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## Associations of child sexual and physical abuse with obesity and depression in middle-aged women

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### Abstract

**Objective**—Examine whether (1) childhood maltreatment is associated with subsequent obesity and depression in middle-age; (2) maltreatment explains the associations between obesity and depression; and (3) binge eating or body dissatisfaction mediate associations between childhood maltreatment and subsequent obesity.

**Methods**—Data were obtained through a population-based survey of 4,641 women (mean age = 52 years) enrolled in a large health plan in the Pacific Northwest. A telephone survey assessed child sexual and physical abuse, obesity (BMI  $\geq$  30), depressive symptoms, binge eating, and body dissatisfaction. Data were analyzed using logistic regression models incorporating sampling weights.

**Results**—Both child sexual and physical abuse were associated with a doubling of the odds of both obesity and depression, although child physical abuse was not associated with depression for the African American/Hispanic/American Indian subgroup. The association between obesity and depression (unadjusted *OR* = 2.82; 95% *CI* = 2.20 – 3.62) was reduced somewhat after controlling for sexual abuse (adjusted *OR* = 2.54; 1.96 – 3.29) and for physical abuse (adjusted *OR* = 2.63; 2.03 – 3.42). Controlling for potential mediators failed to substantially attenuate associations between childhood maltreatment and obesity.

**Conclusions**—This study is the first to our knowledge that compares associations of child abuse with both depression and obesity in adults. Although the study is limited by its cross-sectional design and brief assessments, the fact that child abuse predicted two debilitating conditions in middle-aged women indicates the potential long-term consequences of these experiences.

### Introduction

Both obesity [defined as a body mass index, or BMI (kg/m<sup>2</sup>), of 30 or greater] and depression are highly prevalent in the USA and associated with a number of diseases and health complications (e.g., Blazer, Kessler, McGonagle, & Swartz, 1994; Olshansky et al., 2005). It is also fairly well-established that these two public health problems are associated (Faith, Matz,

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& Jorge, 2002; Stunkard, Faith, & Allison, 2003). Community surveys in the US and Canada have found associations between obesity and depressive symptoms (Heo, Pietrobelli, Fontaine, Sirey, & Faity, 2006; Johnston, Johnston, McLeod, & Johnston, 2004), diagnosis of depressive disorder (Carpenter, Hasin, Allison, & Faith, 2000; Onyike, Crum, Lee, Lyketsos, & Eaton, 2003), and history of depression (Dong, Sanchez, & Price, 2004; Simon et al., 2006). Longitudinal studies indicate a bidirectional relationship. Depression predicts subsequent development of obesity (Goodman & Whitaker, 2002; Hasler et al., 2004) and obesity predicts subsequent development of depression (Herva et al., 2006; Roberts, Deleger, Strawbridge, & Kaplan, 2003). This relationship may differ by gender, with positive associations between obesity and depression among women and either negative or no associations among men (Carpenter et al., 2000; Istvan, Zavela, & Weidner, 1992; Linde et al., 2004; McElroy et al., 2004; Onyike et al., 2003; Palinkas, Wingard, & Barrett-Connor, 1996). The present authors recently contributed to this literature, finding that depression was strongly and consistently associated with obesity in a large sample of middle-aged women (Simon et al., in press).

The reasons for an obesity-depression association have not been established and there may be several contributing factors. One potential explanation for this association is childhood maltreatment. Childhood maltreatment is known to be associated with a range of psychological difficulties and physical health outcomes, including both obesity and depression (Felitti et al., 1998; Green, 1993; Gustafson & Sarwer, 2004). Self-reported childhood abuse is strongly associated with increased body weight and obesity in adulthood (Walker et al., 1999), with risk of obesity increasing as a function of the number and severity of each type of abuse (Williamson, Thompson, Anda, Dietz, & Felitti, 2002). Childhood maltreatment has also been found to be a distal risk factor for depression (Hankin, 2005; McNally, Perlman, Ristuccia, & Clancy, 2006), with increased psychiatric consequences as the number of different types of abuse or chronicity increases (Molnar, Buka, & Kessler, 2001; Teacher, Samson, Polcari, & McGreenery, 2006). Child abuse could increase the likelihood of either obesity or depression through multiple mechanisms, including actual physical changes (e.g., impaired brain development, poor physical health), psychological sequelae (e.g., low self-esteem, sense of powerlessness, social isolation), or behavioral consequences (e.g., delinquency, teen pregnancy, low academic achievement) (e.g., Chalk, Gibbons, & Scarupa, 2002; Colman & Widom, 2004; Finkelhor & Browne, 1986; Nemeroff, 2004).

