Affective responses to body stimuli: comparing male and female bodies with cropped heads and masked faces

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Abstract

Three studies were conducted in order to determine whether headless bodies evoke affective responses that might confound neuroimaging and electrophysiological findings. In Experiment 1, 224 participants used an online questionnaire to rate pictures, including bodies with cropped heads and masked faces, for disgust, fear, naturalness, valence and arousal. In Experiment 2, 38 participants completed a free word association task whilst viewing images that included bodies with cropped heads and masked faces. In Experiment 3, 57 participants completed a similar rating task to that disseminated in Experiment 1, whilst galvanic skin responses were measured. Results from all studies found no differences in the affective response elicited by bodies without heads versus bodies with masked faces. Female bodies were thought of more positively than male bodies, however. These findings suggest that headless body stimuli are not abhorrent in any way and are thus the preferable stimuli for investigating body-selective perceptual processes as they do not evoke face-processing mechanisms. Our findings also suggest that differences between male and female body viewing should be considered when investigating visual body perception.

Keywords: body perception, body representation, headless bodies, masked faces, affective responses

1. Introduction

Interest in understanding the mechanisms of visual body perception has grown over the past two decades, as functionally specialised areas of the visual cortex have been found to respond selectively to the human body and its parts (Downing, Jiang, Shuman, & Kanwisher, 2001; Schwarzlose, Baker, & Kanwisher, 2005). Moreover, research is beginning to show that body processing may be disturbed in some neurological and psychological conditions (e.g. body integrity identity disorder, Blom, Hennekam, & Denys, 2012; heterotopagnosia, Felician & Romaiguère, 2008; and somatoparaphrenia, Vallar & Ronchi, 2009) as well as in some psychiatric illnesses (e.g., schizophrenia, Irani et al., 2006; depersonalization, Ketay, Hamilton, Haas, & Simeon, 2014; and body image disturbance, Vocks et al., 2010). It is therefore increasingly important that we work towards understanding how the visual system perceives the human form.

As evidence suggests distinct neural mechanisms for face and body perception (see de Gelder et al., 2010; Downing & Peelen, 2016; Minnebusch & Daum, 2009 for reviews), studies typically present body stimuli in one of two ways - with the face masked or the head cropped - in order to minimise the activation of face processing mechanisms. However, conflicting results have been found between studies that utilise the different types of stimuli, making firm conclusions about the nature of body-sensitive processing difficult to agree upon (see Minnebusch & Daum, 2009 for review).

For example, studies in which bodies are presented with a masked face often conclude that bodies, like faces, are processed configurally ([or holistically]; see de Gelder et al., 2010 for review). According to such findings, body detection relies on stored templates of first-order relations between individual features (e.g., arms attached to the top of the trunk, legs to the bottom), rather than of the individual features themselves (similar to face processing, see Piepers & Robbins, 2012). Evidence for this is typically found by observing the effects that occur from inverting body stimuli (e.g., Minnebusch, Keune, Suchan, & Daum, 2010; Minnebusch, Suchan, & Daum, 2009; Reed, Stone, Bozova, & Tanaka, 2003; Reed, Stone, Grubb, & McGoldrick, 2006). This is because the templates underpinning configural, or holistic, representations are based on 'canonical viewpoints' (Palmer, Rosch, & Chase, 1981), meaning they are sensitive to changes in orientation. In other words, configural processing is disturbed by inversion and a switch to feature-based processing occurs because, although spatial relations between parts are preserved, the coordinates of those parts relative to some external origin are disrupted. The cost associated with switching from configural processing mechanisms to feature-based analysis is known as an 'inversion effect' (e.g., Piepers & Robbins, 2012), and often manifests as slower and less accurate behavioural responses, as well as enhanced and delayed electrophysiological responses (see Minnebusch & Daum, 2009 for review). These effects are found more prominently for faces compared to other objects, so if body perception also relies on configural processing mechanisms, then inversion effects should also be observed for inverted body stimuli.

However, research has shown that even the presence of contextual cues referring to the head (e.g., a person holding a book at the height of, and occluding, their head) is enough to elicit face processing mechanisms (e.g., Cox, Meyers, & Sinha, 2004; Morris, Pelphrey, & McCarthy, 2006). As it is understood that faces recruit configural processing mechanisms (see Maurer, Le Grand, & Mondloch, 2002), it has thus been proposed that the inversion effects observed when bodies are presented with masked faces occur as a result of the presence of the head (e.g., Brandman & Yovel, 2010). A logical line of argument, therefore, would be to crop the head from body stimuli entirely as utilising bodies with masked faces might result in a misrepresentation of distinct body perception due to the activation of face processing mechanisms.

However, it has been proposed that when bodies are presented without the head they are processed according to their features rather than as a configural whole because inversion effects are often absent (e.g., Minnebusch et al., 2009; Soria Bauser & Suchan, 2018; Yovel, Pelc, & Lubetzky, 2010; but see Robbins & Coltheart, 2012) or reversed (e.g., Minnebusch et al., 2009). Consequently, it has been argued that headless bodies might be confusing stimuli because without the head, they do not match stored templates (Minnebusch et al., 2009). Further to this, it has been claimed that when bodies are presented with a cropped head they are unnatural stimuli as they do not reflect ecologically valid body viewing (i.e. the bodies we see on a daily basis include a head; Minnebusch & Daum, 2009). This raises the concern that headless bodies are substandard stimuli for investigating the neural mechanisms that underpin body representations, especially as electrophysiological responses at time ranges that are sensitive to bodies are also known to be affected by attention, valence and arousal (e.g., Gazzaley, Cooney, McEvoy, Knight, & D'Esposito, 2005; Hillyard & Anllo-Vento, 1998; Mai et al., 2015; Meeren, van Heijnsbergen, & de Gelder, 2005; Stekelenburg & de Gelder, 2004; van Heijnsbergen, Meeren, Grèzes, & de Gelder, 2007).

That said, other lines of evidence suggest that the configural body recognition does not rely on a complete template match (Reed et al., 2006). Moreover, it has been argued that a failure to find evidence for configural body processing is likely due to a fixation on non-body aspects of the stimuli such as clothing, rather than the body itself (Robbins & Coltheart, 2012a). This suggests that bodies with cropped heads are not as unnatural and confusing as previously suggested, and that they can evoke normal inversion effects if extraneous factors are well controlled.

It is also possible that the presence of a masked face could disturb body-selective processes, not only by inducing face-selective mechanisms, but as a result of affective responses to these stimuli. 'Meaning threat' occurs when an unfamiliar experience or observation transpires within the context of familiarity, prompting a state of arousal such as uncanniness, dissonance, disequilibrium and uncertainty (see Proulx & Heine, 2009; Proulx, Heine, & Vohs, 2010). This has been specifically identified as occurring during the observation of absurd art, whereby faces are typically obscured, blurred or pixelated (see Proulx et al., 2010) and linked to increased anterior cingulate cortex (ACC) activity, which has been associated with heightened levels of anxiety (see Tullett et al., 2013). Whilst is it has been suggested that bodies with cropped heads might be aversive (e.g., Minnebusch & Daum, 2009; Minnebusch et al., 2009) the same proposition could also be made with regards to masked face stimuli, on the basis that they evoke 'meaning threat.' Given that top-down processing has been shown to affect both the magnitude and speed of neuronal processing (Gazzaley et al., 2005; Hillyard & Anllo-Vento, 1998), it is therefore also of interest to assess affective responses to both bodies with cropped heads and bodies with masked faces.

