Own attractiveness and dissatisfaction with physical appearance independently predict the salience of facial cues to size when women judge other women’s attractiveness

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Own attractiveness and dissatisfaction with physical appearance independently predict the salience of facial cues to size when women judge other women’s attractiveness

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Abstract
While facial cues to body size are a valid guide to health and attractiveness, it is unclear whether the observer’s own condition predicts the salience of (low) size as a cue to female attractiveness. The current study examines whether measures related to women’s own attractiveness/appearance predict the extent to which they use facial cues to size to differentiate other women on the attractiveness dimension. Women completed a BMI preference task, where they indicated their preference for high-versus low-BMI versions of the same woman, provided data to calculate their BMI and completed various psychometric measures (self-rated attractiveness/health, dissatisfaction with physical appearance). Here, attractive women and women who were dissatisfied with their own appearance were more likely to associate facial cues to low body size with high attractiveness. These data suggest that psychological factors related to women’s appearance shape their evaluations of other women based on cues to size. Such variation in attractiveness judgements may function to reduce the costs of female competition for resources, for example, by identifying ‘quality’ rivals and/or excluding others based on cues to size.

Key Words: BMI, face perception, attractiveness, female competition, indirect aggression
Introduction

Women compete with other women based on their desirability to potential mates via methods of indirect aggression such as self-promotion and denigration (Vaillancourt, 2013) and, on average, are more sensitive to social exclusion than men (Benenson et al., 2013). Moreover, behaviours related to women’s body image, such as eating behaviours, appear to be related to their competitiveness around other women (reviewed in Vaillancourt, 2013). Body-mass index (BMI) predicts health (Finucane et al., 2011) and is negatively correlated with women’s attractiveness, explaining a large proportion of the variance in female physical attractiveness (Tovée et al., 1998). Facial cues provide a valid guide to body size (Coetzee et al., 2009) and measures of health (Rantala et al., 2013; reviewed in Re & Rule, 2016) and facial cues to low BMI are perceived as attractive (e.g., Han et al., 2016). As individuals can accurately gauge BMI from facial adiposity alone (Coetzee et al., 2009), women may use facial cues to body size during day-to-day interaction to assess competitors for mates on the attractiveness dimension, particularly as women’s sartorial appearance may be used to conceal or accentuate certain bodily features (Grogan et al., 2013). Indeed, features of clothing such as patterning may alter the apparent size of the wearer (Thompson & Mikellidou, 2011) and laboratory studies on social judgements of bodies typically enhance internal validity by examining ratings of individuals in tight-fitting clothing (e.g., Stephen & Perera, 2014). Given the importance of facial cues for social interaction (Currie & Little, 2009; Furnham et al., 2001), tests of variation in attractiveness judgements of rivals for mates based on (more subtle) facial cues to body size arguably enhance external validity, given that facial cues are easier to access during social interaction.
Attractive women are thought to be effective competitors for mates due to their 'market demand' (e.g., Wincenciak et al., 2015) and thus may be more likely to promote themselves over rivals or denigrate other rivals (see Vaillancourt, 2013). However, it is unclear if psychological or objective measures of women's own attractiveness predict the extent to which they use facial cues to body size to differentiate female rivals on the attractiveness dimension. The current study examines this, in light of a prior framework where social judgements of the attractiveness of same-sex rivals varies in light of the functional benefits of identifying those rivals (e.g. when competition for mates might be particularly intense; Watkins et al., 2012).

If attractive women have a stronger preference for facial cues to low size, this would suggest that they are more sensitive to effective competitors for mates and/or weaken social effort toward less attractive rivals based on cues to size. Alternately, if less attractive women have a stronger preference for facial cues to low size, this would suggest that low 'market value' women are more sensitive to effective competitors for mates. To test whether this prediction merely reflects preferences for size similarity or similar apparent health in other women, or if psychological factors make unique contributions to women's evaluations of other women, other variables related to own appearance and 'quality' are examined. Here, self-ratings of attractiveness relative to a typical individual may have effects on women's perceptions of other women that are independent of their (dis)satisfaction with their appearance, if visual exposure to women who differ systematically from average shape/size (i.e. via media; Sarwer et al., 2004; Voracek & Fisher, 2002, 2006) is related to appearance concerns (see Grabe et al., 2008; Stephen and Perera 2014), and is motivated by female competition as opposed to female mate choice (Vaillancourt, 2013; see also Mealey, 2000).
Methods