Child sexual and physical abuse are examined separately in the present study, as the two forms of childhood maltreatment have different associations with both adult obesity and depression. Child physical abuse may be more predictive of depression in adults than child sexual abuse (Grilo et al., 2005; Roosa, Reinholtz, & Angelini, 1999), whereas child sexual abuse, but not physical abuse, was associated with elevated BMI in a large sample of adult women (Walker et al., 1999).

Given that childhood maltreatment could be a common factor predicting both negative outcomes, the first goal of the present study was to examine and contrast the associations of obesity and depression with childhood maltreatment. Specifically, the questions of whether child abuse is associated with both obesity and depression and whether the associations remain significant controlling for the demographic factors of age and race/ethnicity were examined; other common demographic factors, such as education, marital status, and SES, were not considered as they could be outcomes influenced by the experience of childhood abuse (e.g., Walker et al., 1999). Some data indicate that the relationship between obesity and depression may be moderated by race or ethnic status (Blazer, Moody-Ayers, Craft-Morgan, & Burchett, 2002; Heo et al., 2006; Stecker, Fortney, Steffick, & Prajapati, 2006). For example, Simon et al. (2006) reported that the association between obesity and diagnosis of MDD varied as a function of both race/ethnicity, being strongest in non-Hispanic whites. Given that the association of sexual abuse and later depression may vary as a function of race/ethnicity (e.g.,

the association was significant for non-Hispanic Whites and Mexican American young women but not African or Native American women in Roosa et al., 1999), we also considered whether the magnitude of associations between abuse and the two examined outcomes varied as a function of race/ethnicity. The sample size and demographic composition of the sample did not allow us to examine all categories of race/ethnicity separately. Rather, three composite categories were created (i.e., White non-Hispanic; Asian/Pacific Islander; and other, i.e. African American, Hispanic, and American Indian/Alaskan Native) based on the relative prevalence of obesity among adult women (e.g., Ogden et al., 2006; Sundaram, Ayala, Greenland, & Keenan, 2005).

If childhood maltreatment is associated with both obesity and depression and precedes both in time, then it could explain at least some of that association. As our second aim, we examined whether the obesity/depression association became nonsignificant or less significant controlling for the presence of either form of childhood maltreatment.

If childhood maltreatment increases the risk of developing obesity later in life, then this relationship should be mediated by specific changes in attitudes or behaviors. Both binge eating and body dissatisfaction have also been found to be associated with child abuse and with adult obesity and are thus also examined as potential mediators of this relationship as the third aim of this paper. Binge eating, which refers to discrete episodes in which the person ate an unusually large amount of food with a perceived lack of control, has been found in several studies to be associated with obesity (e.g., Reichborn-Kjennerud, Bulik, Sullivan, Tambs, & Harris, 2004) and with a history of child abuse in community samples of women (e.g., Fairburn et al., 1998; Kenardy & Ball, 1998; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002) and among obese individuals seeking bariatric surgery (Gustafson et al., 2006). In addition, rates of physical, sexual, and emotional childhood maltreatment among adults with binge eating disorders are elevated (e.g., Grilo & Masheb, 2001). Body dissatisfaction, which refers to negative thoughts and feelings regarding one's size and weight, is higher among obese women than nonobese women (Sarwer, Wadden, & Foster, 1998) and is associated with past sexual abuse in young community-residing women (Kenardy & Ball, 1998) and with emotional but not physical or sexual abuse in extremely obese patients seeking bariatric surgery (Grilo et al., 2005). Binge eating, body dissatisfaction, and depressive symptoms are strongly associated in both obese women and men (Womble et al., 2001).

