



## Effect of clothing colour on body image perception



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### ABSTRACT

The aim of this study was to examine the influence of clothing colour on body image (BI) perception in university aged women. Twenty-six healthy, active females had their photographs taken while wearing tight fitting white, black and bright coloured clothing costumes. Photographs were both enlarged and reduced by 20% with participants asked to digitally manipulate the chest, waist, hips, thigh and calf regions of their own photographs to achieve their perceived BI. Satisfaction with their current BI was assessed using the original photograph and a Likert scale. All participants reported high current BI satisfaction. BI perception, assessed in absolute and relative terms, for all body sites and whole body was similar for white, black and bright coloured clothing. However, BI perception was overestimated for the enlarged compared to the reduced image format. These results demonstrated that image format, and not clothing colour, significantly influenced BI perception in healthy females.

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### 1. Introduction

Body image is commonly referred to as the self-assessment of one's physical appearance, based primarily on self-perceptions and attitudes regarding one's body size and shape (Cash, Morrow, Hrabosky, & Perry, 2004; Thompson, 1990). Over time, the Western cultural image of the "ideal" female body has developed into one which possesses a very slim, toned physique that is virtually free of fat mass (Benninghoven, Raykowski, Solzbacher, Kunzendorf, & Jantschek, 2007; Tiggeman & Lynch, 2001). It has been argued that with this change has come an increase in the perceived importance of possessing such a physique (Cash et al., 2004). It is not uncommon to find women of all ages measuring their self-worth in terms of physical attractiveness, while comparing their bodies to the "ideal" body (Halliwell, 2013; Knauss, Paxton, & Alsaker, 2007; Thompson & Stice, 2001). The results of such comparisons are hypothesised to contribute to many individuals expressing dissatisfaction, or feelings of discontent with their overall physical appearance (Ogden, 2004).

It has been well documented over the last 30 years that negative body image (BI) perceptions can lead to greatly diminished mental and physical health for an individual. Persisting BI dissatisfaction may result in a variety of negative consequences,

such as lowered self-esteem (Powell & Hendricks, 1999), increased depression (Noles, Cash, & Winstead, 1985), social anxiety (Cash & Fleming, 2002b), and disordered eating behaviour (Augestad & Flanders, 2002; Williamson et al., 1995; Ziegler et al., 2005). Such negative consequences can potentially lead either directly or indirectly to outcomes such as general malnutrition (Milos et al., 2005), amenorrhea (Loucks, Verdun, & Heath, 1998), reduced bone mineral density (Guest & Barr, 2005), cardiac arrhythmias (Webb & Gehi, 1981), diminished quality of life (Cash & Fleming, 2002b) and possible death (Halmi, Brodland, & Rigas, 1975). Additionally, it appears that BI dissatisfaction is linked with distortions in the perception and processing of visual information. BI dissatisfaction has been reported to be correlated with an inaccurate perception of one's true body size. Specifically, individuals who score highly on BI dissatisfaction, women in particular, have been reported to perceive their own body regions as being larger than their true size (Cash et al., 2004; Ogden, 2004).

Studies investigating the link between body image and accuracy in estimating body size tend to use a standard methodology. Participants are asked to view a visual image of themselves and manipulate the image until they feel that it is an accurate representation of their body. The difference between the participant's actual measurements and the measurements of the adjusted image is then calculated. This difference is then investigated in light of its relationship with participant characteristics known to be associated with BI dissatisfaction. A review of the literature indicates that the investigation of the nature of the entities – participant vs.

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stimulus – in this relationship is remarkably unbalanced. While the influence of the characteristics of participants has been extensively investigated, less attention has been paid to the influence of the characteristics of the visual representation.

Studies in multimodal perception have reported that colour has distinct effects on the perception of information through other senses. For example, the colour of food has distinct effects on the perception of flavour intensity and the correct identification of flavours (Spence, Levitan, Shankar, & Zampini, 2010). The colour of crockery, tablecloths and level of ambient lighting is also known to influence flavour perception and liking for food (Harrar, Piqueras-Fizman, & Spence, 2011). More recently, Van Ittersum and Wansink (2012) have reported that the colour contrast between plate and the background colour of the table influences serving sizes such that individuals in conditions where there was high contrast between plate and table served themselves a 10% larger serving than a target serving size. When the contrast between plate and table was reduced, so was the discrepancy between the target and actual serving size.

While the exact mechanism by which such effects occur is not known, many research studies have consistently shown that a correlation exists between colour, mood and the hedonic aspects of an experience (Damhorst & Reed, 1986; Mahnke, 1996). In a study assessing liking for a dessert, Piqueras-Fizman, Giboreau, and Spence (2013) reported that plate colour significantly influenced ratings of liking for the dessert and the extent to which an individual found a dessert appetising. More generally the presence of light or bright colours appears to elicit positive emotions, while dull, dark colours tend to trigger negative emotions (Boyatzis & Varghese, 1994; Nolan, Dai, & Stanley, 1995). Several studies have demonstrated that colour has an effect on the overall ratings of the attractiveness of an individual (Elliot & Niesta, 2008) with individuals wearing red clothing tending to be rated as more attractive. There is evidence that the effect depends upon the ‘gender match’ between the rater and the rated individual. Roberts, Owen, and Havlicek (2010) reported that males rated pictures of males wearing a white shirt as less attractive than males wearing other coloured clothing. The same effect was observed for females rating pictures of other females.