Face stimuli

Women were photographed in a standardized setup with neutral expression and direct gaze. High-BMI and low-BMI versions of the same woman were manufactured using established techniques (e.g., Perrett et al., 1998), with 50% of the linear differences in 2D shape between symmetrized versions of a high-BMI female prototype ($M_{\text{age}}=25$ years, $SD=3.57$ years; $M_{\text{BMI}}=24.81\text{kg/m}^2$, $SD=0.45\text{kg/m}^2$) and low-BMI female prototype ($M_{\text{age}}=22$ years, $SD=2.15$ years; $M_{\text{BMI}}=17.24\text{kg/m}^2$, $SD=5.95\text{kg/m}^2$) added to or subtracted from digital face images of 7 young White adult women ($M_{\text{age}}=21.86$ years, $SD=1.78$ years). The constituents of each face prototype (10 faces, downloaded separately from 3d.sk; see, e.g., Fruhen et al., 2015) had accompanying height/weight data (the top/bottom 20% of full face set ordered by BMI). The mean BMI of the ‘high’ prototype was greater than that of the ‘low’ prototype ($t(9.11)=4.01$; $p<.01$, $d=2.66$).

The resultant high-BMI and low-BMI versions of the individual face images differ in size aspects of 2D shape but are identical in other regards (see Figure 1). This process created 7 pairs of female faces, with each pair consisting of a high- and low-BMI version of the same individual. Images were standardized on pupil position, resized (300x400 pixels) and presented adjacently (labels ‘Image A’ and ‘Image B’ above the left/right image respectively).

In a manipulation check, 17 raters (5 males, $M_{\text{age}}=26.06$ years, $SD=8.11$ years) judged the larger of the two faces within each pair (response options: ‘slightly larger’, ‘somewhat larger’, ‘larger’, ‘much larger’). High scores on the task (4-7) reflected a stronger tendency to associate the high-BMI face with larger size and, conversely,
lower scores (0-3) reflected a stronger tendency to associate the low BMI face with larger size. The shape manipulation altered perceived size in the expected direction ($M_{\text{Perceived Size}}=4.80$, $SEM=.04$, $t(6)=36.08$; $p<.001$, $d=13.64$).

**Figure 1.** Example high- (left) and low- (right) BMI versions of the same woman.

**Participants and procedure**

Seventy-nine women ($M_{\text{age}}=27.26$ years, $SD=10.87$ years, one woman later excluded for not completing all trials), recruited via adverts and our research participation scheme (awarded either £5 or course credit), took part in a BMI preference task, with each trial consisting of a high-BMI and low-BMI version of the same woman. Participants indicated which face in the pair they rated as more attractive and how much more attractive they rated their chosen face. Trial order was fully randomized and the side of the screen on which the high-BMI face was presented was
counterbalanced. Bi-items analyses where the stimulus served as the unit of analysis confirmed that low BMI versions of women’s faces were perceived as more attractive than high BMI versions of women’s faces ($t(6)=4.86$; $p<.01$, $d=1.84$).

Participants also took part in a separate randomized face judgement task unrelated to the current study and, following these tasks, a battery of questionnaires run on surveymonkey.com (estimated height to nearest centimetre; self-rated attractiveness/health on a 1 (much less than average) to 7 (much more than average) scale). Self-rated attractiveness is correlated with objective measures of attractiveness and attractiveness ratings of face photographs (Weeden & Sabini, 2007) and prosocial biases toward attractive individuals in naturalistic contexts (e.g., tipping; Lynn, 2009). Participants completed single-item measures of i) general body dissatisfaction and ii) overall appearance dissatisfaction using a paper-based 10cm visual analogue scale (i.e. 0 to 100 scale) with the anchor points ‘None’ and ‘Very much’ (Heinberg & Thompson, 1995; $M_{\text{Body dissatisfaction}}=50.76$, $SD=24.80$, Range=8-100; $M_{\text{Overall appearance dissatisfaction}}=47.22$, $SD=23.73$, range=5-100). This instrument is validated against the body satisfaction subscale of the Eating Disorder Inventory (Garner et al., 1983). Weight was also measured (Weight Watchers 8991BU precision body analyser electronic scale; $M_{\text{BMI}}=24.41$ kg/m$^2$, $SD=5.03$ kg/m$^2$, range=16.88-43.12 kg/m$^2$). Participants were then thanked, debriefed and reimbursed or awarded credit. All procedures were granted full Ethical approval.

