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The Relationship of Violence and Traumatic Stress to Changes in Weight and Waist Circumference: Longitudinal Analyses from the Study of Women's Health Across the Nation (SWAN)

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Abstract

Objective—To investigate the associations of violence and traumatic stress with changes in weight and waist circumference, hypothesizing that violence in midlife would be associated with increases or decreases in weight and waist circumference.

Methods—The longitudinal cohort of the Study of Women's Health Across the Nation (SWAN) comprised the study sample, which included an ethnically/racially and socially diverse group of 2870 women between the ages of 42 and 52 years at baseline. Women were followed annually for 10 years and assessments included weight and waist circumference measures and data on violence, health outcomes and confounders.

Results—At baseline, 8.6% Caucasian, 10.8% African American, 9.2% Chinese and 5.0% Japanese women reported violence and traumatic stress. Reporting violence and traumatic stress during follow-up was significantly associated with weight gain (OR=2.39, 95% CI= 1.28, 4.47), weight loss (OR=3.54, 95% CI=1.73, 7.22), and gain (OR=2.44, 95% CI =1.37, 4.37) or loss (OR=2.66, 95% CI=1.23, 5.77) in waist circumference, adjusting for age, race/ethnicity, education, marital status, and smoking.

Conclusion—Violence and traumatic stress against midlife women was associated with gains or losses in weight and waist circumference.

Violence against women can occur during the entire lifespan and contribute to significant adverse health outcomes, preventable illness, injury and death (Bonomi et al., 2006; Bossarte, Simon, & Barker, 2006; Campbell et al., 2003; Coker et al., 2002; Coker, Smith, Bethea, King, & McKeown, 2000; Paulozzi, Saltzman, Thompson, & Holmgreen, 2001; Tjaden & Theonnes, 2000) and can become a chronic stressor (Breiding, Black, & Ryan, 2008; Gilbert et al., 2009; Midei & Matthews, 2011; Midei, Matthews, & Bromberger, 2010; Mouton et al., 2004; Wuest et al., 2008). The first and only National Violence Against Women Survey (NVAWS) found that 52% of women in the United States had been physically assaulted as a child by an adult caretaker and/or as an adult by any type of perpetrator (Tjaden & Thoennes 1998). In addition, the costs associated with intimate partner violence was $5.8 million dollars per year where the direct costs amounted to nearly $4.1 million for medical care. While the relevant research and literature on the impact of childhood violence on adult health have grown, little is known about the impact on chronic health conditions of violence against women during midlife. Furthermore, the impact of chronic stress due to violence during the normal process of menopause and aging is not well

understood. Chronic stress can accelerate cognitive and physical decline and increase the risk of chronic illnesses, such as cardiovascular disease (Seeman, Singer, Rowe, Horwitz, & McEwen, 1997). Intimate partner violence or other forms of violence against women have been associated with chronic health such heart disease, chronic neck, back pain and headache (Ruiz-Perez, Plazaola-Castano, & Del Rio-Lozano, 2007; Vives-Cases, Ruiz-Cantero, Escriba-Aguir, & Miralles). The hypothalamic-pituitary-adrenal (HPA) axis, the autonomic nervous system, and the immune system respond to stress (McEwen, 1998; McEwen & Stellar, 1993). For example, when the hypothalamic-pituitary-adrenal axis is continuously activated over long periods of time, negative health consequences, such as obesity, can result (Bjorntorp, 2001; Bjorntorp, Holm, & Rosmond, 1999; Bjorntorp & Rosmond, 1999). However, few studies have directly investigated the health risk of violence and traumatic stress, particularly in midlife women.

