Examensarbete på avancerad nivå

Independent degree project – second cycle

Psykologi
Psychology

How do they look?:
An Eye-Tracking Study on Body Dissatisfaction and Attention Bias to Body Types.

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Degree programme: Psykologprogrammet, 300 credits
Main field of study: Psychology
Semester, year: Spring, 2016
Abstract

Body dissatisfaction (BD) and visual attention bias (AB) play a prominent role in the development and maintenance of eating disorders. Previous studies have shown that women with elevated levels of BD, or diagnosed with eating disorders, allocate more of their attention towards body shape images, and in particular images of thin body shapes. The current study used eye-tracking to investigate if and how AB could be changed using instructions that encouraged either: free viewing (condition 1), finding an appealing body type (condition 2), or finding a body type resemblant of the participant’s own (condition 3), when presented with 4 different body types simultaneously, among women with or without BD. The results showed that women with BD fixated significantly more times and longer on images of thin body shapes during condition 1, while the control group showed no such preference. During condition 2, this attention bias towards thin body shape bias was increased for women with BD but was significantly decreased when instructed to find a body that resembled their own as more attention was then directed toward bigger body shapes. In conclusion, these results are in line with previous research concerning attention bias when no instructions were given, but this study contributes with new insight on the possibilities of changing attention biases.
How do they look?:
An Eye-Tracking Study on Body Dissatisfaction and Attention Bias to Body Types.

Anorexia Nervosa (AN) is classified as an Eating Disorder (ED) and is one of the psychiatric disorders with the highest mortality rates (Harris & Barraclough, 1997; Keshaviah et al., 2014). It is most commonly found among young women, 16-24 years old, and within this group roughly a half percent is diagnosed with AN (Ghaderi & Parling, 2007). AN is characterized by a restricted calorie intakes, intense fear of gaining weight, and a distorted body image (American Psychiatric Association, 2013).

Body dissatisfaction (BD) has been shown to one of the most important factors in the development and maintenance of ED (Stice & Shaw, 2002). Body dissatisfaction and Body Mass Index (BMI) appear to have a significant and positive correlation (Annis, Cash, & Hrabosky, 2004; Schwartz & Brownell, 2004). However, for obvious reasons, this is not always the case when it comes to ED, and especially AN, since the BMI of these patients tend to be very low and the BD very high. Even though some level of BD seem to present amongst most women, studies have shown that women with ED have higher levels of BD (Coker & Abraham, 2014), and that BD prospectively can predict the development of an ED (Leon et al, 1993). BD is more common among young women, and young social media users appear to be even more prone to dislike their own body (Stronge, Greaves, Miljev, West-Newman, Barlow, & Sibley, 2015). Body ideals in mass media, and more lately social media, have been shown to affect the audience’s perceptions of what is desirable, no matter how unattainable these ideals may be, and cause unrealistic body shape aspirations and body dissatisfaction (Bandura, 2001; Grabe, Ward, & Hyde, 2008).

The tendency of comparing one’s body to bodies of others have been shown to play a prominent role in BD (Myers & Crowther, 2009). Social comparison theory states that we tend to compare ourselves to others, similar to ourselves, in order to determine and rate our own level of success and it can occur in two different directions, upwards social comparison to others perceived to be better than ourselves, and downwards social comparison towards those perceived to be less fortunate (Festinger, 1954). Upwards social comparison can serve as a motivation of change and to improve oneself, generally through eliciting negative emotions (Higgins, 1987; Wheeler & Miyake, 1992). It has been found that women with higher BD are more likely to engage in upwards social comparison from exposure of thin-body images (Corning, Krumm, & Smitham, 2006) and experience increased body dissatisfaction after watch such images (Lorenzen, Grieve, & Thomas, 2004; Bessenoff, 2006). But there is also evidence that women with BD faced with images of bigger bodies, that would allow for downwards comparison, still experience an increase in body dissatisfaction, possibly due to experience of similarity rather than downwards comparison. In summary, the more unhappy you are with your body, the more do you compare yourself against unattainable body shape ideals and consequently become more unhappy with yourself.