We conducted three studies in order to ascertain whether bodies with cropped heads or masked faces evoke different, or differing affective responses that could confound the findings of behavioural, neuroimaging and electrophysiological studies, perhaps leading to conflicting accounts of body processing mechanisms. Male and female body stimuli were also included as studies have shown that male and female bodies may be thought of, and even processed, differently (e.g., Bernard, Gervais, Allen, Campomizzi, & Klein, 2012; Cazzato, Mele, & Urgesi, 2014; Gervais, Vescio, Förster, Maass, & Suitner, 2012; Groves, Kennett, & Gillmeister, 2017; Heflick & Goldenberg, 2014; Vaes, Paladino, & Puvia, 2011). In particular, it has been argued that due to the societal objectification of women's bodies more so than men's bodies, female body stimuli might be processed in more of a part-based manner than male bodies (e.g., Heflick & Goldenberg, 2014; Vaes et al., 2011).

Experiment 1 assessed explicit, subjective responses to stimuli by asking participants to rate pictures on the basis of disgust, fear, naturalness, valence and arousal. Experiment 2 assessed implicit, subjective responses to stimuli as participants were instructed to freely associate all words that came to mind during observation (see Kris, 2013). Experiment 3 sought to objectively assess responses to stimuli by analysing subtle changes in galvanic skin response (GSR), known as skin conductance (SC), which occurs as a result of autonomic nervous system (ANS) activation. As ANS activation is thought to reflect arousal, any changes observed in SC are thought to reflect an objective measurement of arousal (Ravaja, 2004). However, both very pleasurable and very adverse stimuli can evoke large changes in SC (Hopkins & Fletcher, 1994) and so participants were also asked to rate stimuli as in Experiment 1. In all experiments, images of insects, flowers and houses were also included as a control to assess whether participants were engaged with the task. With that in mind, we expected participants to respond negatively to insect stimuli and positively to flower stimuli, represented by an increase in SC to both stimuli in Experiment 3. Furthermore, we predicted that any differences in affective responses to body stimuli across the experiments, would reveal that headless bodies are not thought of more negatively than bodies with masked faces. In particular, we theorised that meaning threat might elicit an equally strong, or perhaps even stronger, affective response than the 'unnaturalness' of headless bodies due to the dissonance between expectation (I should see a face) and reality (I do not see a face) that is absent in images of bodies where the head has clearly been cropped from view. We also expected that there might be differences in the way male and female bodies were rated and that, specifically in Experiment 2, observers might make more references to the appearance of female bodies than to that of male bodies (e.g., Heflick & Goldenberg, 2014; Vaes et al., 2011).

2. Experiment 1: Assessing explicit differences in ratings of disgust, fear, naturalness, valence and arousal

In Experiment 1, we explicitly addressed whether affective responses to body stimuli without the head differ to those with a masked face. A ratings task was therefore devised in order for pictures of flowers, insects, houses and both types of body stimuli to be rated on the basis of disgust, fear, naturalness, valence and arousal.

2.1 Method

2.1.1 Participants

In response to advertisements emailed to University of Essex mailing lists and posts on social media, 252 people volunteered to complete an online rating survey. Those who disclosed experiences of an eating disorder or body dysmorphic disorder were not included. As a result, data from 224 participants were analysed (63 men, 153 women, 2 gender-fluid individuals and 6 who did not specify this demographic detail). The average age of the sample was 28 years (min.: 18 years, max.: 71 years, SD: 11 years).

2.1.2 Ethical declaration

The study was conducted in line with the 2008 Declaration of Helsinki and approved by the local Ethics Committee for the Psychology Department at the University of Essex.

2.1.3 Apparatus and stimuli

An online picture-rating task compatible with android devices was devised using Qualtrics software (Qualtrics, Provo, UT, USA). Two pictures of insects and two pictures of flowers were downloaded from the template for the 'Brief Implicit Association Task (IAT) with pictures' (Sriram & Greenwald, 2009). Two pictures of houses were downloaded via *Google Images*, whilst two canonical, front-facing pictures of women's bodies and two front-facing pictures of men's bodies were taken from a selection of body stimuli devised for use in our lab. All stimuli were photographs, as opposed to computer generated images, and were edited in *Adobe Photoshop* to remove background information. Each body picture was edited so that the head was either cropped or the face masked by applying a Gaussian blur. In order to avoid fixations on certain parts of a single stimulus that might otherwise affect ratings (e.g. toes or knees) and thus to encourage ratings of the different types of stimuli in general, both images from each category were presented together as foreground information on a black background. This created one image per category with dimensions 720 x 540 pixels (see Figure 1). By means of mouse-click, or by tapping on the screen (if completed with an android device), stimuli were rated on separate 7-point scales according to five attributes, with left and right extremes of the scale marked as follows: disgusting vs. delightful (disgust), natural vs. unnatural (naturalness), fearful vs. calming (fear), rousing vs. soothing (arousal) and negative vs. positive (valence). The neutral point of each scale was 4 and the naturalness scale was reverse scored so that higher scores were indicative of more positive ratings.

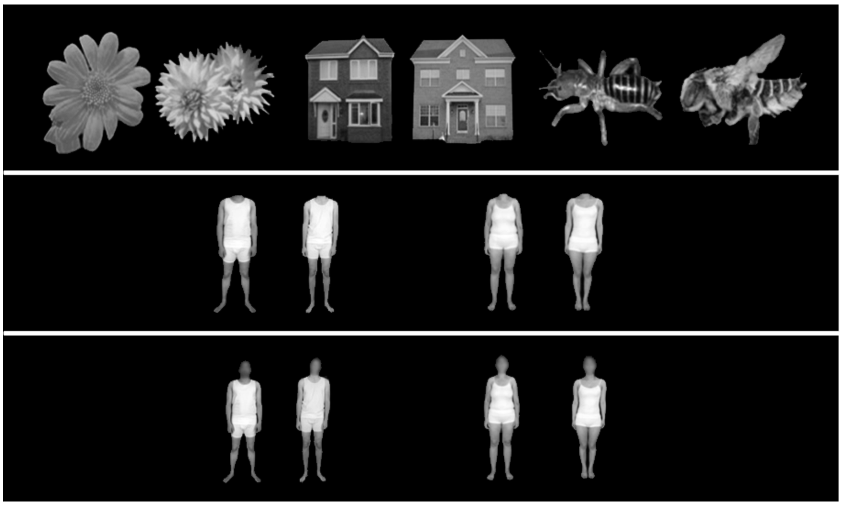

Figure 1. Stimuli rated for disgust, naturalness, fear, arousal and valence. From left to right and top to bottom; flowers, houses, insects, men's bodies with cropped heads, women's bodies with cropped heads, men's bodies with masked faces and women's bodies with masked faces.

2.1.4 Procedure

Instructions were given explaining that participation would involve rating pictures on the basis of disgust, fear, naturalness, valence and arousal. Informed consent was given via tick box to indicate that participants were at least 18 years old and that they understood their right to withdraw. Failure to provide informed consent terminated the task. In order to check whether participants were engaged, each stimulus was randomly presented alongside a text box that required a brief description of the image before ratings commenced. Following this, stimuli were presented randomly above a rating scale that corresponded to one of the five attributes measured, until all images had been rated for all five attributes. Thus, as the 7 stimuli were shown 5 times (once for each rating), 35 trials were completed. A response was always required in order to continue and participants were instructed to give a rating based on both pictures presented in each stimuli set. Demographic information was collected and the task ended with a debrief statement and details of how to contact the researchers for further information. Completion of the entire rating task typically took between 8 and 10 minutes.

