Why Do Young Women Diet? The Roles of Body Fat, Body Perception, and Body Ideal

Amanda J. Gruber, M.D.; Harrison G. Pope, Jr., M.D., M.P.H.; Justine K. Lalonde, M.D.; and James I. Hudson, M.D., S.M.

Background: To assess the relative roles of body fat, body perception, and body ideals as motivations for dieting in college women.

Method: We compared 45 college women who reported having dieted with 32 who had not, using a novel computerized test of body image called the *somatomorphic matrix*.

Results: As expected, the difference in body fat between subjects' "perceived body" and "ideal body" was significantly greater in dieters than in nondieters (p < .001). Remarkably, however, this difference remained highly significant even after adjusting for the subjects' actual measured body fat (p = .002). Further analysis revealed that this difference persisted, not because dieters had unrealistic ideals of thinness, but because they had distorted perceptions of their fatness.

Conclusion: Distorted body image perception, a potentially treatable condition, may play an un-expectedly large role in motivating young women to diet.

(J Clin Psychiatry 2001;62:609-611)

B y the time they reach college age, a large number of American women have tried dieting to lose weight. Presumably, these women diet because the body that they perceive themselves to have (henceforth called the *perceived body*) is fatter than the body that they ideally would like to have (the *ideal body*). For the purposes of this article, we will call this discrepancy *body dissatisfaction*, operationally defined as the difference in percentage of body fat between one's perceived body and one's ideal body. At least 3 components may contribute to body dissatisfaction. The first is actual body fat: fatter women will likely be more dissatisfied with their bodies. The second is body ideal: 2 women may have equal levels of body fat, but one may have a thinner body ideal than the other and thus experience greater body dissatisfaction. The third is body perception: 2 women may have similar levels of actual body fat and aspire to similar body ideals, but 1 may have higher perceived body fat, and hence greater body dissatisfaction.

To what degree do these 3 components motivate dieting? Do women diet simply because they are fatter? Alternatively, do some diet even though they are not fat, because they are pursuing an unrealistically thin body ideal, perhaps propagated by media images of extremely thin female models?¹ Or, do some diet simply because they perceive themselves to be fat even though this is not the case, a situation that reaches its extreme in anorexia nervosa, in which a woman may be emaciated, yet still perceive herself as obese?²

We explored the relative importance of these 3 motivations for dieting in college women, using a novel computerized test of body image called the *somatomorphic matrix*.

METHOD

We recruited 77 women, aged 18 to 27 years, through announcements in classes at a local university, for a short study of body image. Written informed consent was obtained from each woman after the study procedures had been fully explained. We first measured each woman's height, weight, and body fat. Body fat was calculated from skin-fold caliper measurements, using the equation of Jackson et al.³

Next we administered the somatomorphic matrix, an interactive computer program designed to measure body image perception. The somatomorphic matrix was built using reference photographs of women (and men) of known body fat percentage and the fat-free mass index (FFMI), which measures muscularity.⁴ A graphic artist used the photographs to draw line drawings representing 100 different bodies, for both women and men. The 100 images vary along 2 dimensions: 10 degrees of body fat (4%–40%) and 10 degrees of muscularity (FFMI = 11.5–25 kg/m² in

Received Sept. 18, 2000; accepted Feb. 8, 2001. From the Biological Psychiatry Laboratory, McLean Hospital, Belmont, and the Department of Psychiatry, Harvard Medical School, Boston, (all authors); and the Departments of Biostatistics and Epidemiology, Harvard School of Public Health, Boston, Mass. (Dr. Hudson).

In the spirit of full disclosure and in compliance with all ACCME Essential Areas and Policies, the faculty for this CME activity were asked to complete a full disclosure statement. The information received is as follows: Drs. Gruber, Hudson, Pope, and Lalonde have no significant commercial relationships to disclose relative to the presentation.

