

RUNNING HEAD: Information Processing Biases and Appearance Concern

Attentional and interpretative biases in appearance concern: an investigation of biases
in appearance-related information processing.

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Abstract

The present study examined associations between information processing biases in interpretation and attention with high levels of appearance concern. A nonclinical sample (n=83) categorised ambiguous stimuli as related or unrelated to appearance. Participants then responded to the same stimuli in a modified dot-probe task assessing attentional bias. Participant responses were assessed in relation to level of appearance concern. The results indicated a valence specific bias towards interpretation of ambiguous stimuli as negative and appearance-related in individuals with higher levels of concern. There was also evidence of attentional bias towards information perceived as appearance-related in high appearance concern participants. The study findings suggest that individuals with high levels of appearance concern may perceive the world in a way that reinforces and exacerbates their concern.

1. Introduction

Associations between processing styles and psychological disorders such as anxiety (e.g. Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg & van IJzendoorn, 2007) and depression (e.g. Mogg & Bradley, 2005; Strunk & Adler, 2009) are relatively established. Associations between information processing and appearance concerns, however, have received less extensive research. Those who have investigated appearance-related cognitive biases have provided evidence of both increased discrimination (Markus, Hamill & Sentis, 1987) and recall of appearance-related information (Altabe & Thompson, 1996) in individuals with high levels of concern. Increased Stroop task interference has also been demonstrated, although this attentional bias effect was contingent on pre-task appearance priming (Labarge, Cash & Brown, 1998). The priming task requirement may suggest that appearance-related attentional biases do not occur automatically at a pre-conscious stage of processing; rather, conscious direction of attention towards appearance information may be required as a trigger. More recently however, employment of the dot-probe task (Maner, Holm-Denoma, Van Orden, Gailliot, Gordon & Joiner, 2006; Shafran, Lee, Cooper, Palmer & Fairburn, 2007) and eye-tracking technology (Hewig, Cooper, Trippe, Hecht, Straube & Miltner, 2008) in individuals with eating disorders has demonstrated preferential attention towards specific bodily features and negative appearance stimuli without pre-task priming. The discrepancy between stage of activation and automaticity of bias activation in these studies may reflect the complexity of appearance concern. Mogg and Bradley's (2005) review suggests anxiety-related attentional bias is observable at an earlier stage of processing than depression-related bias. Given that appearance concern can be characterised in part by both anxiety and depression (Carr, Harris & James, 2000), the conflicting evidence may reflect these differences.

In addition to the attention biases reported, appearance issues have also been associated with appearance biased interpretation. An increased likelihood of interpreting ambiguous situations as negative and appearance-related has been demonstrated in obese individuals (Jansen, Smeets, Boon, Nederkoorn, Roefs & Mulken, 2007) and those with eating disorders (Cooper, 1997) compared to those without. Processing biases, such as preferential interpretation and attention, may lead to a perception of the world that is dominated by the subject of the individual's concern. Highly anxious individuals are considered to develop hypervigilance towards threatening stimuli, characterised as a self-reinforcing perception of threatening stimuli regardless of environment (Matthews, 1990). A comparable appearance-

orientated perceptual cycle may develop in individuals with high levels of appearance concern.

At present research has predominantly focused on weight- and shape-related processing biases. Evaluation of more general appearance concerns, characterised within this article as concern with one's entire external image, remains relatively unexplored. General concerns beyond weight are commonplace and can reach alarming severity (Harris & Carr, 2001). Appearance concern can be complex and debilitating, contributing to feelings of inadequacy which may extend from perception of appearance to perception of self. There is a need to understand appearance concern outside of the boundaries of weight and shape. Detection of processing biases may be useful informants for intervention development (see Mobini & Grant, 2007); by understanding the specific mechanisms involved in the development and maintenance of appearance concern more tailored support could be designed than exists at present.

The aim of the present research was to investigate processing differences in general appearance concern within a nonclinical sample. It was proposed that individuals with higher levels of concern would exhibit processing that reinforces and exacerbates their concern. Two features of processing were targeted: 1) stimuli interpretation, and 2) attention to stimuli. It was predicted that individuals with higher levels of concern would (a) be more likely to perceive ambiguous stimuli as appearance-related, especially when also interpreting negative associations; (b) demonstrate biased attention towards appearance stimuli over nonappearance stimuli.

