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Understanding the relationship between obesity and positive and negative affect: The role of psychosocial mechanisms[☆]

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Abstract

We examined the relationship between body mass index (BMI) and positive and negative affect, and evaluated whether this relationship is mediated (or suppressed) by physical health, intrusiveness of weight on physical functioning, and distressing interpersonal interactions. Analyses were based on a national sample of more than 3,000 adults ages 25 to 74. Class II (BMI 35–39.9) and Class III (BMI \geq 40) obesity were associated with more frequent negative affect and less frequent positive affect, even after demographic and socioeconomic status characteristics were controlled. After the purported pathway variables were controlled, however, obese I persons reported significantly more frequent positive affect, while overweight, obese I, and obese II persons reported significantly less frequent negative affect, compared to normal weight persons. These patterns did not differ significantly by race or gender. Our findings suggest that excessive body weight is not necessarily distressing, yet the physical and interpersonal strains associated with obesity may impair one's mood. We discuss the implications for policy and practice.

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Keywords: Body mass index (BMI); Negative affect; Obesity; Positive affect; Psychological processes; Stigma

Introduction

The physical health consequences of obesity have been documented extensively, with most studies showing that the risks of chronic illness and mortality increase as one's body mass index (BMI) increases (Calle, Rodriguez, Walker-Thurmond, & Thun, 2003;

Patterson, Frank, Kristal, & White, 2004; Yan et al., 2006). However, a mounting body of research investigating the psychological consequences of obesity yields equivocal findings. The majority of studies reveal a negative relationship between body weight and psychological well-being (Dong, Sanchez, & Price, 2004; Heo, Pietrobelli, Fontaine, Sirey, & Faith, 2005; Herva et al., 2006; Simon et al., 2006; Wadden et al., 2006), yet others reveal either a positive (e.g., Jorm et al., 2003) or nonsignificant association (e.g., Faith, Flint, Fairburn, Goodwin, & Allison, 2001; Istvan, Zavela, & Weidner, 1992). Thus, recent review articles and meta-analyses have concluded that there is not a consistent, statistically significant relationship between obesity and psychological outcomes (Faith, Calamaro,

[☆] A public use version of the Midlife Development in the United States (MIDUS) survey is available from the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan (www.icpsr.umich.edu).

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Dolan, & Pietrobelli, 2004; Faith, Matz, & Jorge, 2002; McElroy et al., 2004).

Faith and colleagues (2003, p. 940) attribute these equivocal findings to the fact that most studies explore “simple associations” between weight and psychological outcomes, and that attempts to delineate the causal pathways are “underutilized and hold great potential for advancing the current state of knowledge.” In this paper, we explore the extent to which an observed statistical association between obesity and mood is attributable to persistent stressors associated with obesity. We propose that obesity increases one’s susceptibility to enduring physical and interpersonal strains that require personal adjustment; both exposure to and efforts to adjust to enduring stressful conditions may affect one’s mood (Thoits, 1995). We investigate the extent to which poor physical health, the intrusiveness of body weight on daily functioning, and distressing interpersonal interactions mediate the relationship between body weight and mood in a large representative sample of American adults.

Compromised health and daily functioning

We propose that obese persons may be more likely than thinner persons to experience compromised health and physical functioning which, in turn, influence their mood (Aluoja, Leinsalu, Shlik, Vasar, & Luuk, 2004). The linkages between obesity and both physical health conditions (Calle et al., 2003; Patterson et al., 2004; Yan et al., 2006) and health-related quality of life (Kolotkin, Crosby, & Rhys Williams, 2002) have been widely documented. Obesity also is associated with compromised physical functioning (Jensen & Friedmann, 2002; Larsson & Mattsson, 2001). Although the relation between functional limitation and negative affect has not been studied extensively in obese populations, several studies suggest that other chronic physical conditions interfere with daily functioning, which in turn triggers negative affect (Neugebauer, Katz, & Pasch, 2003; Talbot, Nouwen, Gingras, Belanger, & Audet, 1999). Given the well-documented linkages between weight and physical well-being, and the association between physical and psychological well-being, we will explore the extent to which an observed statistical association between obesity and affect reflects the influence of functional impairments and health symptoms that may compromise the quality of daily life.

Interpersonal strains

We propose further that distressing, critical, or discriminatory interactions with others may account for

an observed relationship between obesity and mood. Obesity is considered one of the most enduring social stigmas (Cahnman, 1968); obese persons are highly susceptible to both institutional (Carr & Friedman, 2005; Puhl & Brownell, 2003) and interpersonal (Schwartz, Chambliss, Brownell, Blair, & Billington, 2003) discrimination, teasing (Jackson, Grilo, & Masher, 2000), and problematic relationships with family members (Carr & Friedman, 2006; Crandall, 1995). Both actual and perceived mistreatment is associated with poor self-esteem and heightened depressive symptoms (Kessler, Mickelson, & Williams, 1999). Interpersonal mistreatment and verbal slights have been found to harm one’s body image, which in turn compromises one’s self-esteem and psychological well-being (Annis, Cash, & Hrabosky, 2004; Friedman et al., 2005; Myers & Rosen, 1999; Schwartz & Brownell, 2004).