To gain deeper understanding of this phenomenon, one can address another key component of ED: attention bias, defined as the “tendency to over focus awareness on information in the environment that is disorder salient” (Aspen, Darcy, & Lock, 2013). In general, it has been theorized and interpreted that emotion evoking and fear-relevant stimuli are detected faster (Öhman, Flykt, & Esteves, 2001) and that these stimuli are prioritized for attentional processing which causes delays in response time during, for example, a Stroop task (Yiend, 2010), explained by delayed disengagement of the fear-relevant stimuli (Gerdes, Alpers, & Pauli, 2008). However, the exact definition and operationalization of attention bias within the field relevant to ED and BD differs across studies and until recently have mostly been studied indirectly using Stroop and dot-probe tasks. For example, Dobson and Dozois (2004) concludes in their meta-analysis that patients with AN demonstrate a modest
interference for shape related words in studies using the Stroop interference test, whilst Shafran, Lee, Cooper, Palmer, and Fairburn (2007) demonstrated that patients with AN have modest attention bias to negative body shape related images and words using the dot-probe. However, these methods of measurement have serious limitations as they rely on the measurement of secondary behavioral responses and unobservable cognitive processes, which leave the scientists unable to obtain a complete understanding of how and if the stimuli is even looked at.

More recently, the usage of eye-tracking apparatus have lend this field of psychology new possibilities of direct observation of visual scanning and overt attention. Several studies have been conducted and have shown that women with ED fixate more often and longer on images on thin body shapes than on images of fat body shapes (Blechert, Nickert, Caffier, & Tuschen-Caffier, 2009), more on body shapes than on social images or neutral images, compared to controls (Pinhas et al., 2014), that women dissatisfied with their bodies allocate more attention to attractive body parts of others and the unattractive parts of their own bodies (Jansen, Nederkoorn, & Mulken, 2005; Roefs, Jansen, Moresi, Willems, Van Grootel, & Van der Borgh, 2008), and that women with higher level of BD show sustained attention maintenance bias to both thin and fat body shapes during both early and latter stages of attention (Gao, Deng, Yang, Liang, Liu, & Chen, 2014). Combining these findings with the social comparison theory, it is arguable that if a women is dissatisfied with her body, images of thin bodies could give rise to negative emotions because of the comparison she’s making against her own body, and because of this potential fear and anxiety connected to thin body images, more attention is directed towards these images, which in the long run makes these women even more unsatisfied. Thus, it is clear that BD and attention bias along with the tendency to compare oneself unfavorably against others, are tightly interacting and are an integral part of the maintaining and development of a distorted body image, which, if not treated properly, ultimately can lead to the development of an ED.

While previous studies, using eye-tracking method, definitely have shown that attentional bias exists, both in early and late stages in visual scanning behaviors, they fail to control that social comparisons actually occur without explicit instruction to do so and the explanations of the results rely on the assumption that these comparisons happen involuntarily. Therefore, the aim of this study was to investigate if and how the visual scanning behavior changed dependent on instructions aimed at allowing either implicit or explicit social comparisons, and ultimately investigate if the expression of the attention bias could be altered. The targeted response was the primary, more automatic processes and therefore, a 3 second presentation time was used in the current study (cf. Hermans, Vansteenwegen, & Eelen, 1999). As previous studies have shown that the use of multiple stimuli simultaneously enhances the likelihood of attention bias as the stimuli has to compete for the attention (Mathews & Mackintosh, 1998), this was also adopted into the design of this study. Ultimately, this approach also reduces the cognitive strategies and increases the ecological validity (Rinck & Becker, 2006).

Conclusively, with reference to above mentioned notions of body dissatisfaction and its relationship with social comparison and attention bias, I hypothesize that 1) when presented with different body types during a free viewing task, women with a higher level of BD will demonstrate an attention bias, i.e. allocate more of their attention on thin body type images rather than bigger body type images, compared to controls, due to the emotion evocation potential of these images and implicit social comparison, 2) when instructed to find the most attractive body type, i.e. allowing for upwards social comparison, both groups will allocate more of their attention towards thinner body type images, and 3) when instructed to find a body type resembling their own, women with elevated levels of BD will allocate less
time on thinner body types compared to controls, due to actual bigger body shape but also due to an inaccurately experience of being fat.
Method

Participants

The original sample consisted of 121 women all residing in a small city in northern Sweden, recruited using the university’s intranet and student e-mailing lists, a copy of the e-mail script and advertise are found in Appendix A. The participants were screened for BD, height and weight, depression, anxiety, eating disorders (previous and ongoing) and were included if they were female and between the ages 18-30. Out of the 121 who had answered the online administered survey, 80 participated in the final study but due to technical issues, only the data of 55 participants were suited for analysis. Using the cut off on the shortened version of the Body Shape Questionnaire (BSQ-8C), participants were extracted into two groups, control group and BD-group, where the participants of the control group all had scores below 19 and the BD group all had scores of 26 or higher. Demographic information of the participants is presented in Table 1.

