beautiful at all) to 100 (very beautiful). The body parts were classified in breast, shoulders, upper

arms, lower arms, hands, belly, hips, upper legs, knees, lower legs, feet, and throat. Independently of the viewing task, participants were asked to give a general grade to their body on a scale from 1 (not beautiful at all) to 10 (very beautiful).

Procedure

The study was approved by the Ethical Committee Psychology of the University of Groningen. Before entering the study, it was explained that participants would be photographed in their underwear without their face being visible and that these pictures would be used as stimuli in a viewing task. In addition, it was explained to the women with high body dissatisfaction that eligible participants would be randomly assigned to an active intervention group that would receive a training consisting of 5 weekly sessions mirror exposure or to a no-training control group. All women who participated in the current study gave their written informed consent to take part.

During the first laboratory assessment, participants filled in the questionnaires. In addition, the experimenter assessed the participant's weight and length, which were used to calculate BMI ($\text{weight} / \text{length} \times \text{length}$). Two weeks after the first laboratory assessment, participants were photographed in a photo studio. After two more weeks, the free-viewing task was administered in the laboratory for each participant individually. After the free-viewing task, the comparison group low in body dissatisfaction did not receive any further assessments. The active-intervention group received the first session positive body exposure directly after the free-viewing task, followed by four more weekly sessions. After the final exposure session, the free-viewing task and the questionnaires were administered again. Following a comparable time interval (5 weeks) also participants of the no-training control group were subjected to a second assessment (see Figure 1 for an overview of the design). Other measurements were collected as

well during the assessments, but these are not of interest for the present study. After the study had finished, all participants were debriefed in detail via email.

Positive body exposure. The training consisted of 5 weekly sessions positive body exposure with an actual exposure duration of 30 minutes for each session (see Jansen et al., 2016 for a detailed description of the procedure). It was explained to the participants that selective visual attention for one's body might contribute to body dissatisfaction and that positive body exposure has the goal to enhance body satisfaction by giving more attention to beautiful body parts. During the first exposure session participants selected their 8 most attractive body parts and ranked them on their attractiveness. In every exposure session, 2 body parts from the hierarchy were addressed, starting with the most attractive parts and building up to the least attractive of the 8 body parts. During the first exposure session, exposure took place without a mirror and fully dressed. In each of the next 4 sessions, exposure was carried out in vivo. The participant stood before a large, full-length mirror while wearing underwear or a bikini. The therapist guided the direction of the participant's attention while the participant was continuously looking in the mirror. The participant was reinforced by the therapist to look at and talk about the body parts in a positive way. In between sessions, participants received homework assignments.

Data reduction

The eye tracking data were processed with Eyelink DataViewer (SR Research, Mississauga, Ontario, Canada). Regions of interest (ROI) were set for the most beautiful and most ugly body parts as identified by the participants. Both the percentage of time the participant spend looking at ROIs (i.e., percentage dwell time), and the number of fixations (> 100 ms) on each ROI were extracted. Additionally, the size of the ROIs was extracted. The ROIs of the baseline measure were also used as interest areas for the follow-up measure. The percentage

dwelling time and fixation count of the two control bodies was averaged leading to a percentage dwelling time on the most beautiful and most ugly body part of their own body (*self*) and of the average control body (*other*). The data were extracted for the complete trial period (30 s; cf. Jansen et al., 2005). Originally, we also wanted to explore initial attentional patterns for the first 500 ms, as well as for the subsequent 500-2000 ms interval to detect early engagement with beautiful and ugly body parts (see e.g., Janelle et al., 2009). However, there appeared to be too little data points during these time frames to approach normality even after transformation. Consequently, we decided to skip these explorative analyses.

Statistical analyses

To test whether women with high body dissatisfaction would look less at their ‘beautiful’ body parts and more at their ‘ugly’ body parts than women with low body dissatisfaction, a 2 x 2 x 2 mixed model ANOVA’s was planned both on the dwelling time and fixation count data with Group (high vs. low body dissatisfaction) as between subject factor, and Body (self vs. other) and Evaluation (beautiful vs. ugly) as within subject factors. Both the three-way interaction and the two-way interaction of Group x Evaluation seemed of interest to answer this first research question and were therefore included in the model. A priori power-analysis showed that a total sample size of $N = 20$ would be sufficient to detect a medium to large effect (cf. Jansen et al., 2005) with $\alpha = .05$ and power = .80.

