Does body fat protect against negative moods in women?

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Summary An examination of the relationship between body mass index (BMI) and negative mood revealed an inverse relationship between BMI and negative mood symptoms (i.e., depression and negative affect scale scores) in women who were not taking oral contraceptives. The strength of the negative correlations between BMI and negative affect was uniformly higher on days of the menstrual cycle when estrogen levels are expected to be highest. Two interpretations are suggested. Given the positive relationship between estrogen levels and body fat, estrogen may have an effect on both body fat storage and negative affect. The cyclical release of estrogen may also have activational effects on negative affect. These findings have implications for common beliefs about the relationship between body size and emotional well-being, and provide converging evidence for the role of hormones in the regulation of mood. © 2001 Harcourt Publishers Ltd

DOES BODY FAT PROTECT AGAINST NEGATIVE MOODS IN WOMEN?

In the early 20th century, Kretschmer and Sheldon examined the relationships between specific mental disorders or personality traits and specific body types (1,2). While their theories were met with criticism and fell out of favour, recent medical research is again examining the relationships between temperament and biological variables, such as body size (3), hormones, and lipid levels (4). Our findings suggest an association between body size and mood. Women with larger body mass indexes (BMIs) experience fewer symptoms of depression, anxiety, and negative affect than women with smaller BMIs.

During the course of investigating the effects of oral contraceptives on mood (5), analyses revealed a significant negative correlation between BMI and scores on the Depression scale of the Symptom Checklist-90-R (SCL-90-R) for 47 female undergraduate students who were not taking oral contraceptives ($r = -0.29, P < 0.05$, two-tailed test). The finding of lower depression scores in young women with higher BMIs is illustrated in Figure 1A. Similar negative relationships with BMI were found for the women's SCL-90-R Anxiety scores ($r = -0.28, P < 0.05$), mean Negative Affect over 35 days as measured by the Positive and Negative Affect Schedule (PANAS) ($r = -0.29, P < 0.05$), and mean Negative Affect over 35 days as measured by the Menstrual Distress Questionnaire (MDQ) ($r = -0.27, P < 0.05$) (all one-tailed tests). It is also noteworthy that, of the 70 daily correlations between BMI and negative affect, 69 (98.6%) of the correlations were negative. While the size of the correlations is not staggering, the strength of the relationships is comparable to other correlations between stress and health variables which often range from $-0.17$ to $-0.31$ (6,7). Furthermore, the consistency of the negative relationship over the 35 days and over various measures suggests converging evidence of a consistent small to medium effect size for the relationship between BMI and negative affect.

Two areas of research suggest that correlations between BMI and negative affect might differ as a function of day of the menstrual cycle. First, biochemical research suggests the possibility of an inverse association between estrogen and negative affect, mediated by an increase in density of serotonin receptors (8). Second, E2
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esters, extremely potent estrogens, are primarily found in fatty tissues (9), suggesting that women with higher BMIs may have higher E2 levels. Taken together, these findings suggest that the correlation between BMI and negative affect might differ as a function of day of menstrual cycle, given the cyclical release of estrogen over a woman's cycle. Interestingly, when we examined the correlations between BMI and negative affect across the cycle, two peaks were found (see Figure 1B). The two times when BMI and negative affect are most highly correlated, day 11 and days 24 and 25, fall around periods of higher estrogen levels (10). The correlations between BMI and PANAS Negative Affect Scale scores on days 11, 24, and 25 are \(-0.32 (P < 0.025)\), \(-0.36 (P < 0.01)\), and \(-0.37 (P < 0.01)\), respectively (all one-tailed).

While these findings should be replicated with wider age ranges, more extreme BMIs, and hormonal assays, the preliminary results suggest that estrogen may have an effect on both body fat storage and negative affect. The cyclical release of estrogen may also have activational effects on negative affect in women. Somewhat consistent with the "jolly fat" hypothesis, women with greater body fat may experience fewer and less severe negative affect and mood symptoms than their slimmer peers.

REFERENCES

Fig. 1 The relationship between body mass index and depression. a) A scatterplot of depression scores on the SCL-90-R as a function of body mass index (BMI) [weight (kg)/height\(^2\) (m)] (r = \(-0.29, \ p < 0.05\), two-tailed test). b) The correlation between BMI and negative affect as a function of the day of the menstrual cycle. Day 1 represents the first day of menstruation. The signs of the correlations are inverted. Peak correlations are noted on days 11, 24 and 25.