Materials

Body dissatisfaction screening measure. The shortened Swedish version of the Body Shape Questionnaire (BSQ-8C; Cooper, Taylor, Cooper, & Fairburn, 1987; Ghaderi & Scott, 2004; Welch, Lagerström, & Ghaderi, 2012) is a 8-item self-report measure of the body shape preoccupations typical of bulimia nervosa (BN) and AN, in particular the phenomenal experience of “feeling fat”. Sample items include: “Have you noticed the shape of other women and felt that your own shape compared unfavorably?”. Each item is rated on a 6-point scale of frequency that ranges from never to always. The BSQ-8C yields internally consistent scores (Cronbach’s $\alpha=.93$) as well as stable scores over two weeks ($r=.95$) (Welch et al., 2012). Scores ranges from 8-48 with the cutoff for mild concern with shape at 19 points, 26 points for moderate concern and 33+ for marked concern. Swedish norms: $M=20$, $SD=10$.

Table 1

Demographic information of participants: mean (standard deviation)

<table>
<thead>
<tr>
<th></th>
<th>Control group</th>
<th>BD group</th>
<th>$t$</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
<td>19</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>24.16 (2.59)</td>
<td>23.95 (3.05)</td>
<td>-0.23</td>
<td>0.07</td>
</tr>
<tr>
<td>BMI (kg/m$^2$)</td>
<td>21.75 (3.17)</td>
<td>25.61 (4.30)</td>
<td>3.11**</td>
<td>1.02</td>
</tr>
<tr>
<td>HADS Depression</td>
<td>7.47 (3.60)</td>
<td>11.34 (3.87)</td>
<td>2.78**</td>
<td>1.04</td>
</tr>
<tr>
<td>HADS Anxiety</td>
<td>2.47 (2.07)</td>
<td>5.35 (4.03)</td>
<td>3.23**</td>
<td>0.90</td>
</tr>
<tr>
<td>SCOFF</td>
<td>0.16 (0.38)</td>
<td>1.65 (1.14)</td>
<td>5.45 **</td>
<td>1.75</td>
</tr>
<tr>
<td>BSQ</td>
<td>14.85 (3.35)</td>
<td>32.70 (5.61)</td>
<td>11.97 **</td>
<td>3.86</td>
</tr>
</tbody>
</table>
Note: Control group = women with scores less than 19 on BSQ-8C, BD group = women with scores higher than 25 on BSQ-8C; HADS = The Hospital Anxiety and Depression Scale; BSQ-8C = Body Shape Questionnaire, 8-item version. ** $p < .01$.

**Psychiatric measures.** The Hospital Anxiety and Depression Scale (HADS; Sigmond & Snaith, 1983) is a self-assessment scale developed and used for screening for anxiety and depression in a hospital medical outpatient setting. It yields satisfactory stable scores over 2 months ($r = .72$), and is internally consistent (Cronbach’s $\alpha = .89-.93$) and has high specificity and sensitivity with the cutoff at 8 point, for both subscales (Bjelland et al., 2002). Sample items include: “I feel tense or wound up” for anxiety and “I feel as if I am slowed down” for depression. Each item is rated on a 4-point scale (0-3) of either frequency or how well the statement suit the rater’s experience.

SCOFF (Morgan, Reid, & Lacey, 1999) is a 5-item screening measure for AN and BN. Developed to be used in primary health care to detect eating disorders it has been found to have both good sensitivity and specificity, 84.6% and 89.6% respectively with the cutoff at 2 points (Hill, Reid, Morgan, & Lacey, 2010). The items are answered either yes or no where 2 or more yes-answers indicates that a disorder might be present. Sample items include: “Do you believe yourself to be fat when others say you are thin?”.

**Visual stimuli.** The visual stimuli consisted of 96 images assorted in four body types (24 images in each), hereafter referred to as Body Type A-D, where A represent images of skinny and slim women and D those of the heaviest women, for example-image, see Appendix B. All images were sourced from free sites on the internet and were converted into grayscale images, similar resolution, and were all cut into the same size, 160 x 160 pixels. All of the images depicted women with little clothing on, where a lot of skin was showing but no faces.

Prior to the experiment, 8 individual raters (without any affiliation to the study) were asked to independently sort 100 body images into 4 categories, ranging from thinnest to thickest. If 75% of the raters had chosen the same body type category, the image was included. Due to experimental design benefits, 24 images had to be included in each category, thus some images were used twice but then flipped horizontally.