The Word Health Organization defines violence as “the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation” (World Health Organization, 2002). Emerging research in violence and traumatic stress occurring in different settings such as in the neighborhood (e.g., assault, accident, robbery) as well as violence occuring within the home (e.g., by partner, someone close) have been associated with poorer health, increased violence and increased mortality (Cerda et al., 2012; Goldmann et al., 2011; Kiss et al., 2012). In addition, weight gain and waist circumference are important risk factors for several chronic illnesses, including cardiovascular disease (CVD) and excess mortality (Flegal, Graubard, Williamson, & Gail, 2007; Yusuf et al., 2005). The INTERHEART study, an international study of 27,098 participants from 52 countries, sought to determine whether other measures of obesity, such as waist circumference, might be better predictors of myocardial infarction (MI) than body mass index (BMI) (Yusuf et al., 2005). While BMI was associated with MI (OR=1.44, 95% CI=1.32–1.57), after adjusting for risk factors, such as age, this association was no longer significant (OR=0.98, 95% CI: 0.88–1.09). In comparison, waist circumference was significantly associated with MI even after adjusting for risk factors (adjusted OR=1.33; 95% CI=1.16–1.53). Results from the National Health and Nutrition Examination Survey and vital statistics showed an association between obesity and CVD mortality (112,159 excess deaths; 95% CI= 87,842 to 136,476) and cancers that are considered to be obesity-related (13,839 excess deaths; 95% CI= 1,920 to 25,758) (Flegal et al., 2007). Combined overweight and obesity was associated with diabetes and kidney disease mortality (61,248 excess deaths; 95% CI: 49,685 to 72,811). In comparison, underweight was associated with increased non-CVD and non-cancer mortality (23,455 excess deaths; 95% CI: 11,848 to 35 061) (i.e. all other causes).

Research examining the relationship between violence and health in adult women has had mixed results regarding changes in weight, body composition and risk factors for cardiovascular disease. In a sample of 387 female participants from a domestic violence shelter, a higher danger assessment score, a clinical tool used to assess dangerousness and lethality in intimate relationships, was associated with weight gain (p=0.013) (Sato-DiLorenzo & Sharps, 2007). Other health outcomes were also associated with higher danger assessment scores, including anxiety, depression, difficulty concentrating, memory loss, suicidal attempts, past history of smoking and illicit drug use (Sato-DiLorenzo & Sharps, 2007). Similar results were observed cross-sectionally when examining the relationship of violence to obesity in a national sample of Egyptian women (Yount & Li, 2011). Obesity was significantly associated with reporting three or more instances of psychological, physical or sexual violence (OR=1.26, 95% CI: 1.02–1.55). In contrast, the Behavioral Risk Factor Surveillance System (BRFSS) found no association between increased BMI and violence for women (OR=1.07, 95% CI 0.98–1.17) (Breiding et al., 2008). However,

violence was associated with other health outcomes in women, such as heart disease (OR=1.75, 95% CI: 1.45–2.12), high cholesterol (OR=12, 95% CI: 1.14–1.38) and stroke (OR=1.79, 95% CI: 1.43–2.23). The inconsistent findings in these studies between violence and changes in weight and other cardiovascular risk factors may be due to the different ways in which weight was measured (e.g. self report versus clinic measures).

In a subset of women from the Study of Women's Health Across the Nation (SWAN), childhood violence was associated with increased abdominal adiposity (Midei et al., 2010) and hot flashes (Thurston et al., 2008). Women with a history of childhood abuse/neglect had a higher waist circumference and BMI at baseline compared to women with no history of childhood abuse/neglect (Midei et al., 2010). Women with a history of childhood abuse/neglect also had higher levels of trait anger and lower levels of sex binding globulin hormone, both of which were factors associated with weight gain. In the current study, we evaluated the hypothesis that violence and traumatic stress in midlife would also be associated longitudinally with changes in weight and waist circumference.

METHODS

Data from the Study of Women's Health Across the Nation (SWAN) were used for this study. A detailed description of the study design has been published previously (Sowers M, 2000). Briefly, SWAN is a prospective, multi-center, multi-racial/ethnic study of the natural history of the menopause transition, conducted in seven study sites. SWAN includes women from five ethnic/racial groups, including one minority sample, in addition to Caucasians, at each site: African American (Boston, Chicago, Detroit, Pittsburgh), White (all sites), Chinese (Oakland), Hispanic (Newark), and Japanese (Los Angeles). Eligible study participants were enrolled in 1995–1997 and included women between the ages of 42 and 52 years, who had had a menstrual period in the past three months, were not using exogenous hormones, not pregnant, and not lactating. The SWAN data included measures obtained annually from identical protocols, data collection instruments, and specimen collections from all seven study sites that were supported by a written manual of operations, common training, and standardization of research staff. The SWAN protocol was approved by each site's institutional review board. Each participant provided written informed consent.