We know of no studies that have evaluated directly whether perceptions of discrimination or mistreatment by others account for the observed statistical association between obesity and mood. Thus, we evaluate the extent to which the link between body weight and negative affect persists when two indicators of mistreatment are controlled: the perception that one has been mistreated in daily interpersonal interactions due to their body weight (versus other personal traits), and problematic interactions with family members. Given the pervasive evidence that obese people are treated more negatively than normal weight persons (Carr & Friedman, 2005, 2006; Wang, Brownell, & Wadden, 2004), we expect that distressing interpersonal encounters may account, in part, for higher levels of negative affect and lower levels of positive affect among overweight and obese persons.

In sum, our study addresses the call by Faith and colleagues (2002, 2004) for an exploration of the pathways linking body weight with mood. We move away from a simple comparison of obese and non-obese individuals, and instead compare the positive and negative affect levels of normal weight, overweight, moderately obese, severely obese, and extremely obese persons. Second, we recognize that obese persons often have other personal characteristics that may affect both their mood and risk of chronic stressors such as poor health or interpersonal discrimination; thus, we control for demographic (e.g., age, gender, race, and marital status) and socioeconomic characteristics in our analyses. Third, we investigate the extent to which three enduring stressors associated with obesity – poor physical health, compromised physical functioning, and distressing interpersonal interactions – account for the

observed statistical association between obesity and both positive and negative affect. Finally, we assess whether the psychological consequences of body weight vary by race and gender, given that cultural norms in the United States more strongly endorse a “thin” ideal for women (Friedman, Reichmann, Constanzo, & Musante, 2002) and for Whites (Averett & Korenman, 1999).

Method

Sample

We used data from the National Survey of Midlife Development in the United States (MIDUS). The MIDUS is a national multistage probability sample of noninstitutionalized English-speaking adults ages 25 to 74 ($M = 46.8$, $SD = 13.2$), selected from working telephone banks in the coterminous United States. In the first stage, households were selected via random digit dialing. Disproportionate stratified sampling was used at the second stage to select respondents. The sample was stratified by age and gender; men and persons age 65 to 74 were oversampled. A telephone interview and mail questionnaire were administered in 1995–1996. The analyses presented here were based on the unweighted data; the results were virtually identical when we adjusted the data for unequal probabilities of household selection and respondent selection within households.

The total MIDUS sample included 4,242 adults. Our analyses focused on the 3,353 persons who completed the mail questionnaire, including questions assessing current weight and height. The response rate for the self-administered mail questionnaire was 87 percent, thus caution should be taken in extrapolating the results to the total population in the same age range.

The 4.9 percent of respondents who did not report their weight (or height) were more likely than “normal” weight persons to report that they have ever experienced some form of weight-related discrimination. Thus, we assumed that the “missing” weight persons are over-representative of obese persons, and that our results for obese persons may be slightly understated.

Variables

Positive and negative affect. Our outcome measures, positive and negative affect, were assessed independently because each reflects a separate and distinct dimension of affect (Watson & Tellegen, 1985). *Positive affect* ($\alpha = .87$) was evaluated with the question:

“during the past 30 days, how much of the time did you feel: (a) cheerful; (b) in good spirits; (c) extremely happy; (d) calm and peaceful; (e) satisfied; and (f) full of life.” *Negative affect* ($\alpha = .87$) was assessed with the question: “during the past 30 days, how much of the time did you feel: (a) so sad nothing could cheer you up; (b) nervous; (c) restless or fidgety; (d) hopeless; (e) that everything was an effort; and (f) worthless.” The five response categories were none of the time, a little of the time, some of the time, most of the time, and all of the time. Scale scores were constructed by averaging responses across each set of items; higher scores reflect more frequent positive or negative affect. The scales were standardized for ease of interpretation and comparability of coefficients; standardized scores had a mean of 0 and standard deviation of 1.

These scales were developed for use in the MIDUS. Scale items were culled from several well-known and valid instruments, including the Affect Balance Scale (Bradburn, 1969), the University of Michigan’s Composite International Diagnostic Interview (Kessler et al., 1994), the Manifest Anxiety Scale (Taylor, 1953), the Health Opinion Survey (MacMillan, 1957), the General Well-Being Schedule (Fazio, 1977), and the Center for Epidemiological Studies Depression Scale (Radloff, 1977). The 30-day response frame was designed to capture more generalized affect than a format asking respondents to rate current or daily mood (Mroczek & Kolarz, 1998). This general format was appropriate for studying the psychological consequences of obesity, because it is sensitive to enduring contextual and social influences.

