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Diminishing covariation bias in women with a negative body evaluation and the potential roles of outcome aversiveness and interpretation of social feedback

Jessica M. Alleva [a,b,*], Bobby G. Stuijfzand [c], Carolien Martijn [a]

[a] Department of Clinical Psychological Science, Maastricht University, The Netherlands
[b] Centre for Appearance Research, University of the West of England, Bristol, United Kingdom
[c] Jean Golding Institute, University of Bristol, Bristol, United Kingdom

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ABSTRACT

Women with a more negative body evaluation perceive that their body is associated with more negative social feedback. This *covariation bias* could reinforce negative body evaluation. We investigated whether covariation bias could be diminished and explored the potential roles of outcome aversiveness and interpretation of negative social feedback associated with one's body. Ninety-seven undergraduate women completed a computer task wherein photos of their body, a control woman's body, and a neutral object were followed by negative social feedback or nothing. When the relation between each category and the negative feedback was random, women with a more negative body evaluation perceived more negative feedback following their body. They also experienced negative feedback following their body and the control woman's body as more aversive. After a manipulation block, women with a more negative body evaluation no longer perceived more negative feedback for their body. These effects coincided with improvements in state body evaluation.

1. Introduction

Cognitive-behavioural perspectives of body image propose that body evaluation (i.e., satisfaction or dissatisfaction with one's body) influences cognitive processing, and vice versa (Cash, 2011). For example, research has shown that negative body evaluation is associated with distortions in cognitive processing such as dichotomous thinking and selectively focusing on self-perceived physical flaws (Cash, 2011; Jakatdar, Cash, & Engle, 2006). In turn, distortions in cognitive processing can reinforce and maintain negative body evaluation (Williamson, White, York-Crowe, & Stewart, 2004). Similarly, interpersonal experiences and body evaluation mutually affect one another. For example, interpersonal experiences ranging from childhood teasing and bullying to body language and eye gaze can encourage negative body evaluation (Cash & Fleming, 2002; Fredrickson & Roberts, 1997; Jones, 2011). Conversely, negative body evaluation can cause individuals to behave in ways that confirm their body concerns (Cash & Fleming, 2002). For example, if a woman is convinced that she is unattractive, she might inadvertently keep others away by avoiding eye contact or conversation.

Recent research by Alleva and colleagues has integrated cognitive processing and interpersonal experiences in the context of body evaluation, namely by investigating covariation bias (Alleva, Lange, Jansen, & Martijn, 2014; Alleva, Martijn, & Jansen, 2016). *Covariation bias* is a distortion in cognitive processing whereby an individual overestimates the contingency (relationship) between a stimulus and an aversive outcome, even when the contingency is absent or is correlated in the opposite direction (Chapman & Chapman, 1967). Applied to body image specifically, women with a more negative body evaluation have been found to overestimate the relationship between their *own body* (the stimulus) and *negative social feedback* (the aversive outcome; Alleva et al., 2014, 2016). In a first study (Alleva et al., 2014), undergraduate women completed a computer task wherein pictures from three stimulus categories – pictures of one's own body, a control woman's body, or a neutral object – were followed by facial crowds consisting of *equal* proportions of negative, positive, and neutral social feedback. Images of faces are commonly used to simulate social feedback in research on social anxiety (Hirsch & Clark, 2004), and produce corresponding physiological responses in participants (e.g., photos of angry faces elicit larger startle responses compared to photos of happy

* Corresponding author at: Department of Clinical Psychological Science, Maastricht University, P.O. Box 616, 6200 MD, Maastricht, The Netherlands.
E-mail address: Jessica.Alleva@maastrichtuniversity.nl (J.M. Alleva).

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faces; Karos, Meulders, & Vlaeyen, 2014). The results showed that women with a more negative body evaluation perceived that their body was followed by higher levels of negative social feedback, even though there was no contingency between their body and the negative social feedback. This finding was specific for women's own bodies (i.e., not for the other stimulus categories), and was not explained by their interpretation of the social feedback (i.e., how happy vs. angry the portrayed faces were perceived). Research has yet to directly investigate the impact of this covariation bias in daily life, but Alleva et al. (2014) theorised that perceiving that one's own body is followed by higher levels of negative social feedback could confirm negative expectations (e.g., "Everyone really does think that I am unattractive!" p. 229), reinforce negative body evaluation, and even encourage women to behave in ways that elicit negative feedback from others.

In a second study, Alleva and colleagues (2016) investigated in what ways the covariation bias is expressed (Pauli, Montoya, & Martz, 2001) and whether it could be diminished. To do so, they adapted a computer task by Pauli et al. (2001) that was developed to investigate and diminish covariation bias in panic-prone individuals. This task comprised three blocks, wherein pictures of participants' own body, a control woman's body, and a neutral object were followed by negative social feedback (frowning photos) or nothing (a white screen). In Blocks 1 and 3, each stimulus category was followed by negative social feedback on 50% of trials (i.e., contingencies were random). In Block 2, designed to diminish the covariation bias, participants' own body and the control woman's body were followed by negative social feedback on 17% of trials, and the neutral object was followed by negative social feedback on 83% of trials.