## Method

### Participants and procedures

Data used in this paper were obtained through a population-based survey of middle-aged women enrolled in Group Health Cooperative, a prepaid health plan serving approximately 500,000 members in Washington and northern Idaho. The Group Health enrollment is demographically similar to the area population (Simon, Von Korff, Barlow, Pabiniak, & Wagner, 1996). To provide a more diverse sample in terms of race and ethnicity, we recruited participants from eight Group Health primary care clinics with higher rates of minority enrollment. Study procedures were approved by the Group Health Institutional Review Board.

All women aged 40 and older enrolled in Group Health are invited to complete periodic breast cancer risk questionnaires (Taplin, Thompson, Schintzer, Anderman, & Immanuel, 1990), which include questions on self-report of height and weight. For the present study, women who last reported a BMI of 30 or more were sampled at 100%, women who last reported a BMI less than 30 were sampled at 12%, and women with unknown BMI or those who did not complete a screening questionnaire in the last five years were sampled at 25%. This stratified sampling procedure was intended to increase the efficiency of the survey and to permit correction for

differences in response rates. All analyses incorporated sampling weights (see below) so that results accurately reflect the entire target population.

All sampled participants were mailed an invitation letter, which included a \$5 gift card incentive and a phone number through which potential participants could decline further contact. Those who did not decline were contacted by telephone beginning approximately one week after the mailing. Participants received no additional compensation for completing the survey.

### Assessment measures

Surveys were conducted by trained interviewers from Group Health's survey research program. Each interviewer received at least 8 hours of general interview training and 4 hours of project-specific training. Certification required satisfactory performance in 2 role-play interviews and 2 observed interviews. Contact protocols required a minimum of 9 contact attempts, including attempts during evening and weekend times.

### Demographic measures

The telephone survey included measures of age (collected in years); ethnicity (3.7% reported Hispanic origin); and race (5 response categories and rates: 2.5% American Indian/Alaskan Native, 8.3% Asian/Pacific Islander [7.4% Asian and 0.9% Native Hawaiian or other Pacific Islander], 7.0% African American, 82.3% White). Based on the frequency distributions and known associations with obesity, a new race/ethnicity measure with 3 levels was created: (1) White non-Hispanic, (2) Asian/Pacific Islander; and (3) Other (African American, Hispanic, and American Indian/Alaskan Native), where ethnicity took precedence over race.

### Child sexual and physical abuse

Child maltreatment was assessed by four questions adapted from the Childhood Trauma Questionnaire (Bernstein et al., 1994). The interviewer prefaced this assessment with the following statement: "The next four questions ask about childhood experiences. For some people, these questions may evoke unpleasant memories. If you prefer not to answer a particular question, please let me know and we'll skip it. I will read four statements to you about your childhood and would like you to respond using one of these categories: Never true, Rarely true, Sometimes true, Often true, Very often true. When I was growing up....(1) I was frightened of being hurt by someone in my family, (2) Someone tried to touch me in a sexual way or tried to make me touch them, (3) Someone threatened to hurt me or tell lies about me unless I did something sexual with them, and (4) People in my family hit me so hard that it left me with bruises or marks." If the interviewer noted any signs of a negative reaction, they stopped the assessment and said "I can see this is upsetting for you. Would you like me to move on?" If the participant said yes, the remaining questions rated as "refused." Child maltreatment in the present study was categorized as child sexual abuse (using Question 2) and child physical abuse (using Question 4). Question 1 was not included because it referred to a perception of the family rather than an actual event experienced by the individual and Question 3 was not included because it is not a prerequisite of child abuse and did not assess the outcome of the experience. Abuse was considered present if the participant endorsed Sometimes, Often or Very Often True (Walker et al., 1999). Given the sensitive nature of these experiences, we examined the degree of missing data on these two items.

### Outcome measures

**Obesity**—The survey included self-reported height and weight, which were converted to Body Mass Index (BMI) scores ( $\text{kg}/\text{m}^2$ ). Participants were categorized as obese (Yes/No) if their BMI value was 30 or greater (World Health Organization, 1997). To confirm the validity

of self-reported height and weight information, data were examined from a sample of 250 women reporting BMI of 30 or more who were invited to participate in an in-person assessment to assess eligibility for a treatment study. At this assessment, height was measured by stadiometer and weight was measured by triple-beam balance. Comparison of self-reported height and weight with directly measured height and weight obtained on average 26 ( $SD = 19$ ) days later found that weight was under-reported by an average of 1.35 kg and height was under-reported by an average of .002 meters. Pearson's correlations between measured and self-reported heights and weights were  $r = 0.95$  and  $r = 0.98$ , respectively.