The stage of processing at which attentional biases become observable also received preliminary investigation. The literature reviewed suggests conflicting evidence as to the automaticity bias priming. This disparity is also reflected theoretical in the associations between appearance concern and both anxiety and depression – as mechanisms related to these conditions appear to differ in activation stage. This issue was examined to further clarify the potential mechanisms of biased processing in appearance concern.

2. Methods

2.1 Participants

Participants were 83 UK university psychology students. Participants were recruited through a participant pool and were awarded credit for participation. Participants were 18 years of age or older, and literate in English. Of the 83 participants recruited, three were excluded as outliers during data screening – section 3.1. The sample predominantly comprised of females (79%). The age range of participants was 18-49 years old; the average age, 22 years (SD = 6.36).

2.4 Visual Dot-Probe Task Assessing Attentional Bias

A modified version of the dot-probe task (MacLeod, Mathews & Tata, 1986) was employed. The task involves the presentation of word pairs representing different types of stimuli (e.g. appearance and nonappearance information) and assessment of attention to each word. Pilot research was conducted to select appropriate word pairs. Twenty-five word pairs were selected by their ambiguous relevance to appearance and matched on word length, frequency in written and spoken language, and threat level – e.g. ANXIOUS-NERVOUS, FELLOW-STEADY, ETHNIC-MODEST. Matched threat levels were included to decrease confounding effects of anxiety on attention.

A fixation point was presented for 500ms. Words were presented 1.5cm above and below the central point (visual angle of less than 2°). The words were 8mm tall,

and presented in all capitals. Word pairs were presented for 500ms, after which time one word was replaced by a dot, the other remained. Participants were required to identify the location of the dot by pressing the appropriate button.

The continued presentation of one word alongside the probe was to evaluate whether prolonged stimuli presentation influenced any attentional bias observed. This modification of the traditional paradigm was designed to provide initial assessment of processing stage of bias activation. If any bias demonstrated was related to the remaining word only, this may suggest prolonged presentation, thus deeper processing, was required to instigate appearance-related processing biases. General attentional bias towards appearance stimuli regardless of presentation time was also assessed by calculating an Attention Bias Index – section 2.6.

Word pair presentation was randomised by the computer programme SuperLab. Each pair was presented four times. Word location was counterbalanced by presenting words on both halves of the computer screen twice. One hundred trials were conducted. Prior to the recorded trials a short practice trial using neutral words was conducted to orientate participants to the task.

2.3 Word Categorisation Task Assessing Interpretation

Participants categorised the 50 words used in the dot-probe task as either ‘appearance-related’ or ‘non-appearance related’. In a separate component of the task the same words were presented again and this time categorised as ‘negative’, ‘neutral’ or ‘positive’. Presentation order was randomised by the computer programme. The categorisation provided an assessment of interpretation of stimuli and valence.

2.4 Psychometric Measures Assessing Appearance Concern and Mood

Two psychometric measures were included, assessing mood and appearance concern respectively. Mood was appraised using the ‘Positive and Negative Affect Schedule’ (PANAS: Watson, Clark & Tellegen, 1988), a twenty item likert scale design assessing the relevance of valenced words to present mood. The resultant output is an evaluation of positive (PA) and negative (NA) affect respectively. The authors report convergence validity with a number of measures of affective disorder (Beck, Ward, Mendelson, Mock & Erbaugh, 1961; Derogatis, Lipman, Rickels, Uhlenhuth & Covi, 1974; Spielberger, Gorsuch & Lushene, 1970). The measure also demonstrates adequate internal consistency, $\alpha = 0.80$ (PA) and $\alpha = 0.85$ (NA).

The short form version of ‘Derriford Appearance Scale’ was also employed (DAS24: Moss, Harris & Carr, 2004). The twenty-four item measure assesses level of appearance concern. It has adequate internal consistency ($\alpha = 0.92$) and convergent validity with measures of anxiety, depression, social avoidance, social distress, fear of negative evaluation, negative affect, and shame ($r \geq 0.45$).

