



Fluctuating Asymmetry and Body Weight in Men and Women: Implications for Sexual Selection

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Fluctuating asymmetry (FA), small random fluctuations from perfect bilateral symmetry, is an indicator of developmental stability and therefore of good genes. Sexually selected weapons, such as the canine teeth of some primates, often show a negative relationship between FA and size of weapon. This suggests that it is only the males with the best genes who are able to produce large symmetrical weapons. Male body mass, which may improve fighting success, is not bilaterally symmetrical, and little is known of its relationship with FA. It is shown that for human males the body weight in adults is negatively related to FA; this suggests that male body weight is condition-dependent in that it is only individuals with the best genes who are able to develop and maintain large size. There is no relationship between weight and FA in children. For human females, there is a positive correlation between body weight and FA in adults but not in children; the implications of this finding for the understanding of the selection pressures that operate on women's weight are discussed.

KEY WORDS: Fluctuating asymmetry; Body size; Sexual dimorphism; Sexual selection.

Fluctuating asymmetry (FA) is defined as small random deviations from perfect bilateral symmetry (Van Valen 1962). FA is a negative indicator of how well-adapted individuals are to their environment and is increased by mutations (Parsons 1992), infection by parasites (Møller, 1992a), and habitat destruction (Manning and Chamberlain 1994). Because it can indicate "good genes," FA is now used extensively in studies of sexual selection.

The first sexually selected traits to be investigated in this way were those used in display, for example, the tail feathers of male swallows (Møller, 1990)

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and the trains of peacocks (Manning and Hartley 1991). Although exceptions seem to occur (see Watson and Thornhill 1994 for review), it seems that mate choice tends to lead to elaborate paired structures in which FA is negatively related to ornament size. Symmetry and size of ornament may therefore be reliable signals of mate quality (Moller and Pomiankowski 1993).

Humans do not have elaborate paired sexually selected structures. However, it is probable that FA is important in human mate choice. Thornhill and Gangestad (1993) have pointed out that facial composites possess both symmetry and averageness of features, and this makes them more attractive than the majority of individual faces. In support of this, Gangestad, Thornhill, and Yeo (1994) found that facial attractiveness is negatively correlated with FA in body traits, and Grammer and Thornhill (1994) have observed a positive relationship between symmetry and ratings of attractiveness of composite faces. A more subtle form of mate choice, the frequency of orgasms, which may lead to high sperm retention, has also been shown to correlate with low FA in male partners (Thornhill, Gangestad, and Comer 1994).

What of FA and sexual selection through male-male competition? In common with display traits, weapons such as beetle's horns, bird's spurs, and primate's canine teeth tend to show a negative relationship between FA and size (Moller 1992b; Manning and Chamberlain 1993). This may mean that sexually selected ornaments and weapons are both condition-dependent in that only males in good condition (and therefore with "good genes") can afford to develop long and symmetrical trains, spurs, canines, and so forth. However, not all sexually selected weapons are paired. Body-size dimorphism in primates is usually viewed as sexually selected and is correlated with comparative measures of canine dimorphism and male-male aggression (Plavcan and Schaik 1992). Large body size in male primates may be a condition-dependent weapon, but nothing is known of the relationship between body size and FA.

Humans are, in general, only moderately sexually dimorphic. For example, there is little sexual dimorphism in their canines, which shows a positive relationship between FA and length in both sexes (Manning and Chamberlain 1993). However, humans are dimorphic in height and weight (Owen and Brozek 1966). This difference is most marked after puberty and results primarily from a longer period of growth in males compared to females. If body size is a condition-dependent weapon in humans, we would expect that (1) FA will be negatively related to size in males but not in females, and (2) this relationship will not be present in prepubescent males. The purpose of this work was therefore to investigate the correlation between body size and FA in prepubescent and postpubescent males and females.

METHODS

Subjects

Subjects were 110 children (50 males and 60 females) and 70 adults (31 males and 39 females). The children were drawn from Merseyside schools and the adults

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