Evolution and Human Behavior 36 (2015) 423–429

Contents lists available at ScienceDirect

Evolution and Human Behavior

journal homepage: www.ehbonline.org

Original Article

Perceived and experimentally manipulated status moderates the relationship between facial structure and risk-taking☆

Keith M. Welker [a,*], Stefan M.M. Goetz [b], Justin M. Carré [c]

[a] University of Colorado Boulder
[b] Wayne State University
[c] Nipissing University

ARTICLE INFO

Article history:
Initial receipt 16 July 2014
Final revision received 16 March 2015

Keywords:
Facial structure
Risk-taking
Social status
Risk-sensitivity
Individual differences
Ecological rationality

ABSTRACT

Previous work indicates that facial width to height ratio predicts aggressive behavior, particularly when social status is low. The current research extends these findings with experimental evidence that status can moderate the relationship between facial structure and risk-taking. Male participants (N = 165) completed a measure of status, had their facial structure measured, were randomly assigned to win or lose a competition, and completed a behavioral measure of risk-taking. Facial structure predict risk-taking when individuals' perceived status was low, but not high. Additionally, facial structure also predicted risk-taking in losers, but not winners of the competition. Individuals low in self-reported social status who lost the competition showed the highest relationship between facial structure and risk-taking. These findings provide evidence that FWHR is not always an indicator of risk-taking behaviors, but only when individuals perceive themselves as being low in status. These findings are interpreted from an ecological rationality perspective and suggest that risk-taking is adjusted appropriately to strive to meet social goals.

1. Introduction

Physiognomy, the study of the relationship between facial features and personality, has long been dismissed as pseudoscience. Nevertheless, recent evidence suggests that it may contain a kernel of truth. For instance, people make rapid dispositional attributions of faces after only brief exposure (Willis & Todorov, 2006). Some work also suggests that these judgments are accurate, as individuals perform above chance when judging sexual orientation (Rule, Ambady, Adams, & Macrae, 2008), physical strength (Sell et al., 2009; Sell, Tooby, & Cosmides, 2009), and aggressive behavior (Carré, McCormick, & Mondloch, 2009). This ability has been theorized as an adaptive mechanism to infer dominance and trustworthiness (Todorov, Said, Engell, & Oosterhof, 2008). One static facial cue that has gained much recent attention is the facial width-to-height ratio (hereafter FWHR), or the distance between the left and right zygomatic bone and dividing that distance by the distance between upper lip and mid-brow (e.g., Carré et al., 2009; Stirrat, Stulp, & Pollet, 2012). Having a high FWHR, or wider face, has been thought to be a biological index of physical dominance and motivation to achieve power (Carré & McCormick, 2008; Lewis, Lefevre, & Bates, 2012).

Through an examination of human skulls, Weston, Friday, and Liò (2007) found that FWHR was a size independent sexually dimorphic feature with males having relatively larger facial width relative to height compared to females. Importantly, this sex difference emerges around puberty in humans and capuchin monkeys (the only other primate in which this metric has been tested) implicating the potential role of pubertal androgens on facial structure and providing a link between structure and behavior through the organizational effects of androgens on the neural circuits underpinning these behaviors (Carré & McCormick, 2008). Consistent with this idea, neuroimaging work indicates that amygdala reactivity to threatening faces (relative to shapes and neutral faces) – a neural correlate of one's propensity toward aggressive behavior (Coccaro, Sripada, Yanowitch, & Phan, 2011) – is positively associated with aggressive behavior among men with relatively large FWHRs, but not those with smaller FWHRs (Carré, Murphy, & Hariri, 2013). Also, other work indicates that low-dose administration of testosterone in boys with delayed puberty is known to modulate craniofacial growth (Verdonck, Gaethofs, Carels, & de Zegher, 1999) and FWHR was found to be positively correlated with baseline and testosterone reactivity in two samples of men (Lefevre, Lewis, Perrett, & Penke, 2013).