*Depression* was assessed using the 9-item Patient Health Questionnaire (PHQ; Spitzer, Kroenke, & Williams, 1999), which examines the nine DSM-IV (American Psychiatric Association, 1994) criteria for major depression. Validation studies have shown excellent agreement between the self-report PHQ and a clinician structured interview in samples of general medical outpatients (Kroenke, Spitzer, & Williams, 2001; Spitzer, Kroenke, & Williams, 1999) and medical inpatients (Diez-Quevedo, Rangil, Sanchez-Planell, Kroenke, & Spitzer, 2001). A dimensional score was calculated as the total of all 9 items (possible range 0 to 27), which was dichotomized at 10 or more, a cut-point previously found to represent a moderate level of depressive symptoms (Kroenke et al., 2001).

### Potential mediators

*Binge eating* was assessed using three questions from the Questionnaire on Eating and Weight Patterns (Spitzer et al., 1992; 1993): (1) During the past six months, did you ever eat within any two-hour period what most people would regard as an unusually large amount of food? (yes/no), (2) During the times when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating? (yes/no), and (3) During the past 6 months, how often, on average, did you have times when you ate this way – that is, large amounts of food plus feeling that your eating was out of control? (Less than 1 day a week, 1 day a week, 2 or 3 days a week, 4 or 5 days a week, Nearly every day). Binge eating was considered present if the participant said “yes” to the first two questions and reported a frequency of at least 2–3 days a week to the third question.

*Body dissatisfaction* was assessed by a single item (“I feel satisfied with the shape of my body”) (Garner, Olmsted, & Polivy, 1983) with 6 response options (Always, Usually, Often, Sometimes, Rarely, Never). Responses were dichotomized as Never or Rarely (body dissatisfaction) versus Sometimes or more (body satisfaction).

### Data analysis

Data analyses were conducted using SAS/STAT® software, Version 9.1. All analyses incorporated sampling weights (Cochran, 1977) to account for the stratified sampling procedure and for differential response rates across sampling strata. The Taylor series expansion approximation was used to adjust confidence intervals and significance tests for design effects (potential over-estimation of statistical significance due to the stratified sampling design). Specific SAS procedures used included SURVEYFREQ for calculation of proportions and chi-squared tests for association between two variables and SURVEYLOGISTIC for logistic regression models. The actual and weighted frequencies of all variables are shown in Table 1. Logistic regression models were used to examine associations of childhood maltreatment indices with depression and obesity, and the mediation analysis. In addition to examining the unadjusted associations of child abuse with each outcome, the models included a second block that controlled for age and race/ethnicity. To examine differences by race/ethnicity, the significance of the interaction between childhood maltreatment and race/ethnicity classifications was tested. The mediational approach consisted of four steps following the traditional requirements for testing mediation (Baron & Kenny, 1986). First, the risk factor

(i.e., child physical or sexual abuse) should predict the outcome (i.e., obesity). Second, the risk factor should predict the putative mediator (i.e., binge eating or body dissatisfaction). Third, the mediator should be significantly associated with outcome. Fourth, the effect of risk factor (child physical or sexual abuse) on the outcome (obesity) should be attenuated when the mediator (binge eating or body dissatisfaction) is statistically controlled. All tests were conducted at the  $p < .05$  significance level.

## Results

### Survey response

Of the 8,000 potential participants who were mailed invitation letters, 442 were found to be ineligible (had since died, moved away, or disenrolled from the health plan). Of the remaining 7,558 eligible women, 865 could not be reached by telephone and 2,033 declined to participate, leaving 4,660 participants (62% of those eligible). Nineteen participants had missing data on one or more key variables, so 4,641 were included in analyses presented here. Participation varied significantly across sampling strata (63% among those who reported BMI of 30 or more on the breast cancer screening questionnaire vs. 59% among those reporting BMI less than 30 versus 34% among those declining to participate in breast cancer screening,  $\chi^2(2, N = 344)$   $p < .001$ ). As discussed above, all analyses incorporated sampling weights to correct for differential response across strata.