2.2 Results

2.2.1 Assessing task performance

First of all, written descriptions of the pictures were evaluated in order to determine whether participants were paying attention. We planned to discard data in instances where the content of the pictures had not been correctly identified. In order to assess whether pictures evoked affective responses and whether participants engaged with the task, ratings for each picture (male and female bodies collapsed within body type, i.e. responses included to both male and female stimuli either with or without the head) were averaged across participants and subjected to Bonferroni-adjusted one sample t-tests with a test value of 4 (neutral). T-tests are reported unsigned.

All participants gave accurate written descriptions of the stimuli and thus all data were analysed. Average ratings displayed in Table 1 suggest that flowers were rated quite positively, houses and bodies were rated fairly neutrally and insects were rated fairly negatively. Bonferroni-adjusted one-sample t-tests ($\alpha = .01$) revealed that flowers were rated more positively than neutral on all attributes ($t(223) \geq 17.844$, $p < .001$), as were houses ($t(223) \geq 3.988$, $p < .001$). Insects on the other hand, were rated more negatively than neutral on all attributes ($t(223) \leq -9.275$, $p < .001$) other than naturalness, for which they were rated as more natural than neutral ($t(223) = 12.198$, $p < .001$). Ratings for headless bodies did not differ from neutral with regards to disgust, arousal and fear ($t(223) \leq 1.531$, $p \geq .127$) but they were rated as more natural and more positive than the neutral point ($t(223) \geq 3.215$, $p \leq .001$). A similar pattern was observed for bodies with masked faces as ratings did not differ from neutral with regards to disgust, arousal, fear or valance ($t(223) \leq 2.813$, $p \geq .005$) but they too were rated as more natural than the neutral point ($t(223) = 3.215$, $p = .001$).

As expected, insects were rated negatively and flowers were rated positively, which suggests that participants were engaged with the task. Moreover, all biological stimulus types received higher than neutral ratings of naturalness. The pattern of results presented here also suggests that affective responses to bodies with cropped heads and masked faces might be similar.

TABLE 1 HERE

2.2.2 Assessing differences between body stimuli

In order to assess differences in affective responses between body stimuli specifically, ratings for body pictures were averaged within participants, then across trials of the same stimulus type and subjected to a 2 (body type: cropped head vs. masked face) x 2(gender: male body vs. female body) x 5 (attribute: disgust vs. fear vs. naturalness vs. valence vs. arousal) Analysis of Variance (ANOVA[1]). Greenhouse-Geisser corrections to the degrees of freedom were applied where necessary.

To allow for clearer inferences about the probabilities of both significant and non-significant effects, we calculated Bayesian probabilities associated with the occurrence of both the null hypothesis (H_0|D) and the experimental hypothesis (H_1|D) alongside standard statistics (Masson, 2011). These probabilities range from 0 (no evidence) to 1 (very strong evidence).

Average ratings evident in Table 2 suggest that bodies with cropped heads and masked faces might be rated similarly, and that female bodies might be rated more positively than male

[1] Effects found in Multivariate Analysis of Variance (MANOVA) did not differ from those in ANOVA, but where specific statistics were found to differ, MANOVA results are reported as a footnote.

bodies overall. ANOVA confirmed these observations as a main effect of body type was not found ($F(1, 223) = .763$, $p = .383$, $\eta_p^2 = .003$, $p(H_0|D) > .91$), and did not interact with the gender of the body observed ($F(1, 223) = .034$, $p = .885$, $\eta_p^2 < .001$, $p(H_0|D) > .94$), or the attribute rated ($F(1, 223) = .192$, $p = .877$, $\eta_p^2 = .001$[2], $p(H_0|D) > .93$). The three-way interaction between body type, gender and attribute was also not significant ($F(4, 892) = 1.150$, $p = .327$, $\eta_p^2 = .005$[3], $p(H_0|D) > .89$).

A main effect of gender was found, however ($F(1, 223) = 36.418$, $p < .001$, $\eta_p^2 = .140$, $p(H_1|D) > .99$), such that female bodies were rated more positively overall than male bodies (see Table 2). A main effect of attribute was also found, ($F(4, 892) = 165.279$, $p < .001$, $\eta_p^2 = .426$[4], $p(H_1|D) = 1$), although not theoretically important, and is subsumed within the interaction of gender with attribute, which was also significant ($F(4, 892) = 5.693$, $p = .001$, $\eta_p^2 = .025$[5], $p(H_1|D) < .001$). Bonferroni-adjusted follow-up comparisons revealed that for disgust, valence, fear and naturalness, female body pictures were rated slightly more towards the positive end of the rating spectrum than male body pictures ($t(223) \geq 3.000$, $p \leq .003$). There were no gender differences in arousal ratings, however ($t(223) = .730$, $p = .470$).

TABLE 2 HERE

[2] ($F(4, 220) = 339$, $p = .852$, $\eta_p^2 = .006$)

[3] ($F(4, 220) = .788$, $p = .534$, $\eta_p^2 = .014$)

[4] ($F(4, 220) = 60.337$, $p < .001$, $\eta_p^2 = .523$)

[5] ($F(4, 220) = 5.104$, $p = .001$, $\eta_p^2 = .085$)

2.3 Experiment 1: Interim summary of results

Our results suggest that explicit affective responses do not differ according to whether bodies are shown with the head cropped or with a masked face. Moreover, in instances where body pictures were rated differently from neutral, this was in a positive direction. This suggests that from an affective perspective, these stimulus sets are equally adequate for investigating body representation. In addition, we have shown that in comparison to male bodies, female bodies seem to be held in a slightly more positive regard. This should be considered when investigating visual body perception in order to account for possible effects of top-down processing on, for example, amplitudes and latencies of electrophysiological components (see Gazzaley et al., 2005; Hillyard & Anllo-Vento, 1998).

3. Experiment 2: Free word association task

Experiment 2 aimed to address implicit affective responses to bodies with cropped heads and masked faces. In particular, we were interested in whether the two types of body stimuli were thought of differently in the absence of any particular guidance for their evaluation, as well as whether observers might comment on the appearance of the body more if the body was female compared to male. As a result, a free word association task was devised whereby participants were asked to freely speak all words that came to mind when observing pictures of flowers, insects, houses and both types of body stimuli.

3.1 Method

3.1.1 Participants

Thirty-eight University of Essex students (6 men) participated in the study in return for course credits. Those who reported a history of eating disorders or body dysmorphic disorder were not permitted to take part. The average age of the sample was 19 years (min.: 18 years, max.: 23 years, SD: 1 year).

3.1.2 Ethical declaration

The study was conducted in line with the 2008 Declaration of Helsinki and approved by the local Ethics Committee for the Psychology Department at the University of Essex.

3.1.3 Apparatus and stimuli

Stimuli as described in Experiment 1 were presented on 27 inch (resolution 2560x1440 pixels) Apple iMacs running SuperLab 5. Audacity® 2.1.2 software was used to record vocal responses and transcription was completed manually.

3.1.4 Procedure

Standardised instructions were read, explaining that participants should vocalise words they associated with the pictures shown. It was made clear that there were no right or wrong answers and written informed consent was obtained.