To test the effect of the body exposure training on attention for beautiful and ugly body parts, a 2 x 2 x 2 x 2 mixed model ANOVA was performed on the percentage dwelling time and fixation count with Group (experimental vs. no-training) as between subject factor, and Time (baseline vs. follow-up), Body (self vs. other) and Evaluation (beautiful vs. ugly) as within subject factors. Only the four-way interaction and three-way interactions of Group x Time x

Evaluation and Group x Time x Body seemed important to answer this second research question and were therefore included in the model. A priori power-analysis showed that a total sample size of $N = 34$ would have been necessary to be able to detect a medium effect (the expected effect size is unknown) with $\alpha = .05$ and power = .80. However, during the data collection we only managed to include 28 participants with high body dissatisfaction. Post-hoc power calculations show that the power of the present analysis was therefore decreased to .72.

RESULTS

Descriptives

Participant characteristics. The characteristics of the women with high body dissatisfaction and women with low body dissatisfaction at baseline are given in Table 1. Women high in body dissatisfaction had on average a higher BMI, and higher scores on all subscales of the EDE-Q, than women with low body dissatisfaction. Additionally, they graded their own body on average two points lower than women with low body dissatisfaction. The two groups did not differ in age. Table 1 also shows participants' grades of the most beautiful and most ugly body parts of their own body (self) and of the control bodies (other). The *other* grade reflects the average grade given to the 'beautiful' and 'ugly' body parts of the two *other* bodies that were shown during the eye-tracking task. Participants with high body dissatisfaction gave lower grades to both their own 'beautiful' and their own 'ugly' body parts than participants with low body dissatisfaction. The groups did not differ with regard to their grades of other people's 'beautiful' and 'ugly' body parts.

Manipulation check. The experimental group and the no-training control group were compared on BMI, eating disorder symptoms (EDE-Q) and grades given to 'beautiful' and 'ugly' body parts of self and other at baseline (see Table 2). During the baseline assessment, both

groups did not show meaningful differences with regard to any of the variables (age, $t(26) = -0.83$, $p = 0.42$; BMI, $t(26) = -0.33$, $p = 0.75$; grade given to their own body, $t(26) = 0.29$, $p = 0.77$; EDE-Q scores, all t 's(26) < 0.14 , p 's > 0.89). Then, 2 (Group: experimental vs. no-training) x 2 (Time: baseline vs. follow-up) ANOVAs were performed for the EDE-Q subscales and the grade given to own body. Significant Group x Time interactions were found for shape concern ($F(1,26) = 7.93$, $p < 0.01$, $\eta^2 = 0.23$), total EDE-Q score ($F(1,26) = 8.44$, $p < 0.01$, $\eta^2 = 0.25$) and grade given to own body ($F(1,26) = 14.14$, $p < 0.001$, $\eta^2 = 0.35$). No interaction effects were found for the EDE-Q subscales restraint, eating concern, and weight concern. Whereas the control group did not change over time, the experimental group showed less shape concern, less eating disorder symptoms, and higher grading of their body after receiving the training.

Group differences in attention for beautiful and ugly body parts at baseline^{1,2}

A 2 x 2 x 2 mixed model ANOVA was performed on dwell time during the complete trial period with Group (low vs. high body-dissatisfaction) as between subject factor and Body (self vs. other) and Evaluation (beautiful vs. ugly) as within subject factors. Dwell time was first transformed with a square root transformation, because the distribution was rightly skewed. The three-way interaction of Group x Body x Evaluation was not significant ($F(1,40) = 1.14$, $p = 0.29$, $\eta^2 = 0.03$). Yet, the two-way interaction of Group x Evaluation showed a large effect size and was statistically significant ($F(1,40) = 7.97$, $p < 0.01$, $\eta^2 = 0.17$).