Although participants were allowed to skip any questions they chose, this occurred infrequently on the sexual and physical abuse questions. Of the 4641 surveys, 90 (1.9%) skipped the child sexual abuse item and 57 (1.2%) skipped the child physical abuse item. There were no differences in the rates of missing data as a function of BMI or depression level. Weighted frequencies of child sexual abuse and physical abuse in the White non-Hispanic, Asian/Pacific Islander, and other (African American/Hispanic/American Indian) groups were: child sexual abuse = 14.0%, 8.2%, and 28.3%; child physical abuse = 11.2%, 7.3%, and 22.2%, respectively.

### Are child sexual and physical abuse associated with obesity and depression?

A series of logistic regression models were computed examining the association of both childhood maltreatment measures with obesity and with depression. The unadjusted odds ratios (with 95% confidence intervals) are shown in Table 2. In addition, associations adjusted for the non-modifiable demographic factors of age and race/ethnicity were computed. As can be seen, child abuse was associated with a doubling of the odds of both outcomes. The magnitude of association between both forms of childhood maltreatment and between the two outcomes did not differ and all were statistically significant. Controlling for age and race/ethnicity had a minimal impact on the magnitude of associations and did not differentially impact one association more than the others. All remained statistically significant and of a magnitude of approximately two.

### Are the magnitude of associations similar for different race/ethnicity groups?

The interaction of childhood maltreatment and race/ethnicity was examined to see if the associations in Aim 1 varied as a function of race/ethnicity. One of the four race/ethnicity by child abuse interactions attained statistical significance: child physical abuse in the prediction of depression ( $p = 0.02$ ). The other interactions with the race/ethnicity variable were not statistically significant: child sexual abuse and obesity ( $p = 0.33$ ), child sexual abuse and depression ( $p = .96$ ), and child physical abuse and obesity ( $p = 0.33$ ). Results for the various associations are shown in Table 3. Examining the one significant interaction, child physical abuse was not significantly associated with depression for the “other” category comprised of African American/Hispanic/American Indians, whereas child physical abuse was associated

with significantly higher rates of depression for the White non-Hispanic and Asian/Pacific Islander groups.

### **Does the association between obesity/depression become attenuated or nonsignificant controlling for childhood maltreatment?**

Next, the degree to which controlling for the presence of childhood maltreatment attenuated the association between obesity and depression was examined. Analyses also controlled for the effects of age and race/ethnicity. Adjusting for childhood maltreatment and these demographic factors had some attenuation effects, especially for child physical abuse but the association between obesity and depression remained strongly significant. The unadjusted association between obesity and depression was  $OR = 2.82$  (95%  $CI = 2.20 - 3.62$ ;  $p < .001$ ). The association adjusting for age and race/ethnicity was virtually unchanged,  $OR = 2.80$  (2.17–3.61;  $p < .001$ ). Adding the adjustment for child sexual abuse resulted in an  $OR = 2.54$  (1.96–3.29;  $p < .001$ ). Adding the adjustment for child physical abuse rather than sexual abuse resulted in an  $OR = 2.63$  (2.03–3.42;  $p < .001$ ). The association adjusting for both child sexual and physical abuse resulted in an  $OR = 2.45$  (1.88–3.18;  $p < .001$ ).

### **Do binge eating and body dissatisfaction mediate the association between child abuse and obesity?**

Results for steps one, two, and four of the mediational analyses are shown in Table 4. The first three of four steps in mediation were satisfied. Both child sexual and physical abuse measures significantly predicted the outcome (adult obesity) and the potential mediators (binge eating and body dissatisfaction). In addition, both potential mediators significantly predicted adult obesity; binge eating  $OR$  (95%  $CI$ ) = 8.02 (4.79–13.45;  $p < .001$ ); body dissatisfaction  $OR$  (95%  $CI$ ) = 8.80 (7.32–10.57;  $p < .001$ ). However, as can be seen in the Table, models controlling for binge eating or body dissatisfaction failed to substantially attenuate the associations between either childhood physical or sexual abuse and adult obesity, thus failing to support the hypotheses that either binge eating or body dissatisfaction mediated the associations between childhood maltreatment and later obesity.