Audio recording began and participants were asked to fixate on the centre of the screen. Each trial commenced with a black screen, which was displayed for 3000 ms. This was followed by a 600-ms beep, also accompanied by a black background, which served as a preparatory indication of a picture and separated trials in the audio recording. Stimuli were randomly presented in the centre of a black background for 20 s whilst participants freely spoke aloud all words that came to mind. Stimuli were shown twice each, resulting in 14 trials and a break was given after the 5th and the 10th trial. Each break ended when the participant pressed the space bar. Upon completion participants were debriefed and awarded course credit.

3.1.5 Qualitative assessment of the elicited words

As in similar word association studies (e.g., Ares & Deliza, 2010; Sester, Dacremont, Deroy, & Valentin, 2013) elicited associations were assessed for themes by two experimenters (K.G. and H.G.). Working together, a search for recurrent terms was performed for each stimulus and terms were grouped into themes according to personal interpretation of the words and word synonymy as determined by the Oxford English dictionary. Categorisation of terms and identification of themes was agreed in person between researchers so that 100% agreement was reached. Two themes were obvious for all stimuli, which included valence and objectification. Words were therefore categorised according to whether they referred to positive affect (e.g., happy, nice), negative affect (e.g., scary, weird), appearance (e.g., beautiful, ugly) or competence/function (e.g., good posture, flying). For body stimuli three other themes were also apparent, these included making reference to the stimulus as a body (i.e., body), as a person (e.g., man; including reference to the body as he, she or they), and noticing whether the body had a masked face or cropped head (e.g., face blurred or, no head). Phrases such as ‘open door,’ were categorised as one item, whilst miscellaneous words such as ‘disease’ and ‘summer’ were categorised as ‘other’ so that for each participant, counts of words in each category could be normalised as a proportion of total words elicited. Repetitions of words were coded individually, such that if an insect was referred to twice as ‘nasty’ during one trial, or if ‘nasty’ was uttered on one insect trial and then again on another for example, this was coded as two negative words.

3.1 Results

3.2.1 Assessing task performance

In order to assess differences in affective responses between pictures, and whether participants engaged with the task, the number of words each participant uttered of each category was counted as a proportion of the total number of words uttered by that participant. Proportions were used to control for the fact that the total number of words said by participants was variable. In total, 2522 words were uttered by all participants across all trials.The average proportion of positive and negative words elicited for each picture (male and female bodies collapsed within body type) was subjected to a 2 (valence: positive words vs. negative words) x 5 (stimulus: flowers vs. insects vs. houses vs. headless bodies vs. bodies with masked faces) within-subjects ANOVA. Greenhouse-Geisser corrections were applied where necessary.

As in Experiment 1, Bayesian probabilities associated with the occurrence of both the null hypothesis (H_0|D) and the experimental hypothesis (H_1|D) were calculated alongside standard statistics (Masson, 2011).

The average proportion of positive and negative words elicited in response to each stimulus (see Table 3) indicates that flowers evoked more positive than negative affective responses whereas insects evoked more negative than positive affective responses. The ANOVA confirmed this observation as there was a significant interaction between stimulus and valence ($F(4, 148) = 36.387$, $p < .001$, $\eta_p^2 = .496$, p(H_1|D)>.99). Bonferroni-adjusted follow-up comparisons revealed that flowers ($t(37) = 3.647$, p = .001) and houses ($t(37) = 2.920$, p < .001) both elicited more positive affective words than negative, whilst insects elicited more negative affective words than positive ($t(37) = 6.857$, p < .001, see Table 3). By comparison, there were no differences between the proportion of positive and negative affective words elicited to either type of body stimuli ($t(37) \leq 1.700$, $p \geq .114$). A main effect of stimulus was also found ($F(4, 148) = 33.419$, $p < .001$, $\eta_p^2 = .475$, $p(H_1|D)>.99$), such that insects evoked the most affect compared to other stimuli ($t(37) \geq 5.050$, $p < .001$), the number of affective responses to houses and flowers were no different to each other ($t(37) = .700$, $p = 1.000$), whilst body stimuli evoked the least number of affective responses overall ($t(37) \geq 3.000$, $p \leq .031$) although there were no differences between body types ($t(37) = 2.000$, $p = .728$). In addition, a main effect of valence was also evident ($F(1, 37) = 13.884$, $p = .001$, $\eta_p^2 = .273$, $p(H_1|D)>.98$) as 7% of the total words elicited were negative, compared to 3.6% that were positive.

This pattern of results suggests that participants were engaged with the task and that there were no differences in affective response to the two types of body stimuli.

TABLE 3 HERE

3.2.2 Assessing differences between body stimuli

Affective responses and objectification of body stimuli were assessed with two separate 2 x 2 x 2 within-subjects ANOVAs, whereby factors included either valence (positive words vs. negative words) or objectification (appearance words vs. competence words), gender of the body observed (male vs. female) and body type (cropped head vs. masked face). Three separate 2 x 2 within-subjects ANOVAs with the factors body type (headless vs. masked face) and gender of the body observed (male vs. female) investigated whether stimulus type affected the extent to which a stimulus was referred to respectively as a body; as a person; and identified as having a cropped head versus a masked face.

The 2 x 2 x 2 ANOVA conducted to investigate valence responses to body stimuli specifically, found no main effect of gender ($F(1, 37) = 1.489$, $p = .230$, $\eta_p^2 = .039$, $p(H_0|D)>.76$) and no main effect of valence ($F(1, 37) = 3.272$, $p = .079$, $\eta_p^2 = .081$, $p(H_0|D)>.53$). Although bodies with masked faces evoked more valence-related words than headless bodies on average (see Table 3), there was no main effect of body type ($F(1, 37) = 3.410$, $p = .073$, $\eta_p^2 = .084$, $p(H_0|D)>.53$). There were also no significant interactions between these factors ($F(1, 37) \leq 2.080$, $p \geq .158$, $\eta_p^2 \leq .053$, $p(H_0|D)>.69$). In general, body stimuli were regarded with few valence-related words and thought of neutrally on average. Thus, there were no differences in the proportion of positive- or negative- valence words used to describe male or female bodies with cropped heads or masked faces.

As can be seen in Table 4, the average proportion of appearance words elicited appeared to be greater than that of competence words. The ANOVA confirmed this as a main effect of objectification ($F(1, 37) = 161.708$, $p < .001$, $\eta_p^2 = .814$, $p(H_1|D) = 1$), with appearance words elicited 42.1% of the time, compared to competence words, which were elicited 3.3% of the time. Again, there was no main effect of gender ($F(1, 37) = .812$, $p = .373$, $\eta_p^2 = .021$, $p(H_0|D)>.80$) or body type ($F(1, 37) = .113$, $p = .739$, $\eta_p^2 = .003$, $p(H_0|D)>.86$). There were also no significant interactions (F(1, 37) ≤ 2.045, p ≥ .161, η_p^2 ≤ .052, p(H_0|D)>.88). This suggests that bodies were thought of in terms of their appearance rather than their competence regardless of the gender or of whether the body was presented with a cropped head or masked face. In order to assess whether this was specific to bodies or more likely due to the visual nature of the task, a follow-up 3 x 2 within-subjects ANOVA was conducted with picture (house, flower, insect) and objectification (appearance, function) as factors. A main effect of objectification was found (F(1, 37) = 63.681, p < .001, η_p^2 = .633, p(H_1|D)>.99), with appearance words elicited 30.9% of the time, compared to competence words, which were elicited 5.1% of the time. No other main effects or interactions were significant (F(1, 37) ≤ 3.021, p ≥ .060, η_p^2 ≤ .075, p(H_0|D)>.58). This suggests that objectification was not necessarily specific to bodies, but that participants tended to describe what they saw in appearance-related terms for all stimuli.