Body mass index (BMI) was the key independent variable of our analysis. All MIDUS participants were asked to report their weight and height. BMI was calculated based on the formula where BMI equals kilograms/meters squared. BMI scores were recoded into six categories, based on cutpoints defined by the NHLBI (1998). Continuous BMI scores ranged from roughly 15 to 55. The six categories were: *underweight* (BMI < 18.5), *normal* (BMI between 18.5 and 24.9), *overweight* (BMI between 25 and 29.9), *obese Class I* (BMI between 30 and 34.9), *obese Class II* (BMI between 35 and 39.9), and *obese Class III* (BMI of 40 and above). Roughly 2 percent of the sample was classified as underweight; we dropped these cases from the analysis because a full exploration of the psychological well-being of underweight persons was beyond the scope of this manuscript. Thus, our final analytic sample included 3,278 persons.

Demographic and socioeconomic status characteristics. Demographic characteristics included *age* (con-

tinuous measure, ranging from 25 to 74), *sex* (1 = female; 0 = male), *race* (1 = Black; 0 = all other races), and *marital status* (categorical variables indicated persons who were never married, and formerly married. Currently married was the reference group). We used a dichotomous indicator of race, indicating African Americans versus all others because the MIDUS sample included very small numbers of Asians and Hispanics; preliminary analyses revealed that neither category differed significantly from Whites in terms of BMI.

Socioeconomic status characteristics included *educational attainment* and *employment status*. Years of completed education were recoded into the categories: less than 12 years, 12 years (reference category), 13–15 years, and 16 or more years of education. *Employment status* was a dichotomous variable indicating that a person was not employed at the time of interview.

Health conditions. Two dimensions of physical health were considered: self-rated health and a count of chronic conditions. *Self-rated physical health* was evaluated with the question: “In general, would you say your physical health is excellent, very good, good, fair, or poor.” Responses were recoded into a dichotomous variable where 1 = fair/poor, and good or better was the reference group. *Chronic conditions* referred to the total number of conditions that a person had experienced in the twelve months prior to interview. Respondents were asked to indicate which of 29 physical conditions they had “experienced or been treated for” in the past twelve months. The list included a broad range of conditions including ones that are particularly prevalent among overweight and obese individuals, such as asthma, bronchitis or emphysema; arthritis, rheumatism, or other bone or joint disease; urinary or bladder problems; high blood pressure or hypertension; chronic sleeping problems; and diabetes or high blood sugar. Fewer than 10 percent of respondents reported six or more conditions; thus we recoded responses of seven through 29 conditions equal to “six or higher”.

Intrusiveness of body weight. We considered two indications of the ways that body weight intrudes upon daily life: the presence and severity of health symptoms, and functional limitation. *Symptoms* were assessed with the question: “during the past 30 days, how often have you experienced each of the following: (a) headaches; (b) lower back aches; (c) sweating a lot; (d) irritability; (e) hot flushes or flashes; (f) aches or stiffness in joints; (g) trouble getting to sleep or staying asleep; (h) leaking urine; and (i) pain or discomfort during intercourse.” The six response categories ranged from “not at all” to

“almost every day.” The scores were summed and ranged from 6 to 54; higher scores reflected more frequent symptoms.

Functional limitations ($\alpha = .82$) were measured with the instrumental activities of daily living (IADL) scale, which assessed the difficulty of performing practical activities of daily life. The IADL is a widely used measure that assesses functional limitations in community-dwelling populations (Katz, Ford, & Moskowitz, 1963; Lawton & Brody, 1969). Respondents were asked: “How much does your health limit you in doing each of the following? (a) lifting or carrying groceries; (b) climbing several flights of stairs; (c) bending, kneeling, or stooping; (d) walking more than a mile; (e) walking several blocks; (f) vigorous activity (e.g., running, lifting heavy objects); and (g) moderate activity (e.g., bowling, vacuuming).” Response categories ranged from 1 to 4, and included: not at all, a little, some, and a lot. Scale scores reflected one’s average response, where higher scores reflected greater limitation; this measure was standardized.

Distressing interpersonal interactions. We considered two dimensions of distressing interpersonal interactions; the first reflected discriminatory treatment by strangers and acquaintances, and the second captured critical treatment by family members. *Discriminatory treatment from strangers and acquaintances* described recent interpersonal experiences that involved character assaults and unkind treatment; we further considered one’s attribution for this negative treatment. Nine questions evaluated the frequency of such encounters. Respondents were asked: “How often on a day-to-day basis do you experience each of the following types of discrimination: (a) you are treated with less courtesy than other people; (b) you are treated with less respect than other people; (c) you receive poorer service than other people at restaurants or stores; (d) people act as if they think you are not smart; (e) people act as if they are afraid of you; (f) people act as if they think you are dishonest; (g) people act as if they think you are not as good as they are; (h) you are called names or insulted; and (i) you are threatened or harassed.” The four original response categories ranged from 1 (“never”) to 4 (“often”). Respondents who indicated that they had ever experienced any such mistreatment were then asked: “What was the main reason for the discrimination you experienced? (If more than one main reason, circle all that apply): (a) your age; (b) your gender; (c) your race; (d) your ethnicity or nationality; (e) your religion; (f) your height or weight; (g) some other aspect of your appearance; (h) a physical disability; (i) your sexual orientation?” Based on responses to this series of