2.5 Procedure

A within subjects design was employed. Participants completed all tasks and psychometric measures in isolation on a computer. The content of cognitive tasks was randomized using the computer programme presenting the material. The order of tasks was a fixed sequence to prevent potential priming effects. The dot-probe task preceded the categorisation task and the psychometric measures to prevent priming appearance-biased attention. The psychometric measures followed completion of the other tasks and were also randomized.

2.6 Analyses

Shapiro-Wilk tests of normality were conducted prior to the analyses outlined. Non-normal distribution for DAS24 scores, the negative affect subscale of the PANAS, and response latencies ($p < 0.05$) was found. The raw data were converted to standardised z-scores for analyses reported. The standardised data still did not meet all parametric assumptions of normality. Consequently, nonparametric analyses were favoured. Parametric analyses were only conducted when a nonparametric equivalent was not feasible (e.g. ANCOVA).

Analysis of word interpretation in relation to the level of appearance concern included a combination nonparametric correlation analyses and a repeated-measures ANCOVA. The correlation analysis was conducted to explore the potential relations between the number of words interpreted as appearance-related and level of concern. The ANCOVA analysis extended this investigation by assessing the influence of appearance concern on word valence.

The ideographic categorisation task was used to identify which words each participant perceived as appearance-related and nonappearance-related. The categorisation of appearance and nonappearance words was then used for the subsequent reaction time analysis. Analysis of the dot-probe data was two-fold: firstly, in accordance with the traditional method employed by Mathews et al (1986), an Attention Bias Index was evaluated. This index was calculated by subtracted reaction time when the probe appeared in place of nonappearance words from when it appeared in place of appearance words. Negative scores indicate quicker response to appearance stimuli. Correlation analysis between bias index and appearance concern was conducted. Secondly, a 2x2 repeated-measures ANCOVA of stimulus type (appearance vs. nonappearance) by word activity (remain vs. remove) was conducted to evaluate the impact of prolonged stimulus presentation, employing appearance concern as covariate.

3. Results

3.1 Data Screening

Data was screened based on dot-probe reaction times and number of error responses – i.e. misidentification of dot location. Participants with average reaction times outside the normal distribution of the sample (> 250 and < 600 ms) were excluded. The number of participant errors, defined as misidentification of probe location, was modest – lying between 0-19 errors. One participant demonstrated more than 50 errors suggesting a misunderstanding of the task requirements. Two participants were excluded based on reaction time criteria and one based on error response ($n = 80$). In the analyses exploring attention bias one additional participant's data were not included as their word interpretation did not allow for combinations of appearance and non-appearance word pairs.

3.2 Descriptive Statistics

Previous use of the DAS24 in a nonclinical sample suggested females and younger participants (18-49 years) generally report higher levels of concern (mean = 37.09; SD = 15.13) as measured by the DAS24 (Carr, Moss & Harris, 2005). Participant response within this study was slightly higher (mean = 41.55; SD = 12.31) than those reported previously by Carr et al (2005). The difference is, however, relatively small and may be explained by the young, predominantly female sample. Regression analysis confirmed convergence validity between the DAS24 and the PANAS measures ($F(2,77) = 6.765$; $p = 0.002$) for both positive ($\beta = -.217$) and negative affect ($\beta = .330$).

3.3 Word Interpretation

No statistically significant relationship was found between level of appearance concern and number of words interpreted as appearance-related ($r(78) = -.016$; $p(\text{one-tailed}) = .444$). When accounting for interpretation of word valence, however, individuals with higher levels of appearance concern reported more words as both negative and appearance-related ($r(78) = .231$; $p(\text{one-tailed}) = .020$) than those with low levels of concern. Given that depression and negative affect have been related to attentional processing bias, partial correlation analysis accounting for negative affect was conducted. The relationship between number of words categorised as negative appearance words and appearance concern remained significant, although the effect size did diminish slightly ($r(77) = .184$; $p(\text{one-tailed}) = .050$). Appearance concern did not demonstrate a significant relationship with number of neutral or positive valence appearance words ($p > 0.2$).

3.4 Attentional Bias

A negative correlation of small to medium effect size between Attentional Bias Index and appearance concern ($r(78) = -.204$; $p(\text{one-tailed}) = -.036$) was found. As stated, lower Attention Bias Index scores reflect increased attention towards appearance information. Hence, this finding suggests individuals with higher levels of appearance concern demonstrate attentional bias towards appearance stimuli.