## **Discussion**

The goal of the present study was to contribute to our understanding of the impact of childhood maltreatment on two common and related conditions affecting women's health: obesity and depression. We found that both child sexual and physical abuse were significantly associated with higher rates of both obesity and depression. Adult women who reported a history of either child sexual or physical abuse had approximately twice the likelihood of both current obesity and depression in middle age. Whereas previous research reported a stronger association for child physical abuse, compared to sexual abuse, for depression in adults (Grilo et al., 2005; Roosa et al., 1999) and a stronger association for child sexual abuse, relative to physical abuse, for obesity in adult women (Walker et al., 1999), the magnitude of association for the two forms of childhood maltreatment and for the two outcomes in the present study did not substantially differ and all were statistically significant. Controlling for age and race/ethnicity had a minimal impact on the magnitude of associations and did not differentially impact one association more than the others. Thus, we did not replicate the finding reported by Simon et al. (2006) that obesity and MDD were more strongly associated among non-Hispanic whites compared to other race/ethnicity groups (although that study were much larger and consisted of both women and men). To our knowledge, the present study is the first to compare the associations and potential mediators of child abuse with both depression and obesity in adults. The fact that a brief measure of childhood experiences was predictive of two debilitating health conditions in women when they were on average 52 years of age is a potential indication of the long-term consequences of these experiences.

We were also interested in whether the magnitude of associations between childhood maltreatment and either obesity or depression varied as a function of race/ethnicity. One of the four examined interactions attained statistical significance: the association between child physical abuse and current depression in middle age varied as a function of race/ethnicity. The subgroup of African American/Hispanic/American Indian had the highest rates of physical abuse (22%) but the presence of physical abuse had almost no impact on the odds of current depression in middle age. Associations between child physical abuse and future depression for the other two race/ethnicity groups were significant. It was noteworthy that the Asian/Pacific Islander group had the lowest rate of child physical abuse (7%) but the highest odds ratio, with depression being almost six times more likely given a history of child physical abuse, although the confidence interval is wide due to a small number of women. Although the overall interaction was nonsignificant, it was intriguing that child sexual abuse had no association with obesity in this racial group. As mentioned, these analyses were not a primary focus of this research and the base rates of various ethnic and racial groups forced us to collapse across a wide variety of cultural groups. This research needs to be replicated but suggests that the impact of child abuse on depression and perhaps obesity varies across cultural groups, which may have implications for both prevention and treatment.

While both measures of childhood maltreatment were significantly associated with obesity and depression, controlling for the presence of child abuse failed to account for the obesity-depression connection. The association between obesity and depression (unadjusted  $OR = 2.82$ ) decreased only slightly after controlling for a history of child sexual abuse ( $OR = 2.54$ ) or a history of child physical abuse ( $OR = 2.63$ ) but the association remained significant. The pattern of results suggests that obesity and depression may be independent outcomes of child abuse, perhaps driven by separate mechanisms or factors (e.g., fear of sexual intimacy or poor self-care contributing to obesity, low self-worth or increased arousal contributing to depression). Thus, child abuse may be a contributing factor for the association between adult obesity and depression, but it is not the only or primary explanation.

Our last aim was to examine whether either binge eating or body dissatisfaction mediated the associations of child abuse with obesity. Consistent with expectation, both measures of child maltreatment predicted rates of binge eating and body dissatisfaction in middle-aged women, and both binge eating and body dissatisfaction were associated with obesity. However, while the first three steps of the mediational approach were satisfied, controlling for either mediator did not appreciably reduce the association between childhood maltreatment and obesity. Other factors, such as weight stigmatization (Friedman et al., 2005) and poor self-care, including physical inactivity (Felitti et al., 1998), need to be examined as possible mediators of this important connection.