Table 1

Means (and standard deviations) or proportions for all demographic and socioeconomic status characteristics, Midlife in the United States (MIDUS), 1995 ($N = 3,278$)

	Total sample	Normal ^a (18.5–24.9)	Overweight ^b (25–29.9)	Obese I ^c (30–34.9)	Obese II ^d (35–39.9)	Obese III ^e (40+)	<i>F</i> -statistic (<i>df</i> = 4)	Significant subgroup differences
Demographic characteristics								
Sex (1 = female)	.49	.60	.37	.44	.59	.69	44.09***	ab, ac, bc, bd, be, cd, ce
Race (1 = black)	.06	.04	.06	.08	.09	.18	8.69***	ac, ae, bd, ce, de
Age (in years)	46.83 (13.15)	44.71 (13.24)	47.82 (13.40)	49.66 (11.97)	47.37 (12.02)	42.23 (11.68)	15.9***	ab, ac
Currently married	.64	.59	.67	.67	.63	.63	4.65***	ab, ac
Formerly married	.23	.24	.22	.23	.22	.23	.46	
Never married	.13	.16	.10	.09	.15	.13	5.53***	ab, ac
Socioeconomic status								
<12 years education	.09	.07	.08	.13	.09	.09	4.69***	ac, bc
13–15 years education	.30	.31	.28	.30	.30	.40	2.91	
16+ years education	.33	.38	.34	.26	.25	.19	10.17***	ac, ad, ae, bc, be
Not currently employed	.27	.27	.28	.26	.27	.36	.92	
<i>N</i>	3278	1177	1303	526	182	90		
%	100	35.9	39.7	16.0	5.6	2.7		

Notes: Asterisks denote significance level of *F*-statistic, where * $p < .05$, ** $p < .01$, *** $p < .001$. Post-hoc comparisons were conducted using ANOVA; significant subgroup differences are denoted as ab: normal versus overweight; ac: normal versus obese I; ad: normal versus obese II; ae: normal versus obese III; bc: overweight versus obese I; bd: overweight versus obese II; be: overweight versus obese III; cd: obese I versus obese II; ce: obese I versus obese III; de: obese II versus obese III.

Table 2
Means (and standard deviations) or proportions for psychological, physical and social well-being measures, Midlife in the United States (MIDUS), 1995 ($N = 3,278$)

	Total sample	Normal ^a (18.5–24.9)	Overweight ^b (25–29.9)	Obese I ^c (30–34.9)	Obese II ^d (35–39.9)	Obese III ^e (40+)	<i>F</i> -statistic (<i>df</i> = 4)	Significant subgroup differences
Dependent variables								
Positive affect (standardized)	0 (1.0)	.01 (1.02)	.033 (.97)	.035 (.98)	-.11 (1.10)	-.19 (1.07)	.125	
Negative affect (standardized)	0 (1.0)	.02 (1.00)	-.07 (.94)	-.03 (.99)	.16 (1.17)	.33 (1.19)	5.59***	ab, ae, bd, be, ce
Physical health								
Number of chronic conditions	2.27 (1.97)	2.03 (1.86)	2.17 (1.96)	2.72 (2.05)	2.85 (2.08)	3.13 (2.04)	20.95***	ac, ad, ae, bc, bd, be
Self-rated health, fair/poor	.15	.11	.13	.21	.24	.37	20.12***	ac, ad, ae, bc, bd, be, ce, de
Intrusiveness of body weight								
Limitations with instrumental activities of daily living (IADLs) (standardized)	1.59 (.79)	1.38 (.63)	1.55 (.76)	1.80 (.86)	2.05 (.88)	2.29 (.90)	71.24***	ab, ac, ad, ae, bc, bd, be, cd, ce
Intensity of health symptoms	9.29 (7.29)	8.41 (6.43)	9.18 (7.35)	10.13 (7.77)	11.89 (8.41)	13.24 (9.36)	18.71***	ac, ad, ae, bd, be, cd, ce
Interpersonal relationships								
Ever experienced any rude or discriminatory interactions, due to body weight	.11	.07	.09	.15	.29	.42	47.46***	ac, ad, ae, bc, bd, be, cd, ce, de
Ever experienced any rude or discriminatory interactions, due to reason other than weight	.40	.43	.38	.39	.43	.43	2.09	
Negative interactions with family members (standardized)	-.01 (.99)	-.03 (.99)	-.05 (.98)	-.02 (.98)	.22 (1.02)	.37 (.09)	6.28***	ad, ae, bd, be, cd, ce

Notes: Asterisks denote significance level of *F*-statistic, where * $p < .05$, ** $p < .01$, *** $p < .001$. Post-hoc comparisons were conducted using ANOVA; significant subgroup differences are denoted as ab: normal versus overweight; ac: normal versus obese I; ad: normal versus obese II; ae: normal versus obese III; bc: overweight versus obese I; bd: overweight versus obese II; be: overweight versus obese III; cd: obese I versus obese II; ce: obese I versus obese III; de: obese II versus obese III.

questions, we created two dichotomous indicators: whether one has *ever experienced mistreatment due to weight or physical appearance*, and one has *ever experienced mistreatment for any other reason*. The omitted category included those who never experienced interpersonal discrimination.

