should, therefore, be valuable in the pathological diagnosis of multiple-system atrophy. The presence of abundant α-synuclein immunoreactivity suggests that the abnormalities in gene expression or protein structure in α-synuclein or associated proteins may contribute to the pathogenesis of multiple-system atrophy, thereby linking it with other diseases associated with abnormalities in α-synuclein.

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Optimum body-mass index and maximum sexual attractiveness

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Evolutionary psychology suggests that a woman's sexual attractiveness is based on cues of reproductive potential. We compared two potential cues of body shape and weight.

The conventional measure of female body shape is the waist/hip ratio, which has become a major determinant of physical attractiveness. A ratio of 0·7 (a curvaceous body) is said to be the optimum of attractiveness.[1-3] The waist/hip ratio is thought to represent a fat distribution that leads to maximum fertility. However, anorexic women (who are amenorrhoeic and, therefore, infertile) can have the same waist/hip ratio as normal women,[2] which suggests that this ratio is not a reliable measure of reproductive potential.

We suggest that body-mass index is more closely related to fertility and health than waist/hip ratio,[4,5] and, therefore, should be more important in determination of sexual attractiveness.

We studied the relative importance of waist/hip ratio compared with body-mass index in the determination of attractiveness among 40 male undergraduates who rated colour images of 50 women in front view. Ten women were drawn from each of the body-mass index categories: emaciated (<15 kg/m^2), underweight (15–19 kg/m^2), normal (20–24 kg/m^2), overweight (25–30 kg/m^2), and obese (>30 kg/m^2). Within each body-mass index category the women had various waist/hip ratios, typically ranging 0·68–0·90. The women's heads were not visible. We presented the images randomly and the men saw the full set of images before they rated them.

We used multiple polynomial regression to model the contributions of body-mass index and waist/hip ratio to the prediction of attractiveness ratings (figure), with adjustment for the women's ages (best fit model: $y=4\cdot65-0\cdot15x_1-3\cdot79x_2+0\cdot026x_3-0\cdot035x_4+0\cdot0014x_5$, where y is predicted attractiveness and x_1–x_5 are age of women in stimulus image, waist/hip ratio, body-mass index, body-mass index^2, and body-mass index^3, respectively). Although attractiveness ratings were significantly ($p<0\cdot05$) explained by body-mass index and waist/hip ratio, the magnitudes of effect differed strikingly. Body-mass index accounted for 73·5% of variance, whereas
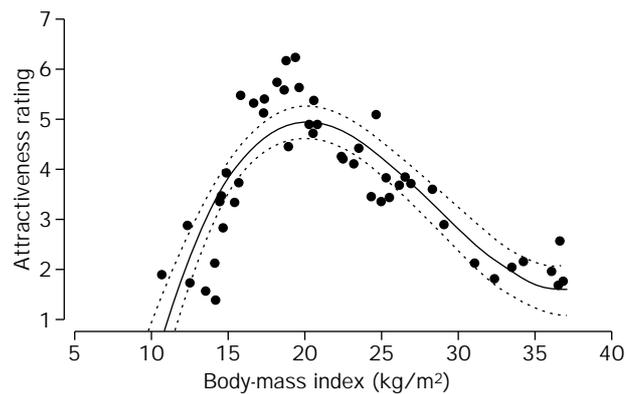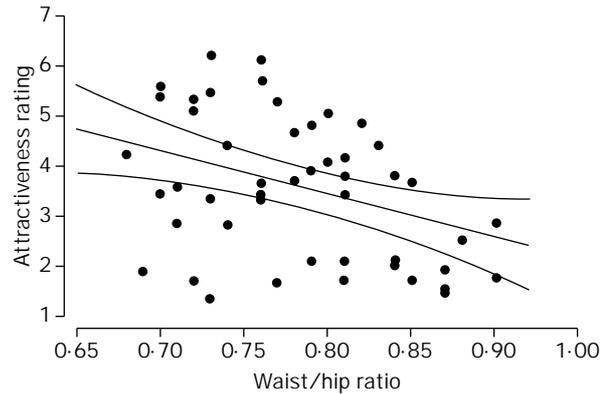
Plots of attractiveness as a function of body-mass index and waist/hip ratio

Black dots are means of 40 judgments. Solid lines show regression results. Dotted lines show 99% CI.

waist/hip ratio accounted for only 1·8%. Waist/hip ratio correlated poorly with attractiveness, whereas even small changes in body-mass index radically altered the attractiveness rating (see figure). Further analyses included other body-shape dimensions, including waist/bust ratio (upper-body shape), bust/hip ratio (degree to which the body has "hourglass" shape), and the leg length/torso length ratio. None of these contributed significantly to attractiveness ratings more than body-mass index and waist/hip ratio alone.

Previous studies have asked participants to rate line drawings of female figures with various waist/hip ratios.[1] Such studies have, however, failed to control for the alteration in apparent body-mass index with narrower or wide waists. With images of real women, body-mass index and waist/hip ratio are known and their effects can be estimated separately. In these conditions, body-mass index emerges as the major factor in determining sexual attractiveness, since it is a good predictor of health and reproductive potential.

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