To further examine the differences between women with high and low body dissatisfaction, the Group x Evaluation interaction was followed up with t-tests (see Figure 2). Bonferroni correction was used to correct for the family wise error rate and α was set at 0.0125. Women with high body dissatisfaction spent less time viewing 'beautiful' body parts than women with low body dissatisfaction ($t(40) = 2.69$, $p = 0.01$), while both groups showed no

reliable difference in viewing ‘ugly’ body parts ($t(40) = -2.14, p < 0.05$). Furthermore, women with high body dissatisfaction spent less time viewing ‘beautiful’ body parts than ‘ugly’ body parts ($t(27) = -4.07, p < 0.001$), while women with low body dissatisfaction did not show reliable differences in viewing time between ‘beautiful’ or ‘ugly’ body parts ($t(13) = 0.39, p = 0.70$).

Effect of training on attention for beautiful and ugly body parts

To test the effect of the training on attention for ‘beautiful’ and ‘ugly’ body parts, 2 (Group: experimental vs. no-training) x 2 (Time: baseline vs. follow-up) x 2 (Evaluation: beautiful vs. ugly) x 2 (Body: self vs. other) ANOVAs were performed for percentage dwell time and fixation count separately. No significant training effects were found when looking at the dwell time data. Firstly, the four-way interaction of Group x Time x Evaluation x Body was small and not significant ($F(1,26) = 1.14, p = 0.30, \eta^2 = 0.04$). Additionally, the three way interactions of Group x Time x Evaluation ($F(1,26) = 0.27, p = 0.61, \eta^2 = 0.01$) and Group x Time x Body ($F(1,26) = 1.89, p = 0.18, \eta^2 = 0.07$) were not significant. Findings for the fixation count data were comparable. Descriptives of percentage dwell time and fixation count for ‘beautiful’ and ‘ugly’ body parts of the experimental group and no-training group at baseline and follow-up can be found in Table 3.

DISCUSSION

The main goal of the present study was to investigate whether selective visual attention towards one’s body in women with high body dissatisfaction can be modified by means of positive body exposure and whether a change in visual attentional patterns is related to an enhancement of body satisfaction. The main findings can be summarized as follows: Overall, body-dissatisfied women spent more time looking at ‘ugly’ body parts than at ‘beautiful’ body

parts, whereas women low in body dissatisfaction spent on average about an equal amount of time viewing ‘ugly’ and ‘beautiful’ body parts. Although the positive body exposure training was generally very successful in reducing shape concern and eating disorder symptoms, there was no evidence indicating that the biased spontaneous viewing pattern of women with high body dissatisfaction was systematically influenced by the positive body exposure training. Both before and after the training, women high in body dissatisfaction seemed to attend relatively longer towards ‘ugly’ than towards ‘beautiful’ body parts.

These outcomes are in line with previous studies showing that women high in body dissatisfaction tend to look less at their own ‘beautiful’ body parts and more at their own ‘ugly’ body parts compared to women with low body dissatisfaction (Janelle et al., 2009; Jansen et al., 2005; Roefs et al., 2008). However, in the present study, women with high body dissatisfaction also focused more on the ‘ugly’ body parts of others. The latter is in contrast with the outcomes of Jansen and colleagues (2005) who used a similar design, but found a reversed pattern of attention. They found that women high in body dissatisfaction tend to focus more on the ‘beautiful’ than on the ‘ugly’ body parts of other women. Perhaps individuals that are unhappy with their body are relatively consistent in their tendency to preferentially allocate their attention to the ‘ugly’ body parts when looking at their own body, whereas their viewing patterns are more variable when looking at other people’s bodies. Some tend to look for the ‘beautiful’ and some for the ‘ugly’ parts of other people’s bodies. Both strategies may provide clues of how viewing patterns may contribute to body dissatisfaction. Focusing too much on others’ ‘beautiful’ body parts (as was found in Jansen et al., 2005) might further fuel dissatisfaction with one’s own body as result of an upward social comparison process between their own body and the more ‘attractive’ comparison target (cf. Roefs et al., 2008). Focusing too much on others’ ‘ugly’ body

parts (as was found in the current study) might reflect a more general negative scrutinizing way of looking at bodies, which may increase the weight of ‘ugly’ body parts in the overall appreciation of one’s body, thereby contributing to body dissatisfaction.