Study Sample

The present study sample included the 3302 participants from the SWAN cohort from baseline through annual follow-up visit 10. One partipant with extreme values on primary variables, weight and waist circumference, was excluded. The participants from the New Jersey site (n=431), who were all Hispanic, were excluded due to large standard errors, too much missing data and low retention rates. Therefore, the final study sample size was 2870 participants.

Primary Outcome Variables

Weight change was examined as: a) annual percent change in weight (i.e., (weight in year n − weight in year n−1)/(weight in year n−1), with n = 1 to 10, and year 0 was baseline)) and b) categorical percent weight change from baseline through follow-up visit 10 (or last year for which woman had weight data), categorized as decrease = weight loss ≥5%, no change (4.9% loss to 4.9% gain), and increase = weight gain ≥5%. *Waist circumference* was also examined as annual percent change in waist circumference (i.e., (waist circumference in year n − waist circumference in year n−1)/(waist circumference in year n−1), with n = 1 to 10, and year 0 was baseline)) and categorical percent waist circumference change between baseline and follow-up year 10 (or last year for which woman had waist circumference

data), categorized as decrease = waist loss ≥5%, no change (4.9% loss to 4.9% gain), and increase = waist gain ≥5%.

Primary Independent variables

Two measures of violence were available at baseline from SWAN interview questions and were combined to address violence and traumatic stress that may occur within the home and in the neighborhood: (1) "In the last 12 months have you experienced the following: slapped, kicked, or otherwise hurt by husband/partner or someone else important to you?" (*baseline physical violence*); and (2) "In the last 12 months have you experienced the following: major accident, assault, disaster, robbery or other violent event happened to yourself?" (*baseline violent event*). We created a new indicator variable, "*violence and traumatic stress*", which has value 1 if a participant reported yes for either *baseline physical violence* or *baseline violent event*, and 0 otherwise.

We also considered incidence of a violent event during follow-up. At each visit, participants were asked "In the last 12 months have you experienced the following: major accident, assault, disaster, robbery or other violent event happened to you?". Based on this variable, we created a variable "any incident violence and traumatic stress", which had value 1 if a woman reported yes to the question during any one of her visits and 0 otherwise.

Covariates

A priori covariates included age, race/ethnicity, marital status, educational attainment, and smoking, based on the literature (Bonomi et al., 2007; Ferris, 1978; Fisher, Zink, & Regan, 2011; Loxton, Schofield, Hussain, & Mishra, 2006; Mouton et al., 2004). Baseline age was calculated as the difference between the date of baseline visit and the date of birth. Follow-up time (in years) was obtained as the difference between a woman's age at a specific visit and her age at the baseline visit, and used in longitudinal analysis for repeated measures. Race/ethnicity included Caucasian, African American, Chinese, and Japanese. Education had the following categories: less than high school, high school, some college, college, and more than college. Marital status included single/never married, married, and separated/widowed/divorced. Smoking was whether a woman was a current smoker (yes or no). Having health insurance (yes or no), depressive symptoms (CES-D scale) (measured at baseline) (Radloff LS, 1977), perceived stress (PSS scale) (measured at baseline) (Cohen, Kamarck, & Mermelstein, 1983), physical activity, total caloric intake, parity, alcohol use, menopausal status, and chronic health conditions such as anemia, high blood cholestoerol, and stroke, were also examined. Study site and number of study visits were also included as covariates.