**Coding of responses to faces**

Low-BMI face rated ‘much more’ (=0), ‘more’ (=1), ‘somewhat more’ (=2), or ‘slightly more’ (=3) attractive than the high-BMI face.
High-BMI face rated ‘slightly more’ (=4), ‘somewhat more’ (=5), ‘more’ (=6), or ‘much more’ (=7) attractive than the low-BMI face.

This data was used to calculate participant’s average score on the BMI preference task. High scores indicate a stronger preference for facial cues to high BMI.

Results

When compared against chance (i.e. 3.5) women generally preferred low-BMI version of women’s faces ($M=2.63$, $SEM=.08$; $t(77)=10.92$; $p<.001$, $d=1.24$). Simple correlations are reported in Table 1. As the two dissatisfaction measures were highly correlated, a new variable was created (dissatisfaction with physical appearance) by averaging scores on the two scales.

Table 1. Correlations ($\rho$) between predictor variables and outcome variable (Ns between 65 and 79).

<table>
<thead>
<tr>
<th></th>
<th>Preference for high BMI</th>
<th>Self-rated attractiveness</th>
<th>BMI (kg/m2)</th>
<th>Body dissatisfaction</th>
<th>Overall appearance dissatisfaction</th>
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<tbody>
<tr>
<td>Preference for high BMI</td>
<td></td>
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<tr>
<td>Self-rated attractiveness</td>
<td>-.365*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>.410*</td>
<td>-.428*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body dissatisfaction</td>
<td>.107</td>
<td>-.486*</td>
<td>.267*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall appearance dissatisfaction</td>
<td>.051</td>
<td>-.539*</td>
<td>.271*</td>
<td>.793*</td>
<td></td>
</tr>
<tr>
<td>Self-rated health</td>
<td>-.176</td>
<td>.331*</td>
<td>-.297*</td>
<td>-.512*</td>
<td>-.435*</td>
</tr>
</tbody>
</table>

Multiple regression analyses were conducted on preference for high BMI in women’s faces, with self-rated attractiveness entered in the first block, and own BMI, dissatisfaction with physical appearance and self-rated health entered simultaneously in the second block. Multicollinearity was not a cause for concern (Average VIF= 1.51,
all VIF<1.65, all tolerance scores >.60; see Field, 2009). The first \((F(1,64)=9.68; p<.01)\) and second model \((F(4,64)=5.36; p=.001)\) were significant and accounted for 13% (adjusted r square = .12) and 26% (adjusted r square = .21) of the variance in the outcome variable respectively. The additional three predictors improved the original model \((F\text{ Change } = 3.53; p=.02)\).

Self-rated attractiveness was negatively correlated with women’s preference for facial cues to high BMI in other women \((t= -3.11, \text{ standardized beta } = -.37; p<.01)\) and remained significant in the second model \((t= -3.29, \text{ standardized beta } = -.47; p<.01)\). BMI and self-rated health did not predict women’s preference for facial cues to high BMI (both absolute \(t<1.77\), both absolute standardized beta <.23, both \(p>.083\)). Dissatisfaction with physical appearance was a negative predictor of preference for high BMI in other women \((t= -2.75; \text{ standardized beta } = -.39, p<.01)\). Rerunning analyses with heterosexual women only revealed the same pattern of results.

**Discussion**

The current study replicates the association between attractiveness and facial cues to low BMI (Han et al., 2016) and presents new evidence that self-rated attractiveness and dissatisfaction with physical appearance make unique contributions to women’s judgements of other women. Relatively attractive women use facial cues to size to a greater extent to differentiate other women on the attractiveness dimension. These women were more likely to associate facial cues to *low* size with *high* attractiveness, when distinguishing between altered versions of the same woman. This may function to reduce the intensity of competition among female rivals by identifying attractive rivals for mates and/or reducing social effort toward other women based on cues to size (i.e. a potential cognitive mechanism for female exclusion or denigration;
Benenson et al., 2013; Vaillancourt, 2013). Critically, this relationship is not a mere by-product of preferences for size similarity as the positive relationship between women’s own BMI and their preferences for facial cues to size was not significant when controlling for other moderating factors, consistent with earlier discussion on the equivocal nature of this relationship (Stephen & Perera, 2014). Indeed, women who were less satisfied with their own appearance also used facial cues to other women’s size to a greater extent when judging their attractiveness. The findings reported here may motivate further work on distinctions between psychological and objective measures of appearance and corresponding judgements or behaviours related to competitiveness within female groups.

