Personality and Individual Differences 86 (2015) 312–317

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Face shape and behavior: Implications of similarities in infants and adults

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ARTICLE INFO

Article history:
Received 5 May 2015
Received in revised form 22 June 2015
Accepted 23 June 2015
Available online 3 July 2015

Keywords:
Face–width–height ratio
Babyface
Assertive/aggressive behavior
Prenatal influences

ABSTRACT

We investigated conceptual overlap between literature demonstrating links between adult facial width-to-height ratio (FWHR) and behavior and that demonstrating links between infant FWHR and temperament by investigating whether babyfaceness is associated with FWHR and behavior at both ages. Babyfaceness was positively correlated with FWHR in both infants and adults. Babyfaceness also was correlated with an infant temperament that is a precursor of bolder behavior in childhood and adulthood, just as a broader infant FWHR was previously shown to be. These results call into question existing explanations for relationships between facial appearance and adult assertive or aggressive behavior. Previously, behavioral correlates of adult FWHR have been attributed to influences of pubertal testosterone, and correlates of adult babyfaceness have been attributed to compensation for undesirable stereotypes. Our findings indicate that the pre-natal developmental influences required to explain appearance–temperament relationships in infancy also should be considered as explanations for appearance–behavior relationships in adulthood.

1. Introduction

1.1. Facial width-to-height ratio (FWHR) and behavior

A burgeoning body of research has highlighted the role of facial width-to-height ratio (FWHR) as an accurate predictor of assertive personality traits in men. Men with relatively broader faces scored higher on laboratory and real-world measures of aggressiveness (Carre, McCormick, & Mondloch, 2009; Carre & McCormick, 2008) and cheating (Jia, Van Lent, & Zeng, 2015; Haselhuhn & Wong, 2012; Stirrat & Perrett, 2010). Broader faces further predicted men's dominance (Mileva, Cowan, Cobey, Knowles, & Little, 2014), US Presidents' achievement drive (Lewis, Lefevre, & Bates, 2012), performance during negotiation tasks (Haselhuhn, Wong, Ormiston, Inesi, & Galinsky, 2014), and CEOs' corporate success (Wong, Ormiston, & Haselhuhn, 2011).

1.2. Dominant explanation for FWHR effects

Most research on the link between FWHR and assertiveness attributes this relationship to the effect of pubertal testosterone to increase both facial masculinization and assertiveness. This explanation rests partly on evidence that pubertal sexual differentiation is associated with widening of the male jaw in many primate species, and human males show a larger FWHR than females (Weston, Friday, & Lio, 2007; but see Lefevre, Lewis, Bates, et al., 2012). Furthermore, testosterone is associated with assertive personality measures, such as physical aggression, reactive aggression, and social dominance (Mazur & Booth, 1998). Also supporting this link, FWHR is correlated with levels of circulating testosterone in men (Lefevre, Lewis, Perrett, & Penke, 2013). Based on the association between FWHR and increased testosterone and links between testosterone and aggressiveness, it is thought that FWHR may provide an honest signal of aggressiveness by indicating a man's level of pubertal testosterone (Carre et al., 2009).

1.3. Other possible mechanisms for FWHR effects

The large body of research investigating links between FWHR and aggressive or assertive behavior has neglected two related lines of research that suggest mechanisms for the relationship other than pubertal testosterone: 1) men judged as more babyfaced show more assertive, aggressive behavior; and 2) infants with a broader FWHR show a less shy and inhibited temperament in childhood and adulthood.

1.3.1. Babyfaceness and assertive or aggressive behavior

Paralleling relationships between greater FWHR and more assertive or aggressive behavior is evidence that more babyfaced adolescent boys and young men show similar behavior. Babyfaced individuals are perceived as more naïve, honest, and warm than their more maturefaced peers (Zebrowitz & Montepare, 1992). However, babyfaced males do not fit these stereotypes. Babyfaced adolescent boys showed more academic achievement than their more maturefaced peers, an effect mediated by their higher motivation (Zebrowitz, Andreoletti, Collins, Lee, & Blumenthal, 1998), and more babyfaced men were more likely to earn military awards (Collins & Zebrowitz,

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http://dx.doi.org/10.1016/j.paid.2015.06.036
0191-8869/

1995). In addition, more babyfaced adolescents from lower socioeconomic status (SES) backgrounds, showed more criminal behaviors (Zebrowitz, Andreoletti, et al., 1998), and early measures of babyfaceness were associated with greater assertiveness and hostility at later ages in men, albeit not women (Zebrowitz, Collins, & Dutta, 1998). These effects parallel the behavioral correlates of higher FWHR discussed in Section 1.1. Moreover, the facial qualities correlated with rated babyfaceness include a rounder face, as defined by relatively equal breadth and length, which is likely to share variance with a broader FWHR (Zebrowitz & Montepare, 1992).