Despite this initial evidence, subsequent research with relatively large samples has failed show sexual dimorphism in FWHR (Lefevre et al., 2012; Özener, 2012). Nevertheless, variation in FWHR within men has been repeatedly found to map onto behaviors and rater judgments that are conceptually linked to dominance and other antisocial behaviors. These include aggression (Carré & McCormick, 2008; Carré et al., 2009; Goetz et al., 2013), unethical behavior (Geniole, Keyes, Carré, & McCormick, 2014; Haselhuhn & Wong, 2012), trustworthiness (Stirrat & Perrett, 2010), prejudice (Hehman, Leitner, Deegan, & Gaertner, 2013; Hehman, Leitner, & Gaertner, 2013), achievement

☆ We thank Shyneth Galicia, Elianna Lozoya, Brian Tyminski, Nicholas Jones, and Jordan Liphardt for assistance with data collection.

* Corresponding author. University of Colorado Boulder, Department of Psychology and Neuroscience, Boulder, CO 80305.
E-mail address: welkerk@wayne.edu (K.M. Welker).

http://dx.doi.org/10.1016/j.evolhumbehav.2015.03.006
1090-5138/

motivation (Lewis et al., 2012), performance in association football (Welker, Goetz, Galicia, Liphardt, & Carré, 2015) and physical formidability in mixed-martial arts fighters (Zilioli et al., in press).

Along with these findings, some studies have failed to replicate the link between FWHR and aggression (e.g., Deaner, Goetz, Shattuck, & Schnotala, 2012; Gómez-Valdés et al., 2013; Özener, 2012). For instance, using a large sample of Turkish participants, Özener (2012) found that FWHR and self-reported aggression were unrelated. Also, using a relatively large sample of National Hockey League players, Deaner et al. (2012) found only a small and non-significant ($p = .057$) positive correlation between FWHR and penalty minutes (used as an ecological measure of aggression). These null results might be explained by a failure to take into account important moderators variables such as personality and social context. Indeed, psychological adaptations are often not obligate, context-insensitive processes rigidly deployed regardless of the environment, rather contextual factors facultatively adjust their deployment (Weisfeld, 1999; Williams, 1966). Relative social status and physical robustness vary at least to some degree intergenerationally and across the lifespan. Therefore, an obligate adaptation that is insensitive to this variance will suffer greater fitness loss than an adaptation that facultatively adjusts to variable parameters of one's self and the environment.

One important environmental moderator that has emerged from the literature is relative social status. A recent study found that relative social status moderated the relationship between facial structure and aggression. Goetz et al. (2013) found FWHR was positively correlated with reactive aggression, but only in men who reported low subjective social status. In a second study, this effect was conceptually replicated in a sample of professional hockey players. Player salary was used as a measure of relative status and found to moderate the relationship between FWHR and aggressive plays such that FWHR was positively correlated with aggression, but only among players with relatively low salaries. The role of social status as a moderator of the relationship between FWHR and dominance has also been documented in nonhuman primates. Lefevre et al. (2014) studied brown capuchin monkeys and found that FWHR was positively related to alpha status and assertiveness – indexed from a variety of behavioral traits including bullying, aggressive behavior, stinginess, dominance, and independence. In a re-analysis of these data, Carré (2014) showed that FWHR was only related to assertiveness among low status monkeys. Collectively, these series of studies highlight the importance of considering relative social status when examining the link between FWHR and dominance-related behaviors.