The visual stimuli were organized into slides that were presented on a computer monitor. They were arranged in a 2x2 configuration with one image from each body type represented. The images were separated by 65 mm and each image in the matrix measured 160x160 pixels which translated to 45x45 mm on the screen. In total, 24 slides were created with all possible combinations of body type-order (ABCD, ABDC, etc.) represented, however the order of the slides and the images within them were counterbalanced and thus differed for each participant. Each trial began with a central fixation cross shown for 1000 ms, and was then replaced with the test slide for 3000 ms.

**Apparatus.** The experiment was programmed using E-Prime 2.0 Software (Psychology Software Tools, Pittsburgh, Pa). Stimuli were presented on a grey background on a 20 inch screen with a resolution of 1024 x 768 pixels, 60 Hz monitor connected to a computer with 3.2 Ghz CPU. Eye movements (left eye) were recorded using SMI: RED250, SensoMotoric Instruments GmbH (2009) and using iViewX, SensoMotoric Instruments GmbH (2015). The eye-tracker sampling rate was 250Hz. A chin rest was used to keep viewing distance constant and to minimize head movements.

**Procedure**
The test was divided into three conditions with differing instructions before each condition, where condition 1 always came first and the order of condition 2 and 3 was randomized among participants. During the first condition, participants were simply asked to watch the images freely; during condition 2 and 3, the participants were asked to look at the images and either choose the most appealing image or to choose the image with the body most resembling their own, respectively. The picking procedure was configured so that after the 3 seconds of visual stimuli, the images was replaced by the numbers 1-4 in the matrix and participants could click on the chosen number using the computer mouse.

On the day of the test, a researcher explained the testing procedure (Appendix C) to the participant and a consent form was signed (Appendix D). Participants were blinded to the full purpose of the study but was told the study examined women's well-being and media.

Following a standardized calibration procedure for eye movements, participants were asked to rate their overall satisfaction with their bodies at the moment on a scale of 1-10. This request was made again following each condition. During each condition, the 24 slides were presented to the participant in a random order. Eye movement data was recorded during each trial, starting immediately before the onset of the images and terminating as they disappeared.

Following the session, the participants were weighed and measures and then debriefed about the true research purpose and given a scratch ticket as compensation for their time. An e-mail was sent out to all participants where they again were thanked for their participation and the e-mail contained information as to where to turn in case they had questions regarding the project or if questions about their own health had arisen.

Data preparation and analysis

Eye-tracking data was calculated and extracted using BeGaze (SensoMotoric Instruments GmbH, 2015). Saccades that remained stable within a 1 degree visual angle for at least 100 ms were classified as fixation to that position. Four areas of interest (AOI) was created covering the position of the images + 5 % to allow for small errors in calibration and measurements. For the purpose of this study, duration and frequency of fixations within AOIs was recorded and any fixations outside of these AOIs were excluded from the analysis. For each participant, the average fixation time in ms and relative fixation count in % for each body type and condition was calculated as well as an attention bias index defined by the difference in the fixation time and fixation count between Body Type A and D.

Ethics

The current study was conducted in accordance with the Mid Sweden University’s ethical guidelines and with the Swedish Act concerning the Ethical Review of Research Involving Humans (SFS 2003:460).

Result

Fixation Time

A mixed design 2 (Group: BD group, control group) x 3 (Condition 1, 2, & 3) x 4 (Body Type: A, B, C, & D) ANOVA on average fixation time revealed a three way interaction. As can be seen in Figure 1, while the control group had no obvious tendencies for Body Type preferences during the free viewing task (Condition 1), the BD group spent relatively more time on Body Type A and B. Further, when instructed to find to most appealing body (Condition 2), the difference between the groups are not as apparent as both groups spent more time on Body Type A and B, compared to Body Type C and D. Finally, during Condition 3, when instructed to find a body resembling their own, the BD group spent most of their time on Body Type B and C, while the control group spent more time on Body
Type A and B. This was shown by an interaction effect between Group, Condition and Body Type, $F(6,222)=13.19$, $p<.01$, $\eta^2=.26$. In addition to the 3 way interaction, the ANOVA revealed a significant main effect of Body Type, $F(3,111)=36.32$, $p<.01$, $\eta^2=.50$, as well as an interaction effect of Condition x Body Type, $F(6,222)=16.31$, $p<.01$, $\eta^2=.30$, but these effects are better explained by the three way interaction effect. No other significant effects were found.