### Strengths and limitations

The study has a number of important positive features. Many previous studies have focused on only individuals who are extremely obese (e.g., bariatric surgery candidates). The present study illustrates the magnitude of associations at a broader range of BMI levels. Second, the large sample size provided good statistical power. Third, the sample was quite representative of the larger population from which it was drawn, having good participation rates and low rates of missing data, which is a concern in the area of childhood maltreatment.

Limitations of the study include its cross-sectional nature and the reliance on telephone-administered survey. Perhaps the most important limitation is that the assessment of child physical and sexual abuse were limited to a single question each. Considered broadly, we believe that the most likely effect of using a brief measure of abuse would be to disguise relationships between abuse and other variables by increasing measurement error and thus that the relationships we observed with a weak measure remain noteworthy. Nevertheless, we

readily concede that the strength of the associations and the specificity of the effects may be misleading due to the truncated assessment of abuse. It is possible that some participants mistakenly reported experiences that would not be considered “child abuse” (e.g., consensual sexual exploration between two adolescents, or some forms of aggression from a sibling or non-family member). Child abuse refers to a wide variety of experiences that differ in terms of age of occurrence, duration, intensity, and nature, and the current age of the individual (Kenardy & Ball, 1998) and a broader or more comprehensive assessment of childhood maltreatment might have produced different associations with obesity and depression. The nature of associations will vary as a function of specifics related to abuse. For example, we did not include a measure of childhood emotional abuse, which may be strongly associated with depression and body dissatisfaction (Grilo & Masheb, 2001). We had reasonable psychometric data for many of the measures but the associations may have been stronger with more intensive assessment methods. For example, the fact that body dissatisfaction was assessed by a single item limits our ability to interpret the nature of association and we do not know whether any reported dissatisfaction was due to weight, BMI, or other factors which would not be expected to be associated with BMI or depression. Given the positive nature of the findings, future research should examine these associations using expanded, more comprehensive measures. Lastly, while the use of a community sample provided a number of positive features, had we examined the interconnections between childhood maltreatment, obesity, and depression in a patient sample, we might have more specific recommendations regarding women who are seeking treatment.

### **Clinical and research implications**

The present study illustrates the importance of routinely assessing for the presence of childhood maltreatment when intervening with obese and/or depressed adult women. If abuse is identified, the individual may benefit from a referral for additional treatment, especially if the depression is being treated pharmacologically. The study also emphasizes the fact that child abuse, particularly child physical abuse, may have different associations with adult depression, depending on race and ethnicity.

Addressing a history of child sexual abuse when treating obese individuals is important because the overeating may be used as a method of avoiding experiences that may trigger negative emotional states, reducing the likelihood of advances from potential sexual partners, or coping with emotional distress (e.g., Felitti, 1993; Gustafson & Sarwer, 2004; Wiederman, Sansone, & Sansone, 1999). Addressing a history of child physical abuse in treatment is important because the patient may be engaging in other risky health behaviors, including substance abuse and risky sexual behaviors, or have other medical diseases that warrant treatment (Felitti et al., 1998). Both obesity and depression treatments may be less successful and more prone to relapse if an underlying history of childhood maltreatment is not acknowledged and addressed. The question is how to assess for a history of child abuse among women in a supportive and nonjudgmental manner, emphasizing that the purpose of this assessment is not solely to discuss painful past experiences but to understand relationships between past abuse and body size and eating behaviors. If a history of child abuse is present and the patient appears to become upset when discussing it or after experiencing some degree of weight loss, a referral to a mental health therapist with expertise in child abuse issues is recommended. Regarding prevention efforts, the findings suggest that women with a history of childhood maltreatment are at high risk for both depression and obesity in middle age.

A number of research directions have already been suggested. In addition, future research should examine the prospective nature of the associations between obesity, depression, binge eating, and body dissatisfaction; other factors that account for the association between obesity and depression, such as intimate partner violence (e.g., Hegarty, Gunn, Chondros, & Small,

2004); and the degree to which child abuse impacts the effectiveness of obesity and depression treatments and the maintenance of treatment gains.

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**Table 1**

Frequency (Actual and Weighted) of Demographic, Childhood Maltreatment, Outcome, and Mediator Variables.