The results showed that, even before the start of the computer task, women with a more negative body evaluation *expected* their body to be followed by higher levels of negative social feedback. Further, throughout Block 1, women with a more negative body evaluation continued to perceive that their body was followed by more negative social feedback, even though this was not the case. These findings provided evidence for *a priori* (i.e., before the stimulus-outcome pairings have occurred) and *online* (i.e., during the presentation of stimuli and outcomes) covariation bias. They suggest that covariation bias exists *pre-experimentally*, is not merely caused by differential 'online' processing of information, and is resistant to disconfirming situational information (e.g., Amin & Lovibond, 1997; Pauli et al., 1996). Indeed, at the end of Block 1, women with a more negative body evaluation perceived that their body had been followed by higher levels of negative social feedback during the now-completed block, reflecting *a posteriori* covariation bias (i.e., after stimulus-outcome pairings have occurred).

Nevertheless, after the manipulation at Block 2, women with a more negative body evaluation no longer perceived that their body was followed by more negative social feedback. That is, despite the persistence of covariation bias in Block 1, reducing the contingency between one's own body and negative social feedback to just 17% successfully diminished the covariation bias (Pauli et al., 2001). This finding is in line with research suggesting that distortions in cognitive processing are more likely to occur when situational information is *ambiguous* (Pauli et al., 2001; Wiemer et al., 2014). This might explain why the impact of the computer task on the covariation bias was temporary: When contingencies returned to random at Block 3, women with a more negative body evaluation again reported that their body was followed by more negative social feedback. All findings were specific for women's own bodies (interpretation of the social feedback was not assessed). Interestingly, Alleva et al. (2016) also found that participants' state body evaluation improved from before to after the manipulation at Block 2, and persisted to the end of the computer task. This finding suggests that covariation bias and body evaluation may indeed influence one another.

The current study expanded this research in three important ways. First, although the computer task of Alleva et al. (2016) diminished the covariation bias, these changes did not persist when contingencies returned to random. Therefore, an important step is to determine whether the covariation bias can be more persistently affected. It could be that greater exposure to the reduced contingencies is needed, before covariation bias is more effectively diminished. To this end, the present study employed a computer task with a longer-lasting manipulation block.

Second, although the covariation bias exists pre-experimentally, that does not necessarily mean that it is entirely unaffected by differential online processing. One factor that could play a role is *outcome aversiveness*: the experienced unpleasantness of the aversive outcome (Wiemer et al., 2014). Studies conducted in spider-fearful individuals have shown that they experience aversive outcomes as more unpleasant following spiders than non-spider-fearful individuals do (e.g., Muhlberger, Wiedemann, Herrmann, & Pauli, 2006). Enhanced outcome aversiveness could exaggerate stimulus-outcome estimates by consuming greater attentional resources and by preferential encoding of that stimulus-outcome pairing (Wiemer et al., 2014). Similarly, women with a more negative body evaluation might experience negative social feedback associated with their own body as more aversive than women with a less negative body evaluation do. As such, the present study assessed outcome aversiveness associated with each stimulus category.

Third, Alleva et al. (2014) showed that women with a more negative body evaluation did not interpret social feedback differently from women with a less negative body evaluation. Yet, women with a more negative body evaluation might interpret the feedback specifically associated with their *own* body more negatively. This would reflect a tendency to be harsher towards oneself than others (Neff, 2003), which may be exaggerated in women with a negative body evaluation (Albertson, Neff, & Dill-Shackleford, 2015). Thus, the current study assessed interpretation of the specific social feedback associated with each stimulus category.

In summary, this study investigated whether a longer-lasting manipulation could diminish the covariation bias more effectively, and explored the potential roles of outcome aversiveness and interpretation of the social feedback associated with one's own body. To do so, undergraduate women completed an adapted version of the computer task of Alleva et al. (2016). First, replicating previous findings (Alleva et al., 2014, 2016), we hypothesised that women with a more negative body evaluation would demonstrate *a priori*, online, and *a posteriori* covariation bias. Further, we hypothesised that the longer-lasting manipulation block would diminish the covariation bias, and that these effects would persist at the end of the computer task. We also predicted these effects to coincide with improvements in state body evaluation. Last, we predicted that women with a more negative body evaluation would experience negative social feedback associated with their own body as more aversive – and would interpret this feedback more negatively – compared to women with a less negative body evaluation.

2. Method

2.1. Participants

Participants were 97 women between 18 and 30 years old (M_{age} = 21.07, SD = 2.51) with body mass indices (BMI) between 17.01 and 29.27 (M_{BMI} = 21.40, SD = 2.23). Most participants were university students (94.8%) of German (40%) or Dutch (22%) descent. The remainder reported being of another European (28%),