We assessed *negative/problematic relationships with family members* excluding spouse ($\alpha = .84$) with four items that asked respondents how much their family members: “(1) make too many demands on you; (2) criticize you; (3) let you down when you are counting on him/her; and (4) get on your nerves.” Response categories were a lot, some, a little, and not at all. Scale scores were the average of one’s responses; higher scores represented higher levels of negative interactions. This scale was standardized and had a mean of 0 and standard deviation of 1. The scale was designed for the MIDUS and draws on widely used indicators of relationship quality (e.g., Schuster, Kessler, & Aseltine, 1990).

Results

Bivariate analysis

Table 1 presents descriptive statistics (i.e., means and proportions) for all demographic and socioeconomic status variables included in the analysis, by BMI category. Table 2 presents descriptive statistics for positive and negative affect, and indicators of physical health, intrusiveness of weight on physical functioning, and distressing personal interactions. We performed a factorial ANOVA and post-hoc comparisons across the five weight categories; the right hand column in each table denotes significant contrasts between specific weight categories.

Roughly 39 percent of the overall MIDUS sample was overweight (BMI of 25 to 29.9), while an additional 24 percent were classified as obese (BMI of 30 or higher). These proportions were similar to national estimates showing that 18 to 25 percent of the U.S. population is obese, while 50–60 percent is overweight or obese (Ogden et al., 2004). The average age of the sample was 46.8 years, and men and women each accounted for one-half of the sample. The MIDUS sample was biased positively in terms of educational attainment; one-third of the sample had graduated from college while an additional 30 percent had at least some college education. Only six percent of the analytic sample was African American; by contrast, 12 percent of the overall U.S. population is African American (U.S. Census Bureau, 2006).

Consistent with past studies of the demographic correlates of obesity, we found that African Americans were over-represented among persons classified as obese, especially the extremely obese; blacks accounted for 6 percent of the overall MIDUS sample, yet they comprised 18 percent of obese III respondents. Obesity was inversely related to socioeconomic status. The proportion of persons with at least a college degree declined monotonically as weight increased beyond the “normal” category. Age was related to body weight in a curvilinear fashion; overweight and obese I persons were significantly older than “normal” weight persons. BMI was not associated with marital status in a systematic fashion.

Table 2 shows that the five weight categories did not differ significantly in terms of positive affect, yet obese persons have significantly higher levels of negative affect than their thinner peers. Negative interpersonal interactions, health conditions, and functional limitations were each strongly related to body weight. Obese I, II, and III persons reported significantly and successively more chronic health conditions, and were more likely to report that their health was “fair” or “poor,” relative to normal weight and overweight persons. Both the extent to which one had difficulty in performing IADLs and the intensity of one’s health symptoms increased monotonically as weight surpassed the “normal” category. Obese persons also were more likely to report rude treatment due specifically to their body weight (15, 29, and 42% percent across the obese categories respectively, compared to 7 and 9% in the normal and overweight categories, respectively). However, the BMI categories did not differ significantly in their reports of discrimination from all other causes. Obese II and III persons also were more likely to report distressing interpersonal interactions; they reported significantly more negative family interactions than did persons in lower BMI categories

Multivariate analyses

The first objective of the multivariate analysis was to assess the extent to which the bivariate association between obesity and affect was attributable to demographic and socioeconomic characteristics of the three subgroups of obese persons. OLS regression models predicting positive and negative affect are presented in Tables 3 and 4, respectively. Model 1 shows the unadjusted effects of BMI category, and Model 2 shows the effects of BMI after adjusting for demographic and socioeconomic status characteristics. Model 2 shows that the harmful psychological consequences of

Table 3

OLS regression predicting positive affect by body mass index, physical health, weight intrusiveness, and interpersonal relations ($N = 3,278$)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Body mass index						
Overweight (BMI 25–29.9)	.02 (.04)	-.04 (.04)	-.01 (.04)	.05 (.04)	-.02 (.04)	.05 (.04)
Obese I (BMI 30–34.9)	.03 (.05)	-.05 (.05)	.07 (.05)	.08 (.05)	-.01 (.05)	.12* (.05)
Obese II (BMI 35–39.9)	-.12 (.08)	-.16* (.08)	.001 (.07)	.08 (.07)	-.04 (.08)	.14* (.07)
Obese III (BMI 40+)	-.20 (.11)	-.25* (.11)	-.02 (.10)	.06 (.10)	-.09 (.11)	.16 (.10)
Physical health						
Number of chronic conditions			-.16*** (.01)			-.08*** (.01)
Self-rated health, fair/poor			-.37*** (.05)			-.23*** (.05)
Intrusiveness of body weight						
Limitations with instrumental daily living activities (IADLs) (standardized)				-.10*** (.02)		-.015 (.03)
Intensity of health symptoms				-.05*** (.002)		-.037*** (.002)
Interpersonal relationships						
Ever experienced rude or discriminatory interactions, due to body weight					-.27*** (.055)	-.18*** (.05)
Ever experienced rude or discriminatory interactions, due to other reasons					-.14*** (.036)	-.03 (.03)
Negative interactions with family members (standardized)					-.17*** (.018)	-.10*** (.02)
Constant	.01 (.03)	-.46*** (.08)	-.32*** (.08)	.04 (.09)	-.25** (.08)	.027 (.08)
Adjusted R^2	.001	.03	.15	.18	.073	.22