An ANOVA assessing the proportion of times stimuli were referred to as a body also found no main effect of gender (F(1, 37) = 2.293, p = .138, η_p^2 = .058, p(H_0|D)>.66), no main effect of body type (F(1, 37) = .086, p = .771, η_p^2 = .002, p(H_0|D)>.86) and no interaction between these two factors (F(1, 37) = .016, p = .899, η_p^2 < .001, p(H_0|D)>.86).

Although on average, participants appeared to refer to bodies with masked faces as people more often than bodies with cropped heads, which was particularly evident for male bodies (see Table 4), a 2 x 2 ANOVA assessing the proportion of times bodies were referred to as people revealed no main effect of gender (F(1, 37) = .039, p = .845, η_p^2 = .001, p(H_0|D)>.86), no main effect of body type ($F(1, 37) = 3.709$, $p = .062$, $\eta_p^2 = .091$, $p(H_0|D)>.50$) and no interaction ($F(1, 37) = 3.510$, $p = .069$, $\eta_p^2 = .087$, $p(H_0|D)>.52$).

Finally, a 2 x 2 ANOVA on the proportion of references to whether the head was cropped or the face was masked also found no main effect of gender ($F(1, 37) = 1.243$, $p = .272$, $\eta_p^2 = .033$, $p(H_0|D)>.77$), no main effect of body type ($F(1, 37) = .694$, $p = .410$, $\eta_p^2 = .018$, $p(H_0|D)>.82$) and again, no interaction ($F(1, 37) = .008$, $p = .928$, $\eta_p^2 < .001$, $p(H_0|D)>.86$). This series of results indicate that bodies with cropped heads are not thought of as less of a body or a person in comparison to bodies with masked faces. Moreover, stated awareness of the specific manipulation of each body type did not differ.

TABLE 4 HERE

3.2 Experiment 2: Interim summary of results

Similar to Experiment 1, there were no differences in the verbal associations made to bodies with cropped heads and bodies with masked faces. Both types of body evoked a similar proportion of positive and negative associations, appearance and competence-related terms, and both were as likely as each other to be described as bodies or persons, or in terms of their specific type. Unlike Experiment 1, however, female bodies did not evoke more positive affect than male bodies in this free association task.

4. Experiment 3: Assessing objective differences in ratings of disgust, fear, naturalness, valence and arousal

In Experiment 3, we explicitly and objectively addressed whether affective responses to body stimuli without the head differ to those with a masked face. Therefore, SC was measured whilst participants completed a rating task similar to that in Experiment 1.

4.1 Method

4.1.1 Participants

In response to advertisements sent to University of Essex mailing lists 57 people (22 men) participated in exchange for payment. Those who reported a history of eating disorders or body dysmorphic disorder were not permitted to take part. The average age of the sample was 32.3 years (min.: 18 years, max.: 73 years, SD: 12.7 years).

4.1.2 Ethical declaration

The study was conducted in line with the 2008 Declaration of Helsinki and approved by the local Ethics Committee for the Psychology Department at the University of Essex.

4.1.3 Apparatus and stimuli

The online picture-rating task used in Experiment 1 was adapted for use with E-Prime software (Psychology Software Tools, Pittsburgh, USA) and interfaced with NeXus-10 and BioTrace+ software (MindMedia B.V., Herten, The Netherlands) to measure autonomic nervous system (skin conductance) responses. The Nexus-10 recording system has a 24 bit resolution, which is able to register changes of less than .0001μS. Bipolar electrodes were attached to index and middle fingers of the non-dominant hand and skin conductance (SC) responses were collected at a rate of 32 samples per second.

4.1.4 Procedure

Instructions were given explaining that participation would involve rating pictures on the basis of disgust, fear, naturalness, valence and arousal, while SC responses would be recorded. Following written informed consent, participants were seated in front of a computer monitor and connected to the skin conductance electrodes by the experimenter. They were asked to take a few deep breaths to check the SC response. They were then asked to keep their non-dominant hand in a comfortable position resting on the table for SC recording, and to make all their rating responses with the other hand. All 20 stimuli were presented one at a time in random order, preceded by a baseline interval (blank screen with the words “please wait” written centrally in black ink) of 5000 ms. Images were then first shown on their own at the top of the screen for 5000 ms, after which the rating scales for all five attributes appeared underneath the image. After all the ratings had been completed, the participant submitted them and the next trial began. Demographic information was collected and the task ended with a debrief statement and details of how to contact the researchers for further information. Completion of the entire experimental session typically took around 10 to 12 minutes.

4.2 Results

4.2.1 Assessing explicit, subjective ratings of stimuli

Data from all 57 participants were included, and as in Experiment 1, in order to assess task performance, ratings for each picture (male and female bodies collapsed within body type) were averaged across participants and subjected to Bonferroni-adjusted one sample t-tests (α

= .01) with a test value of 4 (neutral). Following this, differences between body stimuli were assessed. Results are described below and *t*-tests are reported unsigned.

4.*2.1.1 Assessing task performance*

Average ratings displayed in Table 5 suggest a similar pattern of results to those observed in Experiment 1. Bonferroni-adjusted one-sample t-tests confirmed this, revealing that flowers were rated more positively than neutral on all attributes ($t(56) \geq 13.348$, $p < .001$), whilst houses were rated more positively than neutral on all attributes ($t(56) \geq 5.828$, $p < .001$) other than naturalness, for which they were rated no different from neutral ($t(56) = 2.241$, $p = .029$). Insects on the other hand, were rated more negatively than the neutral point with regards to fear, disgust and arousal ($t(56) \leq -4.297$, $p < .001$), but more natural than neutral ($t(56) = 6.554$, $p < .001$) and no different from neutral with regards to valence ($t(56) = -2.627$, $p = .011$).

Ratings for headless bodies did not differ from neutral with regards to disgust, arousal and fear ($t(56) \leq 2.842$, $p \geq .060$) but they were rated as more natural and more positive than the neutral point ($t(56) \geq 3.670$, $p \leq .001$). Similarly, ratings of bodies with masked faces did not differ from neutral with regards to disgust, arousal and fear ($t(56) \leq 2.395$, $p \geq .020$) but they too were rated as more natural and more positive than the neutral point ($t(56) \geq 3.817$, $p < .001$).

As in Experiment 1, insects were rated negatively, whilst flowers were rated positively, suggesting that participants were engaged with the task. Once again, all biological stimulus types received higher than neutral ratings of naturalness, whilst the overall pattern of results further suggests similar affective responses to bodies with cropped heads and bodies with masked faces.

TABLE 5 HERE

4.2.1.2 Assessing differences between body stimuli

In order to assess differences in affective responses between body stimuli specifically, as in Experiment 1, ratings for body pictures were averaged within participants, then across trials of the same stimulus type and subjected to a 2 (body type: cropped head vs. masked face) x 2 (gender: male body vs. female body) x 5 (attribute: disgust vs. fear vs. naturalness vs. valence vs. arousal) ANOVA[6]. Greenhouse-Geisser corrections to the degrees of freedom were applied where necessary.

As in the previous two experiments, we also calculated Bayesian probabilities associated with the occurrence of both the null hypothesis ($H_0|D$) and the experimental hypothesis ($H_1|D$) alongside ANOVA (Masson, 2011).