Reprint requests to: Amanda J. Gruber, M.D., McLean Hospital, 115 Mill St., Belmont, MA 02478 (e-mail: agruber@mclean.org).

women and 16.5–30 kg/m² in men). A subject is able to navigate among the 100 images by clicking on "buttons" using the mouse to make the image currently displayed more or less fat and more or less muscular. Each woman was asked to choose (1) the body that she felt most closely resembled her own (her perceived body), (2) the body that she ideally would like to have (her ideal body), (3) the body that she felt represented an average woman of her age (the average body), and (4) the body that she felt was most preferred by the opposite sex (the body most preferred by the opposite sex). We have described the development and testing of the somatomorphic matrix in detail elsewhere.^{5,6}

We also administered a brief questionnaire that included the item, "Have you ever gone on a diet to lose weight, gain weight, or never?" None of the 77 women answered "gain weight." Those who answered "lose weight" were classified as dieters, and those who answered "never" were classified as nondieters.

We then compared dieters and nondieters on body fat measurements and the body fat of their perceived body and ideal body as assessed by the first 2 questions on the somatomorphic matrix. We hypothesized first that dieters would show greater body dissatisfaction (defined as perceived minus ideal body fat) than nondieters. We further hypothesized that greater body dissatisfaction among the dieters would be significantly associated with each of the 3 components described above (measured body fat, perceived body fat, and ideal body fat).

To test these hypotheses, we used linear regression to assess differences between groups (dieters vs. nondieters) with adjustment for covariates (e.g., measured body fat). For example, the model to assess the difference between groups in body dissatisfaction, adjusted for measured body fat, is $e(\text{perceived} - \text{ideal}) = \beta_0 + \beta_1$ diet + β_2 measured where E(PERCEIVED - IDEAL) is the expected value for body dissatisfaction, DIET is an indicator variable (1 if dieter, 0 if nondieter), and MEASURED is measured body fat. β_0 is the intercept, β_1 represents the increase in body dissatisfaction for a dieter relative to a nondieter adjusted for measured body fat, and β_2 represents the increase in body dissatisfaction for each increase of 1% in measured body fat. Before fitting this model, we determined that no significant interaction existed between dieting and measured body fat; that is, the relationship between body dissatisfaction and measured body fat did not depend on dieting status. p Values were obtained from Wald t tests for the appropriate parameter from the regression analysis.

RESULTS

Forty-five (58%) of the 77 women reported a history of dieting and 32 (42%) reported no such history. The dieters displayed a slightly higher mean body weight and body mass index (BMI) than the nondieters (mean \pm SD body weight = 136.0 \pm 19.7 lb [61.2 \pm 8.9 kg] vs. 126.0 \pm 16.0

Ib [56.7 \pm 7.2 kg], p = .02; mean \pm SD BMI = 23.1 \pm 3.0 kg/m² vs. 21.4 \pm 2.4 kg/m², p = .01). The mean \pm SD levels of measured, perceived, and ideal percent body fat in dieters versus nondieters, respectively, were 30.5 \pm 6.7 versus 26.8 \pm 6.2 for measured body fat, 26.0 \pm 8.9 versus 19.1 \pm 6.3 for perceived body fat, and 16.7 \pm 4.5 versus 15.8 \pm 4.3 for ideal body fat. As hypothesized, dieters had a significantly higher level of body dissatisfaction than nondieters; the former group displayed a 6.0% greater difference between their perceived and ideal bodies than the latter (95% confidence interval [CI] = 3.0% to 8.9%; t = 3.98, df = 75, p < .001).

We then explored the separate components of body dissatisfaction described above. Not surprisingly, measured body fat was significantly higher in dieters than nondieters, by a mean of 3.7% (95% CI = 0.7% to 6.7%; t = 2.45, df = 75, p = .017). But interestingly, even after adjusting for measured body fat, dieters still exceeded nondieters by a mean of 4.6% on body dissatisfaction, a highly significant difference (95% CI = 1.7% to 7.5%; t = 3.16, df = 74, p = .002). This difference, it emerged, could not be explained by differences in body ideal. After adjusting for measured body fat, the mean fat of the body ideal in dieters minus that of nondieters was only -0.2% (95% CI = -2.1% to 1.7%; t = -0.20, df = 74, p = .85). On the other hand, we found a marked difference between the groups in body perception: after adjustment for measured body fat, the mean perceived body fat in dieters minus nondieters was 4.4% (95% CI = 1.3% to 7.6%; t = 2.77, df = 74, p = .007).