In line with prior findings, positive body exposure was highly effective in improving body satisfaction (e.g., Jansen et al., 2016). The training showed large effects on shape concern, eating disorder symptoms, and overall evaluative ratings of participants’ own body. Although the training successfully reduced body dissatisfaction, the women who received the training did not systematically increase their focus on body parts that were identified as most ‘beautiful’ during the baseline assessment, or decrease their focus on body parts that were initially identified as most ‘ugly’. This seems to imply that changing participants’ spontaneous viewing patterns is not a requisite for changing body satisfaction. Although the viewing pattern remained largely unaffected, one could still speculate that perhaps as a result of the training the difference in evaluation between both types of body parts has disappeared, and thus that also the interpretation of the post-training viewing pattern should be modified. If the ‘ugly’ body parts would no longer be evaluated as uglier than the initially defined ‘beautiful’ body parts, this would of course have great influence on the interpretation of the unchanged viewing pattern. However, since the difference in evaluation between both types of body parts remained very similar³ and the post-training evaluation of the most ‘ugly’ body part remained with a mean score of 30 at the negative end of the scale, it seems safe to conclude that indeed the viewing pattern was relatively unaffected by the training and that also after the intervention participants persisted in their tendency to preferentially allocate their attention towards ‘ugly’ body parts.

The current findings point to the conclusion that a change in selective attention towards one’s body does not necessarily precede a change in body satisfaction during positive body

exposure. Importantly, although we did not find support for the view that the positive body exposure intervention lead to systematic changes in spontaneous body-related viewing behaviors, these findings do not imply that selective viewing to one's own beautiful body parts might not be a critical component of the current intervention's success in enhancing body dissatisfaction. Previous experimental research already showed that externally enforced viewing patterns can successfully affect participants' body (dis)satisfaction (e.g., Smeets et al., 2011). The long-term efficacy of mirror exposure might therefore be further enhanced if it would also successfully change the spontaneous tendency of women with high body dissatisfaction to preferentially allocate their attention to their 'ugly' body parts. The latter is of course still an open question, which should be addressed in future studies. In addition, if a change in interpretation/evaluation is crucial for effective body exposure, it seems important to investigate what causes interpretational change, and which conditions are optimal for such a change. For example, it has been suggested that inhibitory learning might be an underlying mechanism (Jansen et al., 2016), that is through mirror exposure individuals might learn to associate their body with new, more positive meanings which after extensive practice can start to inhibit the "old" negative associations with their body.

Although the evaluation of positive body exposure was not the main goal of the present study, it seems warranted to briefly discuss the use of positive body exposure in clinical practice, e.g. among individuals with eating disorders. Asking individuals high in body dissatisfaction to identify body parts that they like might seem problematic if not impossible. However, as can be seen in the present study as well as in previous work in this area (Jansen et al., 2016), most individuals were able to do so. For example, the individuals high in body dissatisfaction rated their most beautiful body part much more positive ($m = 70.71$) than their ugliest body part ($m =$

18.29). However, for very severely dissatisfied individuals who are not able to identify (relatively) beautiful body parts, the use of positive body exposure might not be the best choice of treatment. In case of the latter, it might be better to first use cognitive techniques and/or different forms of body exposure (e.g. negative body exposure; Jansen et al., 2016) before using positive body exposure.

Limitations and future directions

Although the present study has many strengths, such as the use of an experimental design and a behavioral measure of visual attention, there are also some limitations that should be taken into account when interpreting these results. First of all, it is important to mention that the sample size was small, which was related to the labor-intensive design that was used. One may dispute if power (0.72) was sufficiently high for a strong interpretation of the outcomes regarding the second research question. Accordingly, we should be cautious when interpreting these results and future work is required to heighten confidence in the conclusion that body exposure as conducted in the present design does not affect free-viewing patterns towards ‘ugly’ and ‘beautiful’ body parts. In addition, one should keep in mind that we used a non-clinical sample. Even though the severity of symptoms was quite high and there were large differences between the groups of women with high versus low body dissatisfaction, one should be cautious with translating the present findings to clinical populations. Furthermore, since we used a free-viewing task to measure visual attention, it remains unclear whether the positive body exposure training might enhance individuals’ ability to regulate their attention while they are engaged in a different task, that is whether after the exposure they are perhaps less distracted by or have less difficulty to disengage from ‘ugly’ body parts. Consequently, in future studies it seems worthwhile not only to investigate self-initiated spontaneous viewing behaviors, but also more

bottom-up driven attentional bias for ‘ugly’ body parts. Finally, we did not use a standardized measure of body satisfaction. Although the measures that we used (EDE-Q and general grade given to own body) were used before for the same purpose (e.g., Jansen et al., 2005; 2016), future studies could additionally include a state measure of body satisfaction, such as the Body Image State Scale (Cash, Fleming, Alindogan, Steadman & Whitehead, 2002).