It may seem counter-intuitive that women who consider themselves more attractive than average and women who are dissatisfied with their appearance both judge other women’s attractiveness in a similar manner based on facial cues to their BMI. However, there are reasons why this pattern of results might not be contradictory. The measure of own attractiveness used here captures women’s self-evaluation against an average-looking person. By contrast, dissatisfaction with appearance is correlated, at least in part, with sociocultural pressures from the media (Grabe et al., 2008; see also Boothroyd et al., 2016), where the physical traits of some women in the media (e.g. models) deviate systematically from an average female (e.g., Sarwer et al., 2004; Voracek & Fisher, 2002, 2006). Indeed, female intrasexual competition, rather than female attractiveness to potential mates, may be related to women’s desire to alter or enhance their appearance in light of the environment, as is suggested in studies examining female-specific motives for thinness (Li et al., 2010). The data here is consistent with this proposal, as the relationship between appearance dissatisfaction and women’s attractiveness judgements of other women was observed
after controlling for women’s own BMI, suggesting a psychological component that makes a unique contribution to women’s attractiveness judgements after controlling for a strong physical correlate of their attractiveness to other men (Tovée et al., 1998). As recent work suggests a potential perceptual basis to appearance dissatisfaction in the form of biased subjective perceptions of normality following exposure to body images of specific size (Sturman et al., 2017), further work could examine the role that visual experience plays in female attractiveness judgements of friends and same-sex rivals. Collectively, these data suggest that both self-evaluations related to women’s effectiveness as a competitor for a mate and self-evaluations related to motives to improve appearance and/or a general aversion toward cues to large size predict women’s attractiveness judgements of other women.

In sum, these findings extend work by demonstrating that the characteristics of the perceiver contribute to women’s judgements of facial cues to size in other women. This is of utility for examining physical and psychological predictors of attractiveness and their relationship to behaviours and mental processes that underpin sociality and exclusion within female groups.

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Author contributions
Sole-authored manuscript.

Conflict of interest
The author declares no conflict of interest.

References
Boothroyd, L.G., Jucker, J.L., Thornborrow, T., Jamieson, M.A., Burt, D.M., Barton, R.A.,
Evans, E.H. & Tovée, M.J. (2016). Television exposure predicts body size ideals in


Currie, T. E. & Little, A. C. (2009). The relative importance of the face and body in judgments


regional, and global trends in body-mass index since 1980: Systematic analysis of
health examination surveys and epidemiological studies with 960 country-years and

dominance and trustworthiness predict managerial pay awards in experimental tasks.
*Leadership Quarterly, 26*, 1005-1016.

Furnham, A., Lavancy, M. & McClelland, A. (2001). Waist to hip ratio and facial attractiveness:

multidimensional eating disorder inventory for anorexia nervosa and bulimia.


images: A thematic analysis of women’s accounts during and after trying on dresses.
*Body Image, 10*, 380-388.

Han, C., Hahn, A.C., Fisher, C., DeBruine, L.M. & Jones, B.C. (2016). Women’s facial
attractiveness is related to their body mass index, but not their salivary cortisol.

Heinberg, L.J. & Thompson, J.K. (1995). Body image and televised images of thinness and
attractiveness: A controlled laboratory investigation. *Journal of Social and Clinical
Psychology, 14*, 325-338.

and eating restriction in heterosexual and homosexual individuals. *Evolution and

Lynn, M. (2009). Determinants and consequences of female attractiveness and sexiness:
Realistic tests with restaurant waitresses. *Archives of Sexual Behavior, 38*, 737-745.


Rantala, M.J., Coetzee, V., Moore, F.R., Skrinda, I., Kecko, S., Krama, T. et al. (2013). Adiposity, compared with masculinity, serves as a more valid cue to
immunocompetence in human mate choice. *Proceedings of the Royal Society of
London B, 280*, 20122495.


treatments: Physiological and socio-cultural influences. *Journal of Cosmetic
Dermatology, 2*, 29-39.

Stephen, I.D. & Perera, A.T.M. (2014). Judging the difference between attractiveness and
health: Does exposure to model images influence the judgments made by men and