To analyze the differences in attention bias between conditions, the difference between time spent on Body Type A and Body Type D was calculated for each participant, henceforth called Attention Bias Index for Time. A mixed design 2 (Group: BD group x Control group) x 3 (Condition: 1, 2, & 3) ANOVA on attention bias index revealed a significant difference between conditions, shown by a main effect of Condition, $F(2,74)=19.26$, $p<.01$, $\eta^2=.34$. However, as indicated by the means displayed in Figure 2, the groups behaved differently across conditions and these differences are thus better explained by the retrieved interaction effect of Condition x Group, $F(2,74)=25.52$, $p<.01$, $\eta^2=.41$. There was no significant main effect of Group.

Pairwise comparison (uncorrected) revealed that there wasn’t a significant difference between the groups in attention bias (i.e. spent more time on Body Type A than D) during the free viewing task (condition 1), $t(37)=1.91$, $p>.05$, $d=0.61$, however, one-sample t-test shows that the attention bias index score was significantly greater than 0 for the BD group, $t(19)=3.45$, $p<.01$, but that this was not the case for the control group, $t(18)=1.86$, $p>.05$. There was no significant difference between the groups during the second condition where the objective was to find the most appealing body shape image. During the third condition, when instructions were to find a body shape image resembling their own, the attention bias index of the control group was significantly higher. $t(37)=4.50$, $p<.01$, $d=1.44$. To address the changes between conditions for the BD group, paired samples t-test was conducted and revealed that the BD group had a significantly greater attention bias when instructed to find the most appealing body image compared to during the free viewing task, $t(19)=2.62$, $p<.05$, $d=0.60$, and a significant decrease in attention bias index when instructed to find the body type most resembling their own compared to the free viewing condition, $t(19)=4.10$, $p<.01$, $d=1.10$. 
Figure 2. Average difference of fixation time in ms (vertical bars indicate 95% confidence intervals) between images of thin and big body types, where a positive result indicate more time spent on the thinner body type, over 3 conditions of instruction, 1) free viewing, 2) finding the most attractive body, 3) finding the body type most resembling their own. BD group = Body Dissatisfaction group.

Relative Fixation Times

A mixed design 2 (Group: BD group, control group) x 3 (Condition 1, 2, & 3) x 4 (Body Type: A, B, C, & D) ANOVA on relative fixation times revealed a three way interaction and as seen in Figure 3, the control group demonstrated no significant differences between Body Types during the free viewing task (Condition 1), while the BD group fixated relatively more times on Body Type A. When instructed to find to most appealing body (Condition 2), there were no differences between the groups and both groups fixated more often on Body Type A and B, than on Body Type C and there were least amount of fixations on images of Body Type D. When instructed to find a body resembling their own (Condition 3), the BD group fixated fewer times on Body type A and more on Body Type C and D, compared to controls. This was shown by the interaction effect of Group, Condition and Body Type, $F(6,222)=11.90, p<.01, \eta_p^2=.24$. The overall pattern is very similar to that found for Fixation Time. The ANOVA also revealed that there were significant differences between body types, explained by the main effect of Body Type, $F(3,111)=33.09, p<.01, \eta_p^2=.47$, and an interaction effect of Condition x Body Type, $F(6,222)=16.04, p<.01, \eta_p^2=.30$, but these effects are better understood in the light of the three way interaction. No other significant effects were found.
To assess the level of and differences in attention bias between conditions and groups, the difference between amount of fixations on Body Type A and Body Type D was calculated for each participant. A mixed design 2 (Group: BD group x Control group) x 3 (Condition: 1, 2, & 3) ANOVA on Attention Bias Index Count revealed that there were significant differences in attention bias index between conditions, shown by a main effect of Condition, $F(2,74)=22.69, p<.01, \eta^2_p=.38$. However, as indicated by the means shown in Figure 4, the ANOVA also revealed that there were differences between groups across conditions, shown by an interaction effect of Condition x Group, $F(2,74)=22.44, p<.01, \eta^2_p=.38$. No other significant effects were found.