Conclusions

The present study showed that women with low body dissatisfaction tended to look approximately equally long at ‘ugly’ and ‘beautiful’ body parts, while women with high body dissatisfaction spent more time viewing ‘ugly’ body parts than ‘beautiful’ body parts. Although positive body exposure did show large effects on body satisfaction, the training did not seem to systematically alter self-initiated attention for ‘beautiful’ and ‘ugly’ body parts. Consequently, a change in self-initiated viewing pattern towards one’s body does not seem to be a requisite for changing body satisfaction during positive body exposure. It remains to be tested whether a successful change of body dissatisfied women’s spontaneous tendency to preferentially allocate their attention to their ‘ugly’ body parts might further contribute to the efficacy of positive body exposure in the context of body dissatisfaction.

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References

- Alleva, J. M., Sheeran, P., Webb, T. L., Martijn, C., & Miles, E. (2015). A meta-analytic review of stand-alone interventions to improve body image. *PLoS ONE*, *10*, e0139177.
- Beck, A. T., Steer, R. A., & Brown, G. K. (2002). *Beck depression inventory*. Dutch translation: van der Does, A.J.W. (2002). Manual for the Dutch BDI-II (2nd ed.). San Antonio, TX/Lisse, NL: The Psychological Corporation/Swets Test Publisher.
- Berg, K. C., Peterson, C. B., Frazier, P., & Crow, S. J. (2012). Psychometric evaluation of the eating disorder examination and eating disorder-questionnaire: a systematic review of the literature. *International Journal of Eating Disorders*, *45*, 428-438.
- Cash, T. F., Fleming, E. C., Alindogan, J., Steadman, L., & Whitehead, A. (2002). Beyond body image as a trait: The development and validation of the Body Image States Scale. *Eating Disorders*, *10*, 103–113.
- Delinsky, S. S., & Wilson, G. T. (2006). Mirror exposure for the treatment of body image disturbance. *International Journal of Eating Disorders*, *39*, 108-116.
- Díaz-Ferrer, S., Rodríguez-Ruiz, S., Ortega-Roldán, B., Moreno-Domínguez, S., & Fernández-Santaella, M. C. (2015). Testing the efficacy of pure versus guided mirror exposure in women with bulimia nervosa: A combination of neuroendocrine and psychological indices. *Journal of Behavior Therapy and Experimental Psychiatry*, *48*, 1-8.
- Fairburn, C. G., & Beglin, S. J. (2008). Eating disorder examination questionnaire (EDE-Q 6.0). In: C. G. Fairburn (Ed.), *Cognitive behavior therapy and eating disorders* (pp. 309-314). New York, NY: Guilford Press.
- Hilbert, A., Tuschen-Caffier, B., & Vögele, C. (2002). Effects of prolonged and repeated body image exposure in binge-eating disorder. *Journal of Psychosomatic Research*, *52*, 137-144.