Average ratings evident in Table 6 suggest a similar pattern of results to that which were observed in Experiment 1. Specifically, it appears that bodies with cropped heads and masked faces are rated similarly, whilst female bodies appear to be rated more positively than male bodies. ANOVA confirmed these observations as no main effect of body type was found ($F(1, 56) = .095$, p =.759, η_p^2 = .002, p($H_0|D$)>.88), and nor did this factor interact with the

[6] As in Experiment 1, MANOVA findings did not differ from ANOVA, but where specific results were found to differ, MANOVA results are reported as a footnote.

gender of the body observed (F(1, 56) = 1.073, p = .305, η_p^2 = .019, p(H_0|D)>.81), or the attribute rated (F(4, 224) = 1.241, p = .296, η_p^2 = .022[7], p(H_0|D)>.99). The three-way interaction between body type, gender and attribute was also not significant (F(4, 224) = .294, p = .868, η_p^2 = .005[8], p(H_0|D)>.99).A main effect of gender was found, however (F(1, 56) = 18.063, p =.003, η_p^2 = .150, p(H_1|D)>.93), as female bodies were rated more positively than male bodies (see Table 6). As before, although not theoretically important, a main effect of attribute was also found, (F(4, 224) = 45.542, p <.001, η_p^2 = .449[9], p(H_1|D)>.99), which unlike findings in Experiment 1, did not interact with gender (F(4, 224) = 2.466, p =.061, η_p^2 = .042[10], p(H_0|D)>.99).

TABLE 6 HERE

4.2.2 Assessing objective, skin conductance responses to stimuli

Data from 17 participants (9 men) did not reliably register SC responses in all conditions or lost connection with the stimulus presentation computer after recording began, and were therefore disregarded. As a result, data from 40 participants (13 men) were included in the analysis of SC responses.

[7] (F(4, 53) = .902, p = .470, η_p^2 = .064)

[8] (F(4, 53) = .260, p = .902, η_p^2 = .019)

[9] (F(4, 53) = 17.566, p <.001, η_p^2 = .570)

[10] (F(4, 53) = 1.848, p =.133, η_p^2 = .122)

Because autonomic responses are relatively slow (around 2 to 3 seconds), we extracted raw SC responses (means and variances) from the second half (2500 ms) of the 5000-ms stimulus presentation window. Mean stimulus-related SC values were baseline corrected (divided by mean SC values obtained during the preceding 5000-ms baseline interval). Baseline corrected SC means and (uncorrected) variances were then averaged across all trials of the same stimulus type for statistical analysis.

4.2.2.1 Objective assessment of arousal to stimuli

In order to objectively assess arousal to each stimulus type, SC responses were subjected to within-subjects ANOVA (bodies collapsed within body type) with Greenhouse-Geisser correction. Means and variances of SC responses presented in Table 7 suggest little differences between stimuli. This was confirmed by ANOVA as no main effect of stimulus was found (means: $F(3, 117) = 1.265$, $p = .288$, $\eta_p^2 = .031$, $p(H_0|D) > .77$; variances: $F(3, 117) = .873$, $p = .401$, $\eta_p^2 = .022$, $p(H_0|D) > .80$), suggesting no differences in ANS activity per se, or in its variability, whilst viewing stimuli, and thus no differences in arousal responses to insects, houses, flowers and bodies.

TABLE 7 HERE

4.2.2.2 Objective assessment of arousal differences between body stimuli

SC responses to body pictures were averaged within participants, then across trials of the same stimulus type and subjected to a 2 (body type: cropped head vs. masked face) x 2 (gender: male body vs. female body) within-subjects ANOVA in order to assess ANS activity indicative of arousal. Greenhouse-Geisser adjustments were applied where necessary. Means and variances of SC responses evident in Table 8 suggest that neither the stimulus type nor the gender of the body observed altered participants bodily arousal. ANOVA confirmed these observations as a main effect of body type was not found (means: $F(1, 39) = 1.958$, $p = .170$, $\eta_p^2 = .048$, $p(H_0|D)>.70$; variances: $F(1, 39) < 1$, $p = .953$, $\eta_p^2 < .001$, $p(H_0|D)>.80$), a main effect of gender was not found (means: $F(1, 39) = 1.140$, $p = .292$, $\eta_p^2 = .028$, $p(H_0|D)>.78$; variances: $F(1, 39) = 1.760$, $p = .192$, $\eta_p^2 = .043$, $p(H_0|D)>.73$), and the factors did not interact (means: $F(1, 223) = 1.420$, $p = .241$, $p(H_0|D)>.76$, $\eta_p^2 = .035$; variances: $F(1, 223) < 1$, $p = .697$, $\eta_p^2 = .004$, $p(H_0|D)>.85$).

TABLE 8 HERE

4.2.3 Assessing the relationship between objective and subjective measures of affective response

In order to investigate the relationship between objective and subjective measures of affective responses, subjective ratings and means and variances of SC responses to all stimuli were entered into a Pearson's *r* correlational analysis. There were no significant relationships evident between SC responses and subjective stimuli ratings.

4.3 Experiment 3: Interim summary of results

Supporting results from Experiment 1, findings from Experiment 3 further indicate that affective responses to bodies presented with the head cropped do not differ to those evoked by bodies presented with a masked face; a finding which holds true when measured both objectively (SC) and subjectively (ratings). Once again, in instances where body pictures were rated differently from neutral, this was in a positive direction. Taken together, these patterns of results suggest that these stimulus sets are equally adequate for investigating body representation with regards to the affect that they evoke both viscerally and consciously. Further evidence supporting the position to consider the gender of the body observed when investigating visual body perception is presented, as we show once again that in comparison to male bodies, female bodies seem to be thought of slightly more positively. However, we found no evidence to suggest that objective and subjective responses to stimuli were related, which implies that ratings might have been given on the basis of learned responses, or schemas, rather than a visceral reaction to stimuli.

5. Discussion

Three experiments, presenting two different tasks and including both subjective and objective measurements, were conducted with large samples in order to assess potential differences in how participants felt, both implicitly and explicitly, in response to body stimuli with cropped heads compared to body stimuli with masked faces. This was an important and necessary investigation in order to identify emotional responses that might confound the findings of behavioural, neuroimaging and electrophysiological studies of body perception. Both male and female body forms were included as research shows that men and women's bodies might be thought of [and perhaps processed] differently (e.g., Bernard et al., 2012; Cazzato et al., 2014; Gervais et al., 2012). We predicted that across all three experiments, bodies with cropped heads would not evoke more negative responses than those with masked faces, as might be assumed (Minnebusch & Daum, 2009; Minnebusch et al., 2009) given that bodies with masked faces may evoke meaning threat (see Proulx et al., 2010). We did expect that there might be differences in affective responses according to the gender of the body observed (e.g. Cazzato et al., 2014; Groves et al., 2017), and also that the appearance of female bodies might be referred to more so than that of male bodies in Experiment 2 (Heflick & Goldenberg, 2014).

Experiment 1 established that explicit affective evaluations of headless body stimuli and body stimuli with masked faces did not differ. Specifically, all body types were rated equally on the basis of disgust, fear, naturalness, valence and arousal. In instances where body pictures were rated differently from neutral, it was in a positive direction. In addition, female bodies were rated slightly more positively than male bodies, irrespective of whether the body was presented with a masked face or a cropped head.