Again, pairwise comparison revealed that there was no significant difference between the groups during the free viewing condition (condition 1), $t(37)=1.78, p>.05, d=0.58$, but one sample t-tests revealed that the BD group had an attention bias index significantly greater than 0, $t(19)=2.83, p<.05$, which was not the case for control group, $t(18)=1.55, p>.05$. During the second condition, when instructed to find the most attractive body, no significant differences was found between the groups. Finally, during the third condition, the BD group had a significantly lower attention bias index compared to the control group, $t(37)=4.70, p<.01, d=1.51$. Paired sample t-test also revealed that the BD group had a significantly greater attention bias (i.e. fixated more times on Body Type A than D), during condition 2 (finding the most attractive body) compared to condition 1 (free viewing), $t(19)=3.06, p<.01, d=0.84$, and significant smaller or reversed attention bias during condition 3 (finding a body that resembles one’s own) compared to condition 1, $t(19)=6.97, p<.01, d=0.77$. 

![Mean relative fixation times (RFT) in %, (vertical bars indicate 95% confidence intervals) on images of different body types, Body Type A=thinnest body type and D=biggest body type, over 3 conditions of instruction, 1)free viewing, 2)finding the most attractive body, 3)finding the body type most resembling their own, for a) Body Dissatisfaction group and b) control group.](image)
Figure 4. Average difference of fixation count (vertical bars indicate 95% confidence intervals) between images of thin and big body types, where a positive result indicate relatively more fixations on the thinner body type, over 3 conditions of instruction, 1) free viewing, 2) finding the most attractive body, 3) finding the body type most resembling their own. BD group = Body Dissatisfaction group.

Covariance and BMI

The sum on BSQ-8C and BMI of participants were strongly correlated, r(38)=.508, p<.01 and all the analysis mentioned above, were also conducted using BMI as a covariate as this has been done in previous studies (Gao et al., 2014). However, the general pattern of results were very similar to those already reported and the results of these analysis were consequently not reported.

Order of condition 2 and 3

The order of condition 2 and 3 were randomized and unfortunately unevenly distributed within the groups (BD group, condition 2 first: n=7 and condition 3 first: n=13; Control group, condition 2 first: n=8 and condition 3 first n=11). Analysis were conducted including this variable, however no significant results were obtained and thus excluded from further analysis.

Discussion

The results of this study indicate that the visual scanning behavior are different between women with and without body dissatisfaction and that attention bias can be altered by the use of instructions. Along with the first hypothesis, women with higher levels of BD demonstrated an attention bias, regarding both amount of fixations and fixation duration, towards thin body images that was not apparent in the control group when no specific task was appointed. Secondly, the results of this study also support the hypothesis that when given instructions to find the most appealing body shape image, both groups would demonstrate this bias in attention, however the attention bias of the BD group exceeded the attention bias exhibited during the first condition. Thirdly, it was hypothesized that when instructed to find an image with a body type resembling their own, the BD group would allocate less attention towards thin body images, which was also found to be true within this sample.
In more detail, this study showed that women who are dissatisfied with their bodies have an attention bias towards thin body shape images that is apparent when no instructions are given and that this bias in attention, within the same context, did not appear for the controls. These findings, increased allocated attention towards thin body types during a free viewing task, is perfectly in line with previous research findings of women with eating disorders (Jansen et al., 2005), patients with bulimia nervosa (Blechert et al., 2009), patients with anorexia nervosa (Pinhas et al., 2014), and among women with elevated levels of body dissatisfaction (Roefs et al., 2008; Gao et al., 2014). These results can be explained by the means of social comparison theory (Festinger, 1954), as an expression of upwards social comparison and along with the tendency of body dissatisfied women to do more upwards social comparisons (Corning et al., 2006), i.e. allocate more attention to images of women that are in some regard superior to them. The novelty of these results are that this attentional preference for images of thin body shapes can be changes, and in this case strengthened if the women with BD are given instructions to find the most appealing body. The visual scanning behavior of this condition, very much resembles that exhibited during free viewing, but as noted, the tendency to allocate more attention towards thin body shape images is significantly increased. As the visual scanning behavior during this second setting of instructions are very similar to those displayed by the women without body dissatisfaction, it is plausible to assume that this increase in attention allocation towards thin body images represents what it generally looks like when women try to find the most attractive body. Therefore, as the women with body dissatisfaction showed a similar type of pattern during the first condition, it could be assumed that they are implicitly engaged in comparing and finding the most attractive body shape, even without explicit instructions to do so.