Note: * $p < .05$. ** $p < .01$. *** $p < .001$. Unstandardized regression coefficients are presented. Model 2 through 6 are adjusted for sex, age, race, marital status, educational attainment, and employment status.

Table 4

OLS regression predicting negative affect by body mass index, physical health, weight intrusiveness, and interpersonal relations ($N = 3,278$)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Body mass index						
Overweight (BMI 25–29.9)	-.09* (.04)	-.01 (.04)	-.05 (.04)	-.12*** (.03)	-.03 (.04)	-.12*** (.03)
Obese I (BMI 30–34.9)	-.05 (.05)	.02 (.05)	-.12** (.05)	-.15*** (.04)	-.02 (.05)	-.18*** (.044)
Obese II (BMI 35–39.9)	.14 (.08)	.17* (.08)	-.01 (.07)	-.14* (.07)	.06 (.08)	-.17** (.07)
Obese III (BMI 40+)	.31** (.11)	.31** (.11)	.05 (.10)	-.09 (.09)	.16 (.10)	-.15 (.09)
Physical health						
Number of chronic conditions			.19*** (.01)			.08*** (.01)
Self-rated health, fair/poor			.34*** (.05)			.13*** (.05)
Intrusiveness of body weight						
Limitations with instrumental daily living activities (IADLs) (standardized)				.12*** (.02)		.058* (.023)
Intensity of health symptoms				.07*** (.002)		.05*** (.002)
Interpersonal relationships						
Ever experienced rude or discriminatory interactions, due to body weight					.19*** (.05)	.08 (.05)
Ever experienced rude or discriminatory interactions, due to other reasons					.19*** (.03)	.06* (.03)
Negative interactions with family members (standardized)					.20*** (.02)	.11*** (.015)
Constant	.02 (.03)	.62*** (.08)	.45*** (.07)	-.02 (.07)	.39 (.08)	-.008 (.07)
Adjusted R^2	.005	.07	.23	.32	.12	.36

Note: * $p < .05$. ** $p < .01$. *** $p < .001$. Unstandardized regression coefficients are presented. Model 2 through 6 are adjusted for sex, age, race, marital status, educational attainment, and employment status.

extreme obesity persisted, net of control variables; obese II persons reported positive affect scores that were .16 standard deviations lower and negative affect scores that were .17 standard deviations higher than normal weight persons. Even stronger effects emerged for obese III persons; they had positive affect scores that were .25 standard deviations lower and negative affect scores that were nearly one-third standard deviation higher ($b = .31$) than normal weight persons.

Next, we examined whether a series of purported stressors related to obesity mediated the relation between BMI and affect. These results are presented in Models 3 through 5 of Tables 3 and 4. The final model (Model 6) included all three sets of possible pathway variables. Our technique for assessing mediation effects was consistent with MacKinnon's criteria (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002); we found that BMI significantly affected each of the purported pathway variables, and that the purported pathway variables significantly predicted positive and negative affect in multivariate analyses (results are available from first author).

The harmful effects of obesity on mood operated largely via the physical health consequences of obesity. However, when we included all three sets of purported pathway variables simultaneously in a single model (Model 6), we found that moderately obese (obese I) persons had significantly *elevated* levels of positive affect and that persons classified as overweight, obese I, or obese II had significantly *lower* levels of negative affect. These findings suggest that if overweight and obese people had the same levels of physical health, functional limitations, and difficult interpersonal relations as an "average" MIDUS sample member, they would enjoy significantly *better* mood than normal weight persons.

The significant effects of type II and III obesity on positive affect (shown in Model 2, Table 3) were no longer statistically significant when any of the three sets of pathway variables were controlled. However, after all three sets of obesity-related stressors were controlled, persons who were moderately obese (obese I) enjoyed levels of positive mood that were .12 standard deviation higher than persons who were normal weight. Similarly, Table 4 shows that after health, functional limitations, and distressing interpersonal interactions were controlled, overweight, obese I, and obese II persons had negative affect scores that were .12, .18, and .17 points lower than "normal" weight persons, respectively.

Nearly all of the purported pathway variables had direct and significant effects on affect, after controlling for BMI. Chronic health conditions, symptoms, poor

self-rated health, discriminatory interpersonal interactions, and negative interactions with family members were each associated with higher levels of negative and lower levels of positive affect. The stressors associated with obesity were distressing in their own right, and these effects persisted when BMI was controlled. Thus, our findings suggest that body weight was not inherently distressing to our sample; rather, its interpersonal and physical consequences impaired the daily mood of obese individuals.