Results from Experiment 2 support those from Experiment 1 as there were no differences in the nature or proportion of words elicited between the two types of body stimuli. Unlike Experiment 1, however, male and female bodies did not appear to be thought of differently. Bodies in general evoked more appearance words than competence words, but this was also the case for other stimuli and therefore cannot be taken as evidence for body objectification.

In addition, results from Experiment 3 supported the findings of both previous experiments, as there was no evidence for a difference in visceral or subjective responses to bodies with or without heads, irrespective of gender. Furthermore, the way participants rated stimuli in Experiment 3 was a close reflection of the way participants in Experiment 1 had rated the stimuli.

Taking findings from all three experiments into account, we found no evidence to support the argument that bodies with cropped heads are confusing or that they are not thought of as bodies because they miss a key feature of a person's configural structure (see Minnebusch et al., 2009). In fact, in Experiment 1 all participants correctly identified both types of body stimuli as bodies, and in Experiment 2 both types of body stimuli were referred to as bodies and as persons comparably often. Experiment 3 also showed no differences in SC when participants viewed the different types of body stimuli, indicating that neither stimulus type was more arousing than the other. Supporting this, we found no evidence in subjective responses to suggest that headless bodies were thought of as unnatural, which has been previously claimed (Minnebusch & Daum, 2009). These null findings should be viewed in the context of the many significant findings of differing affective judgement and free association word use across our different control stimulus types (i.e., flowers, insects and houses). Moreover, the consistent pattern of results presented across all three experiments also demonstrates that there was not a predominately negative response to either headless bodies (due to their unnaturalness) or bodies with masked face (due to meaning threat). In fact, ratings obtained for both types of body stimuli in Experiments 1 and 3 were neutral – positive, whilst there was no difference in the proportion of positive and negative valence-affective terms uttered with regards to each stimulus type in Experiment 2. In addition, there was no evidence of any visceral arousal to either type of body stimuli.

Taken together then, the pattern of results suggests that there are no differences between affective responses to bodies with cropped heads and masked faces and importantly, both types of stimuli were thought of rather neutrally. This suggests that both types of body stimuli are equally adequate for investigating visual body processing with regards to the affect that they evoke and thus, stimulus selection should not be based on this argument. As a result, it is unlikely that the effects of differential valence or arousal can explain the inconsistent findings evident in studies that used the two different types of stimuli (e.g., Alho, Salminen, Sams, Hietanen, & Nummenmaa, 2015; Minnebusch et al., 2009; Robbins & Coltheart, 2012a; Yovel et al., 2010). It is possible that attentional processes may account for these differences instead, as it has been shown that unusual aspects of a stimulus are fixated on more quickly and for longer (Rayner, Castelhano, & Yang, 2009). Therefore, with evidence to suggest that images of bodies with blurred, pixelated or obscured faces are thought of as unusual (Proulx et al., 2010), perhaps attention is drawn to the blurred face rather than to the body. On the other hand, when utilising body stimuli with masked or blurred faces, how the face is blurred/masked is likely to be an important consideration. For example, some studies obscure the face with a skin coloured oval (Robbins & Coltheart, 2012b), whereas others appear to blur existing facial information (Minnebusch et al., 2010; Minnebusch et al., 2009). The latter technique would therefore present the face at a low spatial frequency, whilst also retaining the first-order configuration of facial features, and it has been shown that low spatial frequency information can enhance holistic face-processing effects (Goffaux & Rossion, 2006). This suggests that findings of studies investigating visual body processing mechanisms with the use of bodies with masked faces might be confounded as a result of the specific facial mask employed.

With that in mind, as findings from our study suggest that headless bodies are not thought of as more strange than bodies with blurred faces, headless body stimuli may therefore avoid some problems that bodies with blurred faces pose due to the possible confounding effects of face-selective holistic processing. Nonetheless, the debate would still benefit from further research into the attentional processes associated with observing body stimuli with masked faces compared to those where features are made absent rather than unusual, such as bodies with cropped heads.

In addition, given that face processing mechanisms are activated by the presence of the head (Cox et al., 2004; Morris et al., 2006), bodies with cropped heads appear to be a wise choice of stimuli in order to investigate the distinct mechanisms underlying body representations. Having said that, viewing a body without a head in everyday life is an unlikely scenario for most, and therefore, it would be beneficial for future research to also focus on how and when distinct modules integrate and process information to reflect ecologically valid body viewing (i.e. seeing a body with a head and a visible face). With reference to our findings specifically however, we propose that researchers investigating body perception should choose stimuli carefully, based on whether or not the possibility of activating face processing mechanisms is problematic with regards to addressing their research questions(s).

We also found some evidence to suggest that female bodies are held in a slightly more positive regard than male bodies, although we found no evidence to support the idea that female bodies are objectified to a greater extent than male bodies (e.g., Heflick & Goldenberg, 2014; Vaes et al., 2011). It is not entirely clear why women's bodies might be thought of more positively than men's bodies, at least when explicitly evaluated. This pattern could be driven by a societal paradigm shift that encourages positive body image and is typically aimed at reshaping the way the female form is evaluated, especially by women (e.g., Paxton, McLean, Gollings, Faulkner, & Wertheim, 2007; Stice, Marti, Spoor, Presnell, & Shaw, 2008; Wood-Barcalow, Tylka, & Augustus-Horvath, 2010). As a consequence, perhaps media messages and early interventions encouraging positive evaluation of the female form irrespective of weight and shape (see also McKelle-Fischer, 2015, for example) results in women's bodies being thought of in a more positive light than men's bodies. As our sample consisted of a female majority, this might have been especially true. This is largely speculative, however, as limited research exists that has evaluated the efficacy or consequences of these campaigns, especially from a psychological perspective (e.g., Beaudoin, Fernandez, Wall, & Farley, 2007; Heiss, 2011). Further research is required so as to determine why there are affective differences in how male and female bodies are rated in explicit tasks, as well as why such differences are absent in free word associations, which measure affective evaluations more implicitly. Similarly, the difference in ratings given to male and female bodies could be due, at least in part, to stimulus sampling. Studies have shown that the effects of stimulus variation, both within and between studies, can produce random findings (see Judd, Westfall, & Kenny). As we presented a relatively limited number of stimuli – two per category – it could be that the difference in ratings occurred randomly. Future studies should therefore aim to include a considerably larger number of stimuli per category in order to allow for confident generalisation of findings to a given stimulus population.

It is also possible that female bodies were rated more positively because they were thought of as being more attractive. This is supported by evidence that suggests increased attractiveness is associated with increased positive valence as well as positive cognition (Eagly, Ashmore, Makhijani, & Longo, 1991; Langlois et al., 2000; Zebrowitz & Franklin, 2014). Furthermore, it has also been shown that the subjective experience of sexuality and/or sexual orientation does not necessarily dictate the perception of attractiveness (see Rieger, Savin-Williams, Chivers, & Bailey, 2016). Future studies should therefore seek to address whether the affective differences observed towards male and female bodies might be related to how attractive the perceiver reports the body to be.

Taken together, our findings add to a growing literature recommending that stimulus gender be considered when investigating visual body perception. Visual cortical processing mechanisms can differ according to the gender of the body observed (e.g., Alho et al., 2015; Gervais et al., 2012; Groves et al., 2017; Heflick & Goldenberg, 2014; Hietanen & Nummenmaa, 2011), and it has been shown that even the earliest of electrophysiological responses from visual cortex can be modulated by top-down processes (e.g., Meeren et al., 2005; van Heijnsbergen et al., 2007). As a result, if female bodies receive different affective evaluations than male bodies, even early cortical effects may differ.