A repeated-measures ANCOVA was also conducted to evaluate the impact of the duration of stimuli presentation. No significant interaction was found between appearance concern and stimulus type, regardless of whether the stimulus received prolonged presentation ($F(1,68) = 0.64$; $MS = 0.075$; $p = .427$) or was removed ($F(1,68) = 1.127$; $MS = 0.110$; $p = .292$).

4. Discussion

The aim of the investigation was to assess whether individuals with higher levels of appearance concern perceive and process appearance-related information differently than those without such concern. The results indicate support for this proposition.

Interpretation of ambiguous stimuli as appearance-related did demonstrate an association with level of appearance concern. Although a general bias towards interpreting ambiguous stimuli as appearance-related was not present, a valence specific interpretation bias was found. Compared to participants with low levels of appearance concern, those with higher levels of concern reported interpreting more words as being both appearance-related and of negative valence. This finding persisted even when accounting for present level of negative affect. Although causality cannot be assumed, the evidence suggests that individuals with greater concern about their appearance also perceive more elements of their environment as appearance-related and negative.

Concurrent with evidence of biased attention in eating disorders (Shafran et al, 2007), an appearance-orientated attentional bias was demonstrated. Participants' response to the dot-probe task was associated with their level of appearance concern. Individuals with higher levels of concern also demonstrated increased attention directed towards stimuli interpreted as appearance-related. It may be that individuals with higher levels of appearance concern preferentially attend to appearance information, which exacerbates their concern. The presence of a general appearance-

related bias within a nonclinical sample suggests such maladaptive processing may be more common than previously assumed.

The appearance priming required in the Stroop task reported by Labarge et al (1998) suggested that appearance-related attention bias may occur at a post-attentive level of processing. The bias observed within the present research, however, was independent of presentation time of stimuli (i.e. prolonged or standard) implying that the biases are activated at an earlier stage of processing ($\leq 500\text{ms}$). The discrepancy between these findings may be due to different attention tasks utilised. The Stroop task requires attention to differentiate between attributes of the same stimulus whereas the dot-probe task requires spatial attention (Mogg, Bradley, Dixon, Fisher, Twelftree & McWilliams, 2000). Although a modification of the dot-probe task was employed in this study, entailing differentiation between two separate stimuli in the response condition, this task still presents different requirements to the within stimulus differentiation of the Stroop task. Labarge et al's finding may reflect biases during more complex perceptual procedures. This study suggests that basic appearance-orientated processing biases may occur automatically without pre-task priming.

The results do not differentiate whether the biased processing occurs at a stage more comparable to anxiety (pre-attentive) or depression (attentive). Further investigation employing masked and unmasked versions of the traditional dot-probe task would aid clarification of potential distinction. Comparable investigation of processing biases and their magnitude in a clinical sample is also required to establish the extent of the association between maladaptive processing mechanisms and appearance concern. Finally, the causality of the relationship between concern and processing biases cannot be inferred from the present research. Experiment manipulation of attention towards negative weight/shape stimuli by Smith and Reiger (2006) suggests that this relationship may potentially be interactive. Further evidence is required to establish whether this is the case within general appearance concerns as well as eating disorders.

4.1 Conclusions and Implications

The research suggests that concern appears to incorporate a propensity to interpret ambiguous stimuli as both negative and appearance-related as well as preferentially attending to information categorised as such. These features are reminiscent of the negative perceptual cycle of hypervigilance in anxiety described by Matthews (1990). Individuals with high levels of concern may perceive the world in a way that continually reinforces and exacerbates their concern. Recent research has provided evidence that experimental manipulation of anxiety-biased processing, components of hypervigilance, can reduce anxiety (Beard & Amir, 2008); similar therapeutic methods may apply to treatment of appearance concern. Therapy targeting the impact of maladaptive perception may prove useful, both CBT (see Mobini & Grant, 2007) and Acceptance and Commitment therapy (Hayes, Strosahl & Wilson, 1999) offer potentially beneficial approaches. Further exploration of related processing biases may also aid the tailoring of more effective treatment.

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