Moderation analyses

Finally, we evaluated whether the effects of BMI on positive and negative affect varied by race and gender; we assessed whether a series of two-interaction terms were statistically significant. In the baseline model (i.e., Model 1), we found only two significant interaction terms: for persons in the obese II category, Blacks experienced less frequent negative mood than those in the reference category (i.e., Whites, Asians, and Hispanics), while women experienced more frequent bad mood than men. However, these effects were no longer statistically significant when potential confounds and pathway variables were added to the models. We conclude that the effects of body weight on mood did not vary significantly across demographic subgroups, among participants in the MIDUS study.

Discussion

Our analyses revealed that excessive body weight is not necessarily distressing; to the contrary, when a diverse range of obesity-related stressors were controlled, obese persons actually enjoyed better psychological health than their thinner peers. We found initially that type II and III obesity were associated with more frequent negative affect and less frequent positive affect. Yet after we controlled for the potential pathway variables that could account for the relation between weight and affect – such as poor physical health, compromised physical functioning, interpersonal discrimination, and problematic relationships with family members – the effects of obesity attenuated and even reversed.

We also found that "obese" persons constitute a highly heterogeneous group. The ANOVA analyses showed that the three subgroups of obese persons differed significantly from one another in terms of demographic and socioeconomic characteristics, including gender, race, and education. We also found considerable heterogeneity in terms of chronic condi-

tions, self-rated health, functional limitation, and health symptoms, where obese II and III persons reported significantly poorer health outcomes than obese I persons. Our results suggest that future studies should not simply contrast “obese” persons with all other persons, yet should evaluate the distinctive risk and resilience factors associated with specific classes of obesity.

Our findings also suggest that moderate obesity may not be associated inherently with negative affect, and in fact may be associated with enhanced positive affect (see also Crisp & McGuinness, 1976; Flegal, Graubard, Williamson, & Gail, 2005; Jorm et al., 2003). These results are consistent with research suggesting that members of stigmatized groups may enjoy self-esteem or positive affect levels that are equal to or better than members of non-stigmatized groups (Crocker & Major, 1989). One’s interpretation of their mistreatment may moderate the psychological consequences of stigmatization. For instance, individuals who attribute mistreatment to another person’s anti-obese prejudice are less likely to experience negative psychological consequences, whereas obese persons who internalize negative stereotypes and attribute their negative experiences to an enduring personal trait are far more likely to suffer psychological distress (Crocker, Cornwell, & Major, 1993; Wang et al., 2004). Although the MIDUS does assess the personal trait to which one attributes their discriminatory treatment, it does not assess one’s interpretation of whether the discriminatory treatment also reflects traits of those doing the discriminating. However, future studies should explore more fully how attribution processes may affect the psychological well-being of overweight and obese individuals.

To our surprise, we found that the relationship between BMI and mood did not differ significantly by race or gender; the latter finding is consistent with other recent studies based on large nationally representative surveys of American adults (e.g., Dong et al., 2004; Simon et al., 2006). Our lack of significant differences by race may reflect the small sample of African Americans in the MIDUS (and subsequently, low statistical power). It is also possible that the race- or gender-specific consequences of obesity vary over the life course; Heo et al. (2005) found that obesity is more distressing for women than men among younger adults only. Our findings also may suggest that obesity may be a “master status,” or a characteristic that overrides all other features of a person’s identity, such as race or gender (Goffman, 1963). Future studies should identify the extent to which body weight differentially affects specific demographic and cultural subgroups, and

whether these patterns have shifted over time. With the statistical majority of Americans now overweight (Ogden et al., 2004), it is possible that weight is equally stigmatizing for all Americans. Conversely, this stigma may apply only to those at the extreme levels of the BMI continuum.

Finally, our results suggest that growing public awareness of obesity as a public health concern may have both beneficial and harmful consequences for the management of obesity. On one hand, reports about the spread of obesity have attracted both public and scholarly attention to important health-related issues, which could enhance the well-being of obese Americans. For example, Brownell and Horgen (2003) proposed that Americans now live in a “toxic” environment marked by high levels of exposure to unhealthy yet heavily advertised and highly accessible foods, thus increasing individuals’ susceptibility to obesity. Yet public recognition of and debate over the obesity “crisis” also may have potentially harmful effects both for the treatment of obesity and for the daily lives of obese persons, by triggering poor body image, self-blame, or anxiety about one’s health. Recent research documents that overweight and obese individuals are indeed aware of the health risks posed by their weight (Jaffe & Carr, 2006).

Given the poor prognosis for the long-term management of obesity, clinicians and health care providers need to expand their foci to include strategies other than weight management alone, in order to improve the well-being of obese adults (Jeffery et al., 2000). Rather than reinforcing the message that “obesity kills,” practitioners and the media could instead focus on lack of exercise, high blood pressure, the consumption of unhealthy foods, and management of symptoms that may impair daily functioning. Focusing on modifiable behaviors of the patient, rather than enduring attributes such as one’s BMI, may increase patients’ psychological well-being. Persons suffering from negative affect experience impairments in multiple domains, including increased work disability, compromised interpersonal relations, and declines in physical and social functioning (Hays, Wells, Sherbourne, Rogers, & Spritzer, 1995). Thus, improving the psychosocial conditions that perpetuate negative affect among obese individuals may be critical in managing the public health impact of this pervasive and chronic condition.