In contrast to the argument that behavioral correlates of FWHR derive from pubertal testosterone levels, it has been suggested that the correlates of babyfaceness may reflect compensatory responses to the babyface stereotype. Indeed, more babyfaced young and middle-aged adults report more external constraints in their lives (i.e., external factors beyond their control that interfere with reaching goals; Andreoletti, Zebrowitz, & Lachman, 2001). One reason may be that babyfaced individuals are eschewed for jobs that value leadership and shrewdness, and favored for those that value the warmth and submissiveness associated with the babyface stereotype and that are assigned more often to women than men as well as more often to babyfaced than maturefaced men (Zebrowitz, Tenenbaum, & Goldstein, 1991). Since being viewed as warm and submissive conflicts with masculine ideals, it has been suggested that the more assertive and hostile behavior of more babyfaced men may reflect an effort to counter the babyface stereotype.

1.3.2. FWHR and infant temperament

Just as behavioral correlates of babyfaceness parallel correlates of FWHR in adulthood, so do temperament correlates of FWHR in infancy. Specifically, a landmark study by Arcus and Kagan (1995) found that low-reactive infants, who are developmentally prone to become more outgoing children, have higher FWHR than high-reactive infants, who are developmentally prone to be more shy and inhibited as children. Measures of infants' FWHR at 14 months (calculated as the ratio of face width at zygion to head height rather than to mid-face height, as in the adult literature) correlated with infant temperament categories determined at 4 months of age. Moreover, this infant reactivity measure continues to predict reactivity in childhood, adolescence, and even into adulthood (e.g., Hardway, Kagan, Snidman, & Pincus, 2013; 2012; Schwartz, Snidman, & Kagan, 1999; Schwartz et al., 2012).

In contrast to the suggestion that behavioral correlates of FWHR in adult men reflect the influence of pubertal testosterone or the suggestion that similar correlates of babyfaceness reflect a compensatory mechanism, another hormonal influence has been suggested to explain the behavioral correlates of infant FWHR. Specifically, Arcus and Kagan (1995) argued that this relationship may reflect increased prenatal exposure to glucocorticoids in infants with a smaller FWHR. Glucocorticoids are associated with inhibited growth of the palate in primate species (Hendrickx et al., 1975), which would lead to narrower faces and resultant smaller FWHR. Further, overexposure to glucocorticoids in prenatal development leads to increased stress responses as well as higher levels of anxiety (Seckl & Meaney, 2004), which could yield less assertive and aggressive behavior.

1.4. Research aims

The present study investigated the conceptual overlap between the literature demonstrating links between adult FWHR and behavior and that demonstrating links between infant FWHR and temperament. More specifically, we investigated whether babyfaceness is associated with FWHR at both ages. As further evidence of conceptual overlap, we also investigated whether babyfaceness is associated with early infant temperament, as it has been shown to be with behavior in adulthood. If babyfaceness shares variance with FWHR in both infancy and adulthood, this would implicate early developmental contributors to the assertive and aggressive behavior shown by young men high in babyfaceness or FWHR, providing an alternative explanation to the influence of pubertal testosterone or compensatory motivation.

2. Method

2.1. Participants

Child participants were drawn from a longitudinal sample of middle-class Caucasian children studied by Kagan and associates. Data used in the present study included a) temperament assessed at 4-months (Kagan, Reznick, & Snidman, 1988), b) FWHR at 14-months (Arcus & Kagan, 1995), and c) facial ratings made in the present study from videotapes during a follow up study of the children at ages 6 to 8.5 years (Kagan, Snidman, Zentner, & Peterson, 1999). The current sample was restricted to the 120 participants videotaped in childhood who had temperament ratings. Of these, 73 also had FWHR measures, a much smaller sample than the number for whom measurements were originally taken (N = 284). Of those with babyface ratings, 41 had been classified in infancy as low reactive and 37 as high reactive, the two temperament categories contrasted by Kagan. Of those with measured FWHR, 25 had been classified as low reactive and 21 as high reactive.

2.2. Stimulus faces

2.2.1. Child participant faces

Thirty second clips of participants were taken from videotapes made during acclimation to the experimenter at the beginning of a long protocol of tests in the study by Kagan et al. (1999).

2.2.2. Adult faces

Thirty six faces were selected from a publicly available database (Minear & Park, 2004), with equal numbers of younger and older men and women (9 per group). Each photograph was stretched in Photoshop by 3% in either height or width, resulting in 3 versions of each facial identity (Fig. 1), yielding 108 stimuli.

2.3. Raters

2.3.1. Child participant face raters

The videotape clips of the child participants were not publicly available. However, the first author and two graduate students with experience assessing babyfaceness from photographs were permitted to view them in Jerome Kagan's lab in order to make babyfaceness and attractiveness ratings.

2.3.2. Adult faces raters

Thirty two adults (16 women) aged 18–81 ($M = 47$, $SD = 27.86$) rated babyfaceness and attractiveness of the adult faces. Students received course credit; others were paid $25.

3. Measures

3.1. FWHR of child participants

FWHR of participants at 14 months of age were taken from Arcus and Kagan (1995), who used calipers to measure the width between the left and right zygion and the height from the top of the head to the chin.

3.2. FWHR of adult faces

Two trained research assistants marked photographs of faces with 6 points (Fig. 2a) from which three distances were calculated (Fig. 2b). Using these distances, two measures of width to height ratio were