



Original Article

Skin texture and colour predict perceived health in Asian faces

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ARTICLE INFO

Article history:

Initial receipt 15 June 2017

Final revision received 12 February 2018

Keywords:

Face perception

Skin texture

Skin colour

Perceived health

Asian

ABSTRACT

Facial skin texture and colour play an important role in observers' judgments of apparent health and have been linked to aspects of physiological health, including fitness, immunity and fertility. However, most studies have focused on Caucasian populations. Here, we report two studies that investigate the contribution of skin texture and colour to the apparent health of Malaysian Chinese faces. In Study 1, homogenous skin texture, as measured by wavelet analysis, was found to positively predict ratings of apparent health of Asian faces. In study 2, homogenous skin texture and increased skin yellowness positively predicted rated health of Malaysian Chinese faces. This finding suggests that skin condition serves as an important cue for subjective judgements of health in Malaysian Chinese faces.

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1. Introduction

Physical appearance is one of the most important criteria used for mate selection, for both sexes (Rhodes, 2006; Stirrat, Gumert, & Perrett, 2011). Individuals who are physically attractive tend to have more options when choosing a mate, and have more opportunity to pursue a good quality mate. Researchers have identified a number of cues to facial health and attractiveness, including averageness (Langlois & Roggman, 1990; Rhodes et al., 2001), symmetry (Hume & Montgomerie, 2001; Perrett et al., 1999; Rhodes et al., 2001; Thornhill & Gangestad, 1993), sexual dimorphism (Jones et al., 2005; Penton-Voak et al., 2001) and skin condition (Matts, Fink, Grammer, & Burquest, 2007; Scott, Pound, Stephen, Clark, & Penton-Voak, 2010; Stephen, Coetzee, & Perrett, 2011; Stephen, Law Smith, Stirrat, & Perrett, 2009).

1.1. Skin condition and face perception

Previous studies on facial correlates of attractiveness and healthy appearance have tended to focus on facial shape (Said & Todorov, 2011; Rhodes et al., 2001; Fink, Grammer, & Matts, 2006). More recently, however, studies have begun to highlight the importance of skin texture and

colour (Fink, Bunse, Matts, & D'Emiliano, 2012; Fink, Matts, D'Emiliano, Bunse, Weege, Röder, et al., 2012; Stephen et al., 2011).

Facial skin condition, as a rapidly changing health signal, provides useful information about an individual's current health and physiological status (Stephen et al., 2012, Stephen et al., 2011). Both the texture and colouration of human skin change with the influence of various internal and external factors. Skin colour is related to skin blood perfusion and oxygenation, which are associated with physical fitness and pulmonary and cardiac health, and with concentration of melanin, which is associated with photoprotection and production of vitamin D, and carotenoids, which are thought to be associated with healthy immune and reproductive systems (Alaluf, Heinrich, Stahl, Tronnier, & Wiseman, 2002; Charkoudian, 2001 & 2003; Edwards & Duntley, 1939; González-Alonso, Crandall, & Johnson, 2008; Jablonski, 2004; Stephen et al., 2011).

The colour distribution of facial skin has also been found to influence the perception of age and attractiveness in female faces, independent of facial shape and skin surface topography (Fink et al., 2006). Faces with homogenous skin colour distribution were perceived as younger, healthier and more attractive as compared to faces with relatively inhomogeneous skin colour distribution. The same pattern was found for male faces, whereby ratings of cheek skin can be used to predict the age, health status and attractiveness of men's faces (Fink, Bunse, et al., 2012). Further, Fink, Grammer, and Thornhill (2001) found that skin texture affected male judgments of attractiveness in female faces, while Jones, Little, Burt, and Perrett (2004) found an association

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between male facial attractiveness and the health rating of their skin patches, after controlling for structural cues.