In general, low status individuals are more likely to take risks than high status individuals (Wilson & Daly, 1985, 1997). This perception is supported by work suggesting that individuals low in social status are more likely to engage in – and suffer the consequences of – risky behaviors, such as drug use (Finkelstein, Kubzansky, & Goodman, 2006), risky sexual behaviors (e.g., Adler et al., 1994; Capaldi, Stoolmiller, Clark, & Owen, 2002), and aggression (e.g., Archer, 2009; Wilson & Daly, 1985). Risk-taking is often used as a means of enhancing one's position in a social hierarchy (see Ellis et al., 2012 for a review), or at least dissuade future challenges directed at oneself (e.g., Fessler, Tiokhin, Holbrook, Gervais, & Snyder, 2014). The form that risk-taking assumes depends on the options available to an individual and these are not evenly distributed across social strata. Thus, the cost-benefit ratio of using risky strategies (e.g., aggression) to achieve status can be shifted in favor of their use (Wilson, Daly, & Pound, 2009). Furthermore, both aggression and risk-taking have been associated with impulsivity (Campbell & Muncer, 2009; Lauriola, Panno, Levin, & Lejuez, 2014). Relevant to this research, several studies have linked FWHR to formidability (ability to win in an all-out fight). In a forensic sample of skeletal remains, FWHR was related to the means by which the victim was killed (Stirrat et al., 2012). Wider faced men were more likely to have been killed using methods that allow killing at a distance (e.g., projectiles or poison), whereas narrower faced men showed more signs of having been bludgeoned to death. Also, FWHR was positively associated with having a winning record (formidability) in mixed martial artists (Třebický et al., 2014; Zilioli et al., in press), and was related to subjects' own ratings of formidability (Stirrat & Perrett, 2010). Taken together, these results indicate that the costs of aggression might be further defrayed by ones formidability (Sell, Tooby, & Cosmides, 2009). Thus, FWHR might be more strongly related to risk-taking among low status men.

From an evolutionary perspective, the sex that experiences higher variance in reproductive potential is expected to be less risk-averse (Wilson & Daly, 1985). Consistent with this perspective, men are the more reckless sex (Byrnes, Miller, & Schafer, 1999). In a large meta-analysis drawing from over 150 studies, men displayed higher levels of risk-taking across 14 of the 16 categories of risk-taking (Byrnes et al., 1999). To the degree that FWHR co-varies with masculinity in men, it should also co-vary with risk-taking.

Returning to the issue of relative social status, risk-taking can become a suboptimal strategy under certain social conditions. Under conditions of high social status, risk-taking is suboptimal as further gains have diminishing returns (Ermer, Cosmides, & Tooby, 2008). However, having low status or experiencing an acute drop in status should motivate an individual to prefer risk-seeking strategies that can recover or close the gap. Risk-sensitivity theory proposes that when faced with the option of adopting a risky strategy (one with high variance in outcome) or a less risky strategy, one's state of need will determine which to adopt. In situations in which lower risk options are unlikely to meet one's needs, risk-aversion toward high risk options is expected to decrease (Mishra & Lalumière, 2010). This possibility is consistent with the evolutionary models positing that adaptations are formed to adjust to specific contexts (Weisfeld, 1999; Williams, 1966). Thus, FWHR may specifically promote risk-taking in situations where risk-taking is advantageous, such as low social status.

2. Overview of present research

The present research was designed to investigate whether social status moderates the relationship between facial structure and risk-taking behavior. This research not only measured participants' perceptions of status, but also experimentally manipulated their status using a rigged competition task. Based on previous reports that social status moderates the relationship between facial structure and aggression (Goetz et al., 2013), we hypothesized that FWHR would be positively correlated with risk-taking behavior, but only under conditions of low social status.

3. Methods

3.1. Participants and design

One hundred and sixty-five men ($M_{age} = 20.64$, $SD = 3.00$) enrolled at Wayne State University participated in the study for partial course credit. The sample was diverse (37.7% Caucasian, 20.1% African American, 18.8% Asian, 4.4% Latin American, .6% Native American, and 18.2% Other Race). Participants were randomly assigned to either win or lose a rigged competition manipulated as a video game participants played. Assuming a two-tailed alpha of .05, this sample size provided substantial power for detecting large effect sizes ($|r| = .50$, power > .99) and medium effect sizes ($|r| = .30$, power = .98), and low power for detecting small effect sizes ($|r| = .10$, power = .25). Data for this study are available in the online supplemental materials (available on the journal's website at www.ehbonline.org).

3.2. Procedure and materials

3.2.1. Consent and facial structure measurement

After providing informed consent, participants had a picture of their face taken. Specifically, participants were instructed to look directly at the camera, not tilting their head, with an emotionally neutral expression. After the study, two hypothesis-blind researchers independently