Data Analyses

We performed descriptive statistics (mean and standard deviation for continuous variables and frequency and proportions for categorical variables) for baseline characteristics stratified by baseline violence and traumatic stress. Two sample t-tests were used to compare the means of continuous variables between women who reported violence and traumatic stress at baseline and those who did not. Chi-square tests were used to examine the association between categorical variables and baseline violence and traumatic stress. We used multinomial logistic regression models to study the association between "any incident violence and traumatic stress" (defined under *Primary Independent variables*) and the categorical percent weight change and waist change, respectively. Multinomial logistic models generalize logistic regression by allowing response variables with more than two levels and comparing different levels of the response variables to the reference level. For both of the outcome variables (weight change and waist change), the reference level was no change, and we considered three models: 1) unadjusted models, and 2) a minimally adjusted

model which included baseline age, number of visits, and study site and 3) a fully adjusted model that included baseline age, race/ethnicity, education, marital status, smoking, number of visits, and study site. Odds ratios (ORs) and 95% confidence intervals (CIs) were obtained based on all three models.

We also examined annual percent change in weight and waist as continuous variables over time, using linear mixed effects regression models (PROC MIXED procedure in SAS) (SAS Institute Inc, 2009) to account for the correlation of within woman repeated observations. Repeated measurements of annual percent change in weight and waist from year 1 up to year 10 were modeled as a function of longitudinal violence and traumatic stress (i.e. incidence of a violent event during follow-up) and follow-up time (in years), with and without other covariates. To study the longitudinal effects of violence and traumatic stress on weight and waist change, we used the violence and traumatic stress variable measured in the previous year as the predictor for subsequent outcome variables. Thus, violence and traumatic stress was lagged one year before annual percent weight and waist change were measured. Repeated measurements over time for each woman were considered by using the autoregressive-1 (AR (1)) covariance structure. For adjusted analyses, we used the same analysis strategy as described above for the multinomial logistic regression models. All statistical analyses were carried out using SAS version 9.2 (SAS Institute Inc, 2009). All statistical tests were two-sided, and $p<0.05$ was considered statistically significant.

RESULTS

Descriptive Analysis

At baseline, approximately 8.9% of women reported baseline violence and traumatic stress. While over the ten-year follow-up, violence and traumatic stress ranged from 5.2% to 3.5%. The average age of participants, 46 years, did not significantly differ by reported violence and traumatic stress (Table 1). At baseline, 8.6% Caucasian, 10.8% African American, 9.2% Chinese and 5.0% Japanese women reported violence and traumatic stress (p=0.02). Women with high school, some college, and more than college had the highest reported prevalence of violence and traumatic stress (10.7%, 9.5%, and 9.4%, respectively). Women, who were single/never married (10.9%) or separated, widowed or divorced (15.9%) were significantly more likely to report violence and traumatic stress than women who were married ($p<0.0001$). Violence and traumatic stress was associated with a higher perceived stress score, depressive symptom score, and not having health insurance at baseline.

Association between Any Violence and Traumatic Stress and Weight Change

In unadjusted multinomial logistic regression analyses, reporting any violence and traumatic stress during follow-up was significantly associated with weight change (Table 2). Reporting any violence and traumatic stress was significantly positively associated with weight gain (OR = 2.39, 95% CI = 1.28, 4.47) and weight loss (OR=3.54, 95% CI=1.73, 7.22), adjusted for *a priori* covariates (age, race/ethnicity, education, marital status, and smoking) (pseudo $R^2=0.09$). The OR decreased slightly when only age was included in the logistic regression models for weight gain (OR=2.18, 95% CI=1.20, 3.97) and for weight loss (OR=3.39, 95% CI=1.70, 6.74), but both remained significantly associated with any violence and traumatic stress (pseudo $R^2=0.08$). Health insurance, depressive symptoms, perceived stress, physical activity, total caloric intake, parity, alcohol use, menopausal status, and chronic health conditions were not significantly associated with weight change.

Association between Any Violence and Traumatic Stress and Waist Change

Any violence and traumatic stress reported during follow-up was significantly associated in multinomial logistic regression models with gain (OR=2.44, 95% CI =1.37, 4.37) or with

loss (OR=2.66, 95% CI=1.23, 5.77) in waist circumference when adjusted for a priori variables (age, race/ethnicity, education, marital status, and smoking) (pseudo R^2