Variable	Frequency	Weighted Frequency	Weighted Frequency %
Age			
40–49	1609	1719	37.0
50–59	2273	2188	47.2
60–65	759	733.3	15.8
Race/Ethnicity Categories			
White non-Hispanic	3646	3704	79.8
Asian/Pacific Islander	235	357.9	7.7
other <sup>a</sup>	759	577.8	12.5
Child Sexual Abuse			
No	3647	3839	84.6
Yes	904	698.6	15.4
Child Physical Abuse			
No	3875	4021	87.7
Yes	709	562.7	12.3
Obesity			
No	1390	3092	66.7
Yes	3251	1548.4	33.4
Depression			
No	3898	4044	87.1
Yes	743	596.4	12.9
Binge Eating			
No	4202	4383	95.5
Yes	390	207.8	4.5
Body Dissatisfaction			
No	1991	2867	62.4
Yes	2605	1728	37.6

<sup>a</sup> defined as African American, Hispanic, and American Indian.

**Table 2**  
Associations of Childhood Maltreatment with Obesity and Depression.

Childhood Maltreatment	Obesity		Depression	
	OR (95% CI)	<i>p</i> -value	OR (95% CI)	<i>p</i> -value
Child sexual abuse				
Unadjusted	2.03 (1.63 – 2.52)	<0.0001	2.21 (1.68 – 2.90)	<0.0001
Adjusted for age, race <sup>a</sup>	1.84 (1.47 – 2.31)	<0.0001	2.14 (1.62 – 2.83)	<0.0001
Child physical abuse				
Unadjusted	2.24 (1.75 – 2.87)	<0.0001	2.42 (1.80 – 3.26)	<0.0001
Adjusted for age, race*	2.05 (1.59 – 2.63)	<0.0001	2.34 (1.72 – 3.18)	<0.0001

Note. OR = odds ratio, CI = confidence interval

<sup>a</sup> Age (40–49, 50–59, 60–65) and race (White non-Hispanic, Asian/Pacific Islander; other) modeled as categorical variables

**Table 3**  
Associations of Childhood Maltreatment with Obesity and Depression as Function of Race/Ethnicity.

Childhood Maltreatment	Race/Ethnicity Classification					
	White non-Hispanic		Asian/Pacific Islander		other <sup>a</sup>	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Child sexual abuse	1.95 (1.51 – 2.51)	<0.0001	0.95 (0.38 – 2.39)	0.91	1.66 (0.99 – 2.79)	0.055
Child physical abuse	1.96 (1.48 – 2.62)	<0.0001	2.21 (0.72 – 6.82)	0.17	2.44 (1.34 – 4.45)	0.004
Child sexual abuse	2.09 (1.51 – 2.90)	<0.0001	2.41 (0.56 – 10.3)	0.24	2.26 (1.27 – 4.02)	0.0006
Child physical abuse	2.67 (1.88 – 3.79)	<0.0001	5.84 (1.55 – 22.0)	0.009	1.14 (0.64 – 2.04)	0.66

Note. OR = odds ratio, CI = confidence interval.

<sup>a</sup>Category consisted of African American, Hispanic, and American Indian.

**Table 4** Degree to which Binge Eating or Body Dissatisfaction Mediate Associations Between Childhood Maltreatment and Obesity.

Logistic Regression Models	Child sexual abuse		Child physical abuse	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Abuse predicting Obesity	2.03 (1.63 – 2.52)	<0.0001	2.24 (1.75 – 2.87)	<0.0001
Abuse predicting Binge Eating	2.90 (2.04 – 4.11)	<0.0001	1.87 (1.24 – 2.84)	0.003
Abuse predicting Obesity, controlling for Binge Eating	1.86 (1.48 – 2.33)	<0.0001	2.17 (1.68 – 2.80)	<0.0001
Abuse predicting Body Dissatisfaction	1.89 (1.50 – 2.37)	<0.0001	2.10 (1.63 – 2.70)	<0.0001
Abuse predicting Obesity, controlling for Body Dissatisfaction	1.67 (1.29 – 2.17)	0.0001	1.78 (1.32 – 2.41)	0.0002

Note. OR = odds ratio, CI = confidence interval.