The other finding of significance is that when instructed to find the body type most resembling their own, the attention bias of women with body dissatisfaction more or less disappeared as relatively more attention was directed towards the bigger body shapes, while the control group in contrast maintained the attentional preference towards thin body shape images. The discrepancy between how the body dissatisfied women looked at the images during this condition and when they were instructed to find the most appealing body type image, concords with the fact that they are unhappy with their body shape, whilst the control group seem to be congruent with what they like and how they perceive themselves. Due to the significant difference in BMI, if the participants simply followed the instructions and directed their attention towards a body type that did resemble their own, we should expect this difference between groups. However there is a possibility that the BD group view themselves as larger than they actually are, which was expected but was not taken into account in this study. Research that take the BMI or other more accurate measurements of body shape such as 3D body scanning (Wells, Treleaven, & Cole, 2007) of the images and the participants could possibly reveal more about these potential distorted body shape assumptions.

The aim of this study was to investigate the more automatic processes and early stages of attention and supports previous findings that emotion-provoking and fear-relevant images are found faster and steals the attention of other stimuli, especially during early stages of processing, (Öhman et al., 2001; Yiend, 2010). However, with the use of eye-tracking, it is possible to get a continuous measure of attention that also includes latter stages of attention and gain access to more cognitive processes that can be of interest and importance. With longer presentation time it should be possible to gain more insight into how women more cognitively choose to spend their time and if there could be some sort of fear-avoidance paradigm. As previous studies have shown, women with BD and/or ED have other attention biases tendencies that can be of interest, for example the duration and latency of first fixation (Gao et al, 2014; Gao, Weng, Chen, Wang, & Zhang, 2012). These measures are used as
indicators of speeded detection and of attentional disengagement and differences can be attributed to the fear-relevancy of these images for women dissatisfied with their bodies. If these images of thin body shape images (and fat body shape images) really are fear/emotion-evoking, some type of increase of arousal should be measured. With the use of measures that are compatible with the eye-tracking, such as saccadic speed and/or pupil dilation (Di Stasi, Catena, Cañas, Macknik, & Martinez-Conde, 2013; Henk van, 2011), it should be possible to detect if there is an increase in arousal in these situations, which ultimately could shed further light on the question about the fear-relevancy of these body shape images.

There are a few limitations of this study and its design, especially regarding the sampling procedure, the visual stimuli and with an aspect of the experimental design. First of all, the background information collected from the participants mainly focused on the body dissatisfaction aspect but could have incorporated other variables that could have been of importance, such as eating attitudes and restrictions, social media usage and attitudes towards the thin-ideal, something that future studies could take into account. Regarding the participants, advertisement and emails was sent out to hundreds of student but there were only 121 respondents and out of these 121 roughly 16% had at some point in their life been diagnosed with an eating disorder and the mean on BSQ-8C for all participants was 23.6 while the norms for a Swedish population within the same age group is 20 (Welch et al., 2012). These numbers seem very high and could possibly indicate that the participants were especially interested in this topic, potentially due to some type of disorder saliency of the project. On the other hand, eating disorders are most common among high-achieving perfectionist young women (Keel & Forney, 2013), traits that could be of higher prevalence within a population of the high-aspiring young students at a University. The question still remains if this sample is representative of young women in general or of undergrad students interested in eating disorders.

Concerning the visual stimuli, there was a problem with the spacing between them as it was possible to attend one image but not look directly at it. Since only fixations within the areas of interest were analyzed, this could indicate that some fixations are not registered and thus excluded from the analysis. Another problem was that the same images were shown several times and some images, especially from Body Type C and D, were shown 6 times. It is unclear how this has affected the results as there could have been some sort of recognition of the images that could cause the participants to spend less time on them. If this was the case it would be demonstrated by less time spent on body types C and D, especially during the latter conditions, which was also the case.

Finally, the question about current body satisfaction that was presented a total of 4 times during the testing procedure needs to be addressed. The answer to this question and how the groups were affected, was the research question of a study conducted parallel to this, but it is possible that this question have interfered with the visual scanning behavior as well as the question made the participants draw attention to their own body and level of satisfaction. Preliminary results from that study indicate that groups were affected differently which could pose a problem for the validity of the results of this study, since it could have created some sort of demand characteristics or increased levels of dissatisfaction that this study has not accounted for. Due to the relatively short presentation time, this risk could have been averted to some degree since it prevented the participants from applying cognitive strategies to their visual scanning behavior to a large extent.