- Hildebrandt, T., Loeb, K., Troupe, S., & Delinsky, S. (2012). Adjunctive mirror exposure for eating disorders: a randomized controlled pilot study. *Behaviour Research and Therapy*, *50*, 797-804.
- Janelle, C. M., Hausenblas, H. A., Ellis, R., Coombes, S. A., & Duley, A. R. (2009). The time course of attentional allocation while women high and low in body dissatisfaction view self and model physiques. *Psychology and Health*, *24*, 351-366.
- Jansen, A., Bollen, D., Tuschen-Caffier, B., Roefs, A., Tanghe, A., & Braet, C. (2008). Mirror exposure reduces body dissatisfaction and anxiety in obese adolescents: A pilot study. *Appetite*, *51*, 214-217.
- Jansen, A., Nederkoorn, C., & Mulkens, S. (2005). Selective visual attention for ugly and beautiful body parts in eating disorders. *Behaviour Research and Therapy*, *43*, 183-196.
- Jansen, A., Voorwinde, V., Hoebink, Y., Rekkers, M., Martijn, C., & Mulkens, S. (2016). Mirror exposure to increase body satisfaction: Should we guide the focus of attention towards positively or negatively evaluated body parts? *Journal of Behavior Therapy and Experimental Psychiatry*, *50*, 90-96.
- Jarry, J. R., & Berardi, K. (2004). Characteristics and effectiveness of stand-alone body image treatments: a review of the empirical literature. *Body Image*, *1*, 319-333.
- Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: a prospective analysis. *Journal of Abnormal Psychology*, *114*, 119-125.
- Key, A., George, C. L., Beattie, D., Stammers, K., Lacey, H., & Waller, G. (2002). Body image treatment within an inpatient program for anorexia nervosa: the role of mirror exposure in the desensitization process. *International Journal of Eating Disorders*, *31*, 185-190.

- Luce, K. H., & Crowther, J. H. (1999). The reliability of the Eating Disorder Examination – Self-Report Questionnaire Version (EDE-Q). *International Journal of Eating Disorders*, 25, 349–351.
- Luethcke, C. A., McDaniel, L., & Becker, C. B. (2011). A comparison of mindfulness, nonjudgmental, and cognitive dissonance-based approaches to mirror exposure. *Body Image*, 8, 251-258.
- Moreno-Domínguez, S., Rodríguez-Ruiz, S., Fernández-Santaella, M. C., Jansen, A., & Tuschen-Caffier, B. (2012). Pure versus guided mirror exposure to reduce body dissatisfaction: a preliminary study with university women. *Body Image*, 9, 285-288.
- Roefs, A., Jansen, A., Moresi, S., Willems, P., van Grootel, S., & van der Borgh, A. (2008). Looking good: BMI, attractiveness bias and visual attention. *Appetite*, 51, 552-555.
- Smeets, E., Jansen, A., & Roefs, A. (2011). Bias for the (un)attractive self: On the role of attention in causing body (dis)satisfaction. *Health Psychology*, 30, 360-367.
- Stice, E., & Shaw, H. E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology: A synthesis of research findings. *Journal of Psychosomatic Research*, 53, 985.
- Trentowska, M., Svaldi, J., & Tuschen-Caffier, B. (2014). Efficacy of body exposure as treatment component for patients with eating disorders. *Journal of Behavior Therapy and Experimental Psychiatry*, 45, 178-185.
- Von Wietersheim, J. Kunzl, F., Hofmann, H., Glaub, J., Rottler, E., & Traue, H. C. (2012). Selective attention of patients with anorexia nervosa while looking at pictures of their own body and the bodies of others: an exploratory study. *Psychosomatic Medicine*, 74, 107-113.

Footnotes

¹The analyses were also performed with fixation count as outcome variable. These outcomes were comparable to the outcomes of the analyses on percentage dwell time.

²When correcting for size of the ROIs in the analyses, the difference between women with high and low body dissatisfaction in the time spent viewing ‘beautiful’ body parts ($t(40) = 1.64$, $p = 0.11$) were no longer significant. All other effects remained significant.