The colour black has a more complicated relationship with hedonic responses. While black team uniforms have been associated with increased perceived aggression on the part of team sport players (Frank & Gilovich, 1988), the outcomes appear to be context specific. In terms of fashion clothing, it has been observed that black clothing has positive associations. In fashion magazines, black is promoted as a “slimming” colour. Fashion experts explain that the colour black absorbs light particles, thus diverting visual attention from an object, giving it a smaller appearance (Finney, 2006). In contrast, the colour white reflects light and attracts the eye, enlarging the appearance of an object (Finney, 2006). Therefore the selection of black clothing in a fashion context may represent a ‘safe’ choice for an individual.

To our knowledge, the influence of clothing colour on BI perception has not been examined. Given the association between colours and emotional responses (Boyatzis & Varghese, 1994; Mahnke, 1996; Vrij, 1997), and between BI and emotions (Cash & Fleming, 2002a; Powell & Hendricks, 1999), the aim of this study was to examine the influence of clothing colour on the perception of BI in university women. It was hypothesised that colour extremes would influence BI perception with a black costume creating a “slimming” effect, greater perceptual accuracy and a favourable BI, while a white costume would create an “enlarging” effect, resulting in reduced perceptual accuracy and a less unfavourable BI.

## 2. Method

### 2.1. Participants

Twenty-six, female university students with a mean ( $\pm$ SD) age of  $22.0 \pm 4.9$  yrs, height of  $167.5 \pm 6.2$  cm, mass of  $60.6 \pm 7.5$  kg, and body mass index of  $21.6 \pm 2.1$  kg m<sup>-2</sup> volunteered for this study. Participants completed a general health questionnaire to confirm their good general physical health, a Profile of Mood States (POMS) questionnaire (Lorr, McNair, Heuchert, & Droppleman, 2003) to identify any atypical pessimistic mood states, and the Eating Disorder Inventory (EDI-3) (Garner, Olmstead, & Polivy, 1983) to identify disordered eating behaviour. A trained psychologist examined the EDI-3 profiles and determined that no participant showed evidence of disordered eating. No disorders of mood were identified on the POMS. All participants provided signed informed consent in accordance with the institutional Human Ethics Research Committee’s approval for this study.

### 2.2. Procedures

The study involved the photographing of each participant while wearing three different clothing costumes (white, black and bright) followed by the computer manipulation of each photographic image to determine the participant’s BI perception. The white and black costumes were provided to the participants in a size that was tight fitting and consisted of the same style crop top and fitted lycra bike shorts. The bright costume was chosen and provided by each participant and was used as a comparative clothing costume that was tight fitting (i.e. swimming costume) and a colour different to the extreme colours examined (i.e. white and black). The bright costumes were predominantly multi-coloured consisting of primary colours. The order of the costumes worn was randomly determined. All photographs were taken in portrait format using a digital camera (Powershot G6, Canon, Tokyo, Japan) placed approximately four metres perpendicular to the participant. For each photograph, the participant was devoid of any jewellery and assumed a standard position with arms abducted to approximately 90 degrees and feet, shoulder-width apart. The digital photographs were taken with a resolution of  $2304 \times 3072$  pixels and exported at a resolution of  $270 \times 360$  pixels to a computer image manipulation programme (Sands, Maschette, & Armatas, 2004).

In a randomised order, the participant viewed the three colour photographic images with each colour image being displayed in three different formats, a 20% enlarged image, a 20% reduced image, and a 100% “true” image (i.e. total of 9 images, Fig. 1). On viewing the enlarged and reduced formats, participants were instructed “to change the right hand image to show what you ACTUALLY look like” by clicking on the following body regions of the image: armpits, sternum, navel, groin, left/right upper thigh, left/right lower thigh, left/right upper calf, and left/right lower calf. Upon viewing the “true” image, the participant was asked to not manipulate the image but was asked to indicate their satisfaction with this image by responding to the following question “I am satisfied with this image” using a 4-point Likert scale ranging from “Strongly agree” to “Strongly disagree”.

### 2.3. Data and statistical analysis

Computer manipulation of the photographic images was examined across five body regions (i.e. chest, waist, hip, thighs, calves) and the whole body (average of all five body regions) with BI perception expressed in absolute terms (expressed as a percentage of the original image) and relative terms (percentage deviation from the 100% true image). For the enlarged image format, relative BI perception was calculated as (manipulated measurement – 100)

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