To conclude, this study has shown that women dissatisfied with their bodies generally allocate more of their attention towards images of thin body shapes but when instructed to find a body shape resembling their own, this attention bias towards thin body shapes more or less diminished. Since the design of the current study, combining instructions and presenting
images of various body types simultaneously, hasn’t been done yet within this line of research, these results in their entirety can neither be backed nor opposed by similar findings. Since body dissatisfaction and attention bias seem to be important components of understanding the mechanism behind the development and maintenance of eating disorders, more research regarding how we can affect and alter these biases is needed, and maybe, that way accomplish a change in body satisfaction in order to treat and prevent eating disorders.
References


Appendix A

E-mail to students

Hej!

Just nu genomförs ett forskningsprojekt inom ramen för examensarbete på Mittuniversitetets Psykologprogram. Forskningsprojektet handlar om hur kvinnors kroppar porträtteras i media och hur det påverkar oss. För att möjliggöra detta projekt behöver vi ett antal kvinnliga deltagare i åldern 18-25 år. Vi vänder oss därför till dig för att undersöka om du skulle vilja delta i denna studie. Deltagandet är frivilligt och anmälan görs genom att besvara frågorna som du hittar i länken i detta e-mail. Lämna även din e-mailadress och ditt telefonnummer så vi kan komma i kontakt med dig angående deltagande i efterföljande testställfälle. Anmälan är inte bindande och du kan när som helst avbryta ditt deltagande utan att uppge anledning.

Som tack för ditt deltagande får du en trisslott.

Klicka här för att komma till enkäten och delta i studien: https://freud.itm.miun.se/psyklab/ht15/kroppsyn

Om du har några frågor och vill veta mer om studien är du välkommen att höra av dig till oss via e-mail, PSY2016@miun.se

Tack på förhand!

Alexandra M. Jansson, Marie Manholm och Kerstin By
Psykologkandidater, Psykologprogrammet år 5
Appendix B

**Example of body shape images,**
Top left: Body Type A, Top Right: Body Type B, Bottom left: Body Type C, Bottom right: Body Type D
Information till dig som är intresserad av att delta i Kroppsprojektet vid Mittuniversitetet

- Inga personuppgifter kommer att lagras eller användas i studien. Alla malladresser och telefonnummer som används för att komma i kontakt med forskningsdeltagarna kommer att raderas och/eller förstöras så att de ej kan brukas efter studien.

- Informationen som samlas in kommer att användas i tre olika studier, alla inom Kroppsprojektet, men med olika forskningsfrågor. Den insamlade informationen kommer inte att användas till något annat än detta.

- Studien bedrivs av tre studenter på femte och sjätte året av psykologiprogrammet. Studien ligger till grund för dessa studenters psykologexamen uppsats. Kroppsprojektet handleds av professor Francisco Esteves som också är huvudman för studien.


- Som tack för din medverkan och bidrag till forskning inom området mottar du, efter deltagandet i psykologilaboratoriet, en trisslott.

- Förståndare för forskning vid Mittuniversitetet är Ingrid Zackrisson, docent och avdelningschef för Avdelningen för psykologi vid Mittuniversitet.

- Du kan när du vill avbryta din medverkan i studien, utan att uppgöra någon särskild anledning.

- Genom att skriva under följande blankett samtycker du till att dina svar får användas inom ramen för "Kroppsprojektet" i enlighet med vad som framgår i samtyckesblanketten.

För frågor och vidare information om projektet är du välkommen att mälla PSY2016@miun.se
Appendix D

Consent form

Samtycke till deltagande i forskningsstudie

Nedan ger du ditt samtycke till att delta i denna studie vars syfte är att undersöka hur kroppsideal och bilder på kroppar, påverkar kvinnors mående och välbehag.

Läs igenom nedanstående noggrant och ge ditt medgivande genom att skriva under med din namnteckning nedan

- Jag har tagit del av informationen kring studien och är medveten om hur den kommer att gå till samt vilken tid den tar i anspråk
- Jag har fått tillfälle att få mina frågor angående studien besvarade innan den påbörjas samt information om vem jag kan vända mig till om frågor uppstår
- Jag deltar i denna studie helt frivilligt och har blivit informerad om varför jag har blivit tillfrågad att delta samt vad syftet med deltagandet är
- Jag är medveten om att jag när som helst under studiens gång kan avbryta mitt deltagande, utan att behöva förklara varför
- Jag ger härmed mitt medgivande till Mittuniversitetet att lagra och bearbeta den information som har samlats in under studien
- Jag ger detta medgivande förutsatt att inga andra än de forskare som är knutna till studien kommer att ta del av det insamlade materialet

Namn

 Ort

 ____________________________

Namnförtydligande

 Datum

 ____________________________