Limitations and future directions

Our conclusions must be interpreted in light of several methodological limitations. First, we relied on

the respondent's own reports of their height and weight. Although self-reported weights are highly correlated with scale weights (Palta, Prineas, Berman, & Hannan, 1982; Stunkard & Albaum, 1981), some studies show that very overweight persons tend to underestimate their weight (Palta et al., 1982: 230). Second, although the MIDUS study includes a rich array of measures of body weight, health conditions, and affect, the study was not designed expressly to uncover linkages between body weight and affect. In particular, our outcome measures may not be the best or most appropriate indicators of psychological health in overweight and obese individuals. Future studies should use multiple measures of normal and pathological affect, such as standard negative affect, depressive symptoms, and anxiety symptom scales.

Third, because the MIDUS data are cross-sectional, we cannot ascertain causal ordering. For instance, we cannot ascertain definitively whether current BMI is a cause or consequence of long-term emotional problems, or whether both current BMI and affect are consequences of distressing early life experiences. Future studies should use longitudinal data to better specify the causal linkages among weight, affect, and early influences on both. Fourth, the MIDUS sample is over-representative of whites and well-educated adults, and under-representative of African Americans, Hispanics, and persons with less than a high school diploma; thus, our findings cannot not be generalized to the overall U.S. population.

Fifth, we did not consider the full range of other stressors associated with body weight, such as binge eating, complications associated with bariatric surgery, or poor body image. For example, researchers have reported a higher prevalence of binge eating among persons with very high BMIs (Telch, Agras, & Rossiter, 1988). Obese binge eaters report higher levels of affective disorders and depressive symptoms than non-binge eating obese persons (e.g., Linde, Jeffery, Levy, Pronk, & Boyle, 2004). Likewise, gastric bypass patients tend to experience impaired quality of life (e.g., Kolotkin et al., 2002; Sarwer, Wadden, & Fabricatore, 2005). Body dissatisfaction may also contribute to the association between obesity and mood (Wardle & Cooke, 2005), especially because body dissatisfaction is influenced by slights or insensitive comments from strangers or family members (Myers & Rosen, 1999; Schwartz & Brownell, 2004).

Sixth, we cannot ascertain whether our measure of critical family relationships captures tensions due to one's body weight or to other factors. Past studies have found that overweight and obese people reported

significantly poorer family relationships than their thinner peers (Carr & Friedman, 2006), and that one's family of origin influences both body weight and body image (Annis et al., 2004; French, Story, & Perry, 1995; Lissau & Sorensen, 1994). Future studies should explore whether criticism from family members expressly targeting one's weight mediates the relationship between obesity and psychological well-being.

Finally, the effect sizes reported in our study are relatively small. However, we concur with the position of Prentice and Miller (1992): if a psychological variable operates in a domain that was unexpected, then it is important substantively even if the magnitude of the effect isn't strong. Our detection of a counterintuitive finding – that obesity may be associated with enhanced positive and lower negative affect – is important because it is unexpected, especially within a large, representative, community sample. Our results suggest that obesity is just as strong a predictor of affect as poor self-rated health, discriminatory treatment by strangers, or a one-standard deviation increase in negative family interactions, each of which is a well-established predictor of negative affect.

Despite these limitations, our study provides an important springboard for future research; we urge researchers to consider the broad array of factors that may account for the association between obesity and affect. Many of the factors that link obesity to affect are potentially modifiable and can be targeted (and possibly ameliorated) via well-designed interventions. For example, obese individuals may suffer significant limitations in daily functioning and work productivity that may be improved without necessarily changing their weight drastically. When considering the challenges associated with long-term weight loss and weight loss maintenance (Jeffery et al., 2000; Wadden, Brownell, & Foster, 2002), addressing the secondary stressors of weight such as daily functioning may be a more effective (and realistic) way of minimizing public health costs.

Although most public health interventions target the lifestyles and health behaviors of obese persons (Brownell & Horgen, 2003), our findings suggest that interventions also should target the practices of “those who do the discriminating” (Link & Phelan, 2001: 366). More than 40% of obese III persons reported that they had been mistreated due to their weight, and this mistreatment was associated with compromised mood. It is certainly possible that self-reports of weight-related discrimination reflected one's perceptions rather than reality; however, we believe that perceptions are important in their own right, as they may have

important consequences for the perceiver's health and well-being (Thomas & Znaniecki, 1958: 79).

Our provocative findings sound a call for other researchers to further explore the ways obesity may have positive psychological consequences. Our study results are not meant to minimize the potentially devastating social and health consequences of obesity, but rather to help provide a more complex picture of the psychological experiences of obese individuals.

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