The striking nature of these findings is highlighted when viewed in another way: body dissatisfaction (perceived body fat minus ideal body fat) is associated with an increase of 3.7% for each increase in 10% of actual body fat, regardless of the presence of dieting. In addition, dieting is associated with an increase of 4.6% in body dissatisfaction, regardless of level of body fat. Thus, a dieting woman with 17.5% body fat experiences the same level of dissatisfaction as a nondieting woman with 30% body fat.

DISCUSSION

We compared 45 college women who reported having dieted with 32 who had not, using a novel computerized test of body image, the somatomorphic matrix. We found, as expected, that dieters were more dissatisfied with their bodies and that their measured body fat was significantly greater than that of nondieters. Unexpectedly, however, we found that the dieters continued to have significantly higher levels of body dissatisfaction even after adjusting for their measured body fat. This dissatisfaction occurred not because dieters had unrealistic ideals of thinness, but primarily because they had distorted perceptions of their fatness. So pronounced was this effect that a dieting woman would be predicted to experience levels of dissatisfaction comparable with those of a nondieting woman with almost twice as much fat as herself.

One limitation of this preliminary study is that we assessed dieting with only a single binary question. Strictly speaking, our findings apply to individuals who report a history of dieting rather than individuals who have a confirmed history of dieting. Had we asked further questions about dieting history, such as whether the women were currently dieting, a variable which one might expect to influence body perception, we would have been able to analyze our data in more detail. The lack of a more detailed dieting history makes it less likely that we would find significant differences between the groups, so our findings probably represent a conservative measurement of the effect of dieting history on body image perception. We should also note that our study does not address larger issues of whether dieting in and of itself is harmful or is related to disordered eating or eating disorders.

These findings are preliminary, but if confirmed would have important implications for public health. Because distorted body perception is a potentially treatable problem, either through simple educational techniques or cognitive-behavioral approaches, it may be possible to alleviate some of the distress and dissatisfaction experienced by many women who feel compelled to diet.^{7.8} Further studies seem warranted to characterize more precisely the role of distorted body perception in dieters and to attempt specific treatment for this problem.

Disclosure of off-label usage: The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents has been presented in this article that is outside U.S. Food and Drug Administration–approved labeling.

REFERENCES

- Brownell KD, Napolitano MA. Distorting reality for children: body size proportions of Barbie and Ken dolls. Int J Eat Disord 1995;18:295–298
- Pope HG Jr, Hudson JI. Eating disorders. In: Kaplan HI, Sadock BJ, eds. Comprehensive Textbook of Psychiatry, V. Baltimore, Md: Williams & Wilkins; 1989:1854–1864
- Jackson AS, Pollock ML, Ward A. Generalized equations for predicting body density of women. Med Sci Sport Exer 1980;12:175–181
- Kouri E, Pope HG Jr, Katz DL, et al. Fat free mass index in users and nonusers of anabolic-androgenic steroids. Clin J Sport Med 1995;5:223–228
- Gruber AJ, Pope HG Jr, Borowiecki JJ, et al. The development of the somatomorphic matrix: a bi-axial instrument for measuring body image in men and women. In: Norton K, Olds T, Dollman J, eds. Kinanthropometry VI. Adelaide, Australia: International Society for the Advancement of Kinanthropometry; 2000:221–231
- Pope HG Jr, Gruber AJ, Mangweth B, et al. Body image perception among men in three countries. Am J Psychiatry 2000;157:1297–1301
- Rosen JC, Reiter J, Orosan P. Cognitive-behavioral body image therapy for body dysmorphic disorder. J Consult Clin Psychol 1995;63:263–269
- Phillips KA. Pharmacotherapy of body dysmorphic disorder: a review of the empirical data and a proposed treatment algorithm. Psychiatr Clin North Am. Annu Drug Ther 2000;7:59–82

For the CME Posttest for this article, see pages 663–664.