The texture of facial skin is influenced by both internal biological factors (such as aging and hormonal balance) and external environmental factors (for example diet and humidity), which have been suggested to be more important (Kammeyer & Luiten, 2015). As we age, our skin loses its elasticity, becoming fragile and frail (Al-Nuaimi, Sherratt, & Griffiths, 2014; Naylor, Watson, & Sherratt, 2011), mainly due to the progressive loss of skin tissue (Robert, Labat-Robert, & Robert, 2009). Elevated levels of sex hormones have also been highlighted as a factor that contributes to the physiological changes in skin. Specifically, women with increased levels of androgens were found to have more severe dermatosis problems (Essah, Wickham, Nunley, & Nestler, 2006; Karrer-Voegeli, Rey, & Reymond, 2009). Environmental dryness and individual differences in diet have also been found to be related with the prevalence of acne (Danby, 2005; Davidovici & Wolf, 2010; Egawa, Oguri, Kuwahara, & Takahashi, 2002; Spencer, Ferdowsian, & Barnard, 2009). Research conducted by Nkengne et al. (2008) showed that skin condition was one of the most important criteria used when judging the perceived age of individuals. It is apparent, therefore, that the physical appearance of human skin, both its texture and colour, play an important role in determining its attractiveness and perceived health.

Historically, studies have tended to focus on a single cue in isolation. More recently, however, studies have begun to examine multiple cues in a single study, though there is mixed evidence about which cues are most important in determining perceptions of attractiveness and health. It has been suggested that skin condition may play a more important role in defining perceived facial health and attractiveness than structural cues (Scott et al., 2010; Stephen et al., 2012). Using geometric morphometric methods (GMM), researchers (Scott et al., 2010; Stephen et al., 2012) found no contribution of morphological masculinity in predicting attractiveness. Increment in skin yellowness and decrement in skin luminance, however, predicted rated attractiveness when judged by own ethnicity raters. A recent study by Mogilski and Welling (2017), though, found that individuals prioritised sexual dimorphism over averageness and skin colour.

The relationship between facial cues, perceived health and actual health is complex and inconclusive. Foo, Simmons, and Rhodes (2017) found a weak association between attractive facial cues and actual health. In their study, men's perceived health was predicted by both shape cues (specifically averageness, symmetry and adiposity) and a colour cue (skin yellowness); whereas women's perceived health only found to be associated with sexual dimorphism. However, in order for a cue to be considered a valid cue to health, it must be linked to both healthy/attractive appearance and to some aspect of physiological health (Coetzee, Perrett, & Stephen, 2009). Though masculinity in

male faces was found to be associated with semen quality, there was a negative association between averageness and semen quality. Further, there was no significant association between perceived health cue and actual health for female. Here, for the first time, we examine skin texture and colour's influence on perceived health in a single study.

Further, while the effect of skin colour on apparent health of faces has been replicated in black African (Coetzee et al., 2012; Stephen et al., 2011; Stephen et al., 2012) and Asian populations (Tan, Graf, Mitra, & Stephen, 2017), skin texture has only been examined in Western Caucasian populations (Fink, Matts et al., 2012; Fink et al., 2006), apart from one study in a black African population that used rated skin homogeneity in place of subjective measurement of texture (Coetzee et al., 2012). Since previous studies have found differences in preference for ideal body size between individuals from different cultures (Swami & Tovée, 2005a, 2005b; Tovée et al., 2006), and variation in skin colour has been proposed to be the evolved based on the needs of the individual living in a specific geographical location, for example photoprotection and vitamin D production (Jablonski, 2004), cross cultural replications are required.

The purpose of this paper is to explore the relationship between perceived facial health and facial skin condition, in an East Asian setting. Study 1 investigated the relationship between perceived facial health and objective analysis of skin texture and colour. Study 2 was an extension (and improvement) to Study 1, whereby the associations between perceived facial health, perceived skin health, skin colour and texture were explored in a more controlled setting.

2. Study 1: the relationship between facial skin condition and perceived facial health

Based on the results of previous studies conducted in the West exploring the relationship between skin texture and attractiveness (Fink et al., 2006, 2001; Fink, Matts, Röder, Johnson, & Burquest, 2011; Jones et al., 2004; Matts et al., 2007; Samson, Fink, & Matts, 2010), it was predicted that there will be a relationship between perceived facial health and a measure of skin texture, such that smoother skin will be perceived as healthier.

2.1. Methods

This study was approved by the Ethics Committee at the University of Nottingham Malaysia Campus. All participants gave both verbal and written informed consent in advance. The current study was divided into two main parts. In Part 1, a group of participants were recruited for their facial photographs to be taken (henceforth referred to as “subjects”). In Part 2, the standardized photos collected in Part 1 were



Fig. 1. Examples of three skin patches produced by cropping the left cheek area of 143 facial photographs with Matlab.

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