³A 2 Group (experimental vs. no-training) x 2 Time (baseline vs. follow-up) x 2 Body (self vs. other) x 2 Evaluation (beautiful vs. ugly) ANOVA was performed on the evaluation of specific body parts. (It is important to mention that at follow-up participants rated the body parts that they considered most beautiful/ugly at that moment, which differed in approximately half of the cases from the body parts that they considered most beautiful/ugly during baseline.) The four-way interaction of Group x Time x Evaluation x Body was not significant ($F(1,26) = .59$, $p = 0.45$, $\eta^2 = 0.02$) and the three way interaction of Group x Time x Body was also not significant ($F(1,26) = 0.07$, $p = 0.79$, $\eta^2 = 0.00$). However, the interaction of Group x Time x Evaluation ($F(1,26) = 8.18$, $p < 0.01$, $\eta^2 = 0.24$) was significant. This interaction effect was further explored in two separate 2 Time (baseline vs. follow-up) x 2 Evaluation (beautiful vs. ugly) ANOVAs for the experimental and no-training group. For the experimental group the ANOVA showed main effects of Time ($F(1,14) = 8.44$, $p = 0.01$, $\eta^2 = 0.38$) and Evaluation ($F(1,14) = 195.31$, $p < 0.001$, $\eta^2 = 0.93$), but no significant interaction effect ($F(1,14) = 1.72$, $p = 0.21$, $\eta^2 = 0.11$). Women who received the training generally rated body parts more positive after the training. For the no-training group the ANOVA showed main effects of Time ($F(1,12) = 6.71$, $p = 0.02$, $\eta^2 = 0.36$) and Evaluation ($F(1,12) = 99.59$, $p < 0.001$, $\eta^2 = 0.89$), as well as a significant interaction effect of Time x Evaluation ($F(1,12) = 8.58$, $p = 0.01$, $\eta^2 = 0.42$). Paired t-tests showed that the

women in the no-training control group did not rate 'beautiful' body parts as more positive during follow-up ($t(12) = -.63, p = 0.54$). However, they rated the 'ugly' body parts significantly more positive during follow-up compared to baseline ($t(12) = -3.41, p < 0.01$).

Figure 1

Study design

Screening <i>Week 1 & 2</i>	T1a <i>Week 3 & 4</i>	<i>Week 7 & 8</i>	T1B <i>Week 11 & 12</i>	<i>Week 12 - 16</i>	T2 <i>Week 16 & 17</i>
Online questionnaires	Questionnaires + weight/length	Photosession	Free-viewing task	Positive body exposure	Free-viewing task + questionnaires
All participants	All participants	All participants	All participants	EX	EX + C

Note. EX = Experimental group; C = No-training control group.