In conclusion, the selection of headless or masked-face body stimuli in visual body processing research should not be based on the assumption that one or the other evokes different or differing affective responses, which might confound results. Specifically, we found no evidence to suggest that either stimulus type evokes negative affect. We therefore propose that instead, consideration be given as to whether the possibility of activating face-sensitive processing mechanisms is problematic to answering the research question(s). In addition, based on the findings outlined in this paper, it seems that subjective affective responses do differ according to the gender of the body observed. We therefore propose that this should be considered during both the design and analysis stages of future visual body perception research.

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Author Contributions

K.G. and H.G. conceived and designed the study, K.G. conducted the study, K.G., H.G. and S.K. analysed the results and wrote the paper.

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Table 1

Average ratings across all 5 attributes for each stimulus (male and female bodies collapsed within body type). A rating of 4 is equal to neutral, scores above 4 lean towards the positive-valence end of the spectrum (more delightful, natural, calming, positive, soothing) with 7 being the highest, whereas scores below 4 lean towards the negative-valence end of the spectrum (more disgusting, unnatural, fearful, negative, rousing) with 1 being the lowest. Standard deviation in parentheses.

Stimulus	Disgust	Naturalness	Fear	Valence	Arousal
Flowers	5.71 (1.03)	6.12 (1.18)	5.65 (1.00)	5.79 (1.00)	5.41 (1.18)
Insects	2.89 (1.30)	5.34 (1.65)	2.91 (1.03)	3.15 (1.38)	3.11 (1.12)
Houses	4.61 (1.02)	4.38 (1.45)	4.45 (.96)	4.66 (1.20)	4.36 (.96)
Bodies with cropped heads	4.06 (.57)	5.15 (1.33)	4.05 (.52)	4.17 (.78)	4.00 (.54)
Bodies with masked faces	4.06 (.56)	5.14 (1.24)	4.01 (.57)	4.15 (.80)	3.97 (.46)

Table 2

Average ratings across all 5 attributes for male and female body stimuli. A rating of 4 is equal to neutral, scores above 4 lean towards the positive-valence end of the spectrum (more delightful, natural, calming, positive, soothing) with 7 being the highest, whereas scores below 4 lean towards the negative-valence end of the spectrum (more disgusting, unnatural, fearful, negative, rousing) with 1 being the lowest. Standard deviation in parentheses.

Stimulus	Disgust	Naturalness	Fear	Valence	Arousal
Men with cropped heads	3.96 (.73)	5.04 (1.48)	3.95 (.54)	4.04 (.85)	3.99 (.55)
Men with masked faces	3.97 (.63)	5.08 (1.36)	3.98 (.64)	3.97 (.87)	3.95 (.51)
Women with cropped heads	4.15 (.73)	5.27 (1.45)	4.12 (.70)	4.23 (.99)	4.01 (.73)
Women with masked faces	4.14 (.69)	5.21 (1.38)	4.13 (.67)	4.33 (1.03)	3.99 (.60)

Table 4

Average proportion of positive, negative, appearance, competence and other words elicited, as well as the proportion of instances whereby stimuli were referred to as a body or as a person, or the body type was recognised, and the number of participants who responded (respondents) for body stimuli. Standard deviation in parentheses.

Stimulus	Positive	Negative	Appearance	Competence	Body	Person	Body type	Other
Men with cropped heads	0 (0)	.006 (.021)	.416 (.236)	.033 (.082)	.038 (.072)	.161 (.171)	.017 (.048)	.329 (.262)
Respondents	0	3	37	7	10	25	5	28
Men with masked faces	.010 (.035)	.014 (.058)	.361 (.217)	.040 (.103)	.042 (.089)	.222 (.225)	.024 (.076)	.287 (.232)
Respondents	3	3	32	7	9	31	5	29
Women with cropped heads	.009 (.031)	.010 (.334)	.430 (.239)	.038 (.081)	.053 (.078)	.197 (.190)	.011 (.036)	.252 (.269)
Respondents	3	3	34	8	14	31	4	26
Women with masked faces	.005 (.029)	.033 (.093)	.449 (.228)	.020 (.052)	.054 (.102)	.197 (.152)	.020 (.060)	.222 (.227)
Respondents	1	7	36	6	12	32	5	26

Table 5

Average ratings across all 5 attributes for each stimulus (male and female bodies collapsed within body type). A rating of 4 is equal to neutral, scores above 4 lean towards the positive-valence end of the spectrum (more delightful, natural, calming, positive, soothing) with 7 being the highest, whereas scores below 4 lean towards the negative-valence end of the spectrum (more disgusting, unnatural, fearful, negative, rousing) with 1 being the lowest. Standard deviation in parentheses.

Stimulus	Disgust	Naturalness	Fear	Valence	Arousal
Flowers	5.97 (.94)	6.17 (1.20)	5.84 (1.02)	5.91 (1.05)	5.80 (1.02)
Insects	3.22 (1.30)	5.36 (1.56)	3.18 (1.05)	3.56 (1.27)	3.37 (1.10)
Houses	4.93 (.88)	4.39 (1.33)	4.71 (.86)	4.87 (.93)	4.68 (.87)
Bodies with cropped heads	4.22 (.58)	5.17 (1.20)	4.23 (.74)	4.42 (.87)	4.10 (.56)
Bodies with masked faces	4.15 (.51)	5.25 (1.19)	4.19 (.59)	4.39 (.76)	4.08 (.59)

Table 6

Average ratings across all 5 attributes for male and female body stimuli. A rating of 4 is equal to neutral, scores above 4 lean towards the positive-valence end of the spectrum (more delightful, natural, calming, positive, soothing) with 7 being the highest, whereas scores below 4 lean towards the negative-valence end of the spectrum (more disgusting, unnatural, fearful, negative, rousing) with 1 being the lowest. Standard deviation in parentheses.

Stimulus	Disgust	Naturalness	Fear	Valence	Arousal
Men with cropped heads	4.05 (.71)	5.06 (1.31)	4.11 (.73)	4.31 (.97)	4.05 (.65)
Men with masked faces	3.95 (.61)	5.11 (1.30)	4.04 (.64)	4.21 (.84)	4.04 (.73)
Women with cropped heads	4.39 (.76)	5.27 (1.24)	4.35 (.90)	4.34 (.98)	4.14 (.74)
Women with masked faces	4.36 (.74)	5.39 (1.21)	4.34 (.80)	4.56 (.94)	4.12 (.70)

Table 7 *Average SC responses (microsiemens (µS)) to each stimulus type (bodies collapsed across both levels of body type and gender). Standard deviation in parentheses.*

Stimulus	SC means	SC variances
Flowers	1.07 (.45)	.00031 (.00010)
Insects	1.08 (.41)	.00032 (.00012)
Houses	1.08 (.45)	.00027 (.00009)
Bodies	1.10 (.51)	.00046 (.00018)

Table 8 *Average SC responses (microsiemens (µS)) to male and female body stimuli with and without the head. Standard deviation in parentheses.*

Stimulus	SC means	SC variances
Men with cropped heads	1.06 (.05)	.00033 (.00015)
Men with masked faces	1.11 (.09)	.00026 (.00010)
Women with cropped heads	1.13 (.11)	.00057 (.00039)
Women with masked faces	1.10 (.08)	.00068 (.00041)