Figure 2

The percentage viewing time of 'beautiful' and 'ugly' body parts

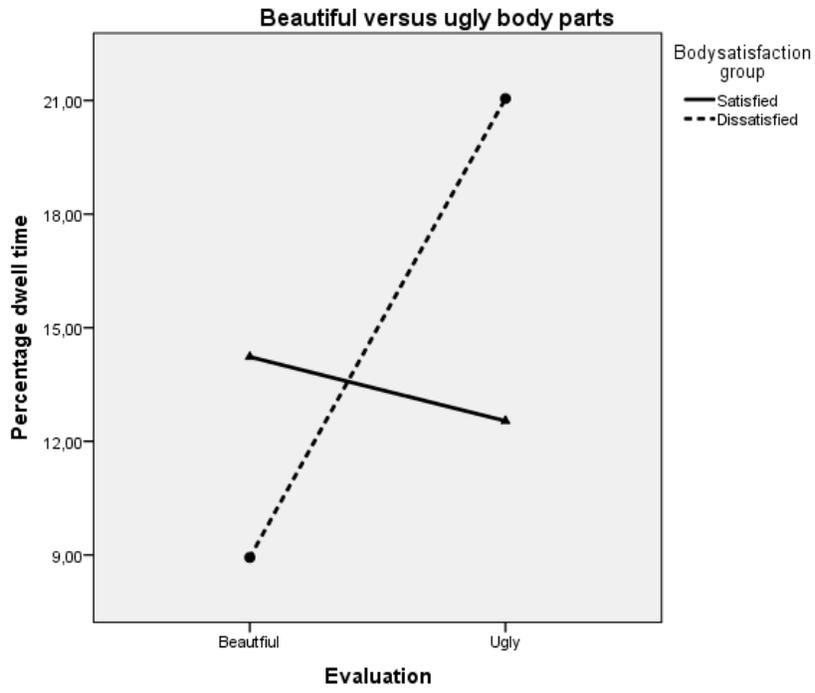


Table 1

Sample characteristics at baseline

	Body satisfied (N = 14) Mean (SD)	Body dissatisfied (N = 28) Mean (SD)	T (df)¹	p	95% CI
Age	19.79 (1.89)	19.96 (2.06)	-0.27 (40)	0.79	[-1.51, 1.15]
BMI	21.22 (1.30)	22.93 (1.56)	-3.52 (40)	0.001	[-2.68, -0.73]
EDE-Q Restraint	0.13 (0.19)	2.26 (1.30)	-8.49 (29.15)	<0.001	[-2.64, -1.62]
EDE-Q Eating concern	0.16 (0.22)	1.99 (1.14)	-8.16 (30.9)	<0.001	[-2.29, -1.37]
EDE-Q Shape concern	0.67 (0.38)	4.06 (1.20)	-13.64 (36.0)	<0.001	[-3.90, -2.89]
EDE-Q Weight concern	0.37 (0.41)	3.68 (1.18)	-13.26 (37.2)	<0.001	[-3.81, -2.80]
EDE-Q Global score	0.33 (0.23)	3.00 (1.02)	-13.20 (31.9)	<0.001	[-3.08, -2.80]
Total grade own body	7.54 (0.91)	5.52 (0.98)	6.46 (40)	<0.001	[1.39, 2.65]
Grade beautiful self	82.50 (9.95)	70.71 (15.68)	2.56 (40)	0.01	[2.48, 21.10]
Grade ugly self	41.79 (22.67)	18.29 (12.93)	3.60 (17.4)	<0.01	[9.74, 37.26]
Grade beautiful other	80.54 (10.25)	76.95 (11.32)	1.00 (40)	0.32	[-3.68, 10.86]
Grade ugly other	43.04 (19.84)	34.52 (16.07)	1.50 (40)	0.14	[-2.98, 20.02]

Note. ¹ Degrees of freedoms differ due to the correction for violation of the assumption of equal variances

Table 2

Scores of the experimental group and no-training group at baseline and follow-up

	No-training control group		Experimental group	
	(N = 13)		(N = 15)	
	Baseline	Follow-up	Baseline	Follow-up
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
EDE-Q Restraint	2.28 (1.12)	2.55 (1.15)	2.24 (1.48)	1.80 (1.59)
EDE-Q Eating concern	1.95 (1.19)	2.11 (1.43)	2.01 (1.14)	1.57 (1.25)
EDE-Q Shape concern	4.05 (1.18)	4.10 (1.11)	4.08 (1.26)	3.09 (1.59)
EDE-Q Weight concern	3.68 (1.17)	3.55 (1.29)	3.68 (1.23)	2.89 (1.57)
EDE-Q Global score	2.99 (0.96)	3.08 (0.96)	3.00 (1.10)	2.34 (1.28)
Total grade own body	5.58 (1.15)	5.49 (1.34)	5.47 (0.83)	6.77 (0.98)
Grade beautiful self	69.23 (17.66)	68.46 (18.30)	72.00 (14.24)	78.33 (11.75)
Grade ugly self	20.92 (13.79)	26.54(14.35)	16.00 (12.13)	30.00 (16.69)
Grade beautiful other	78.85 (10.49)	82.04 (7.86)	75.30 (12.11)	76.33 (9.01)
Grade ugly other	38.38 (16.58)	49.23 (13.05)	31.17 (15.38)	35.83 (15.55)

Table 3

Percentage dwell time and fixation count for beautiful and ugly body parts of the experimental group and no-training group at baseline and follow-up

	No-training control group		Experimental group	
	<i>(N = 13)</i>		<i>(N = 15)</i>	
	Baseline	Follow-up	Baseline	Follow-up
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Percentage dwell time				
Beautiful self	5.53 (5.94)	5.78 (6.38)	5.36 (5.10)	8.90 (9.44)
Ugly self	20.68 (14.61)	16.43 (9.50)	23.26 (14.64)	21.88 (16.35)
Beautiful other	9.82 (6.88)	10.23 (6.58)	15.69 (11.21)	8.32 (5.51)
Ugly other	20.94 (22.81)	17.34 (11.23)	19.34 (12.90)	21.11 (13.54)
Fixation count				
Beautiful self	3.00 (2.74)	3.77 (3.70)	4.07 (3.84)	4.93 (4.50)
Ugly self	10.46 (5.99)	9.92 (5.35)	15.47 (8.93)	11.20 (8.39)
Beautiful other	4.73 (2.81)	5.19 (3.09)	7.17 (5.31)	5.00 (3.64)
Ugly other	7.88 (5.11)	8.73 (4.98)	9.30 (5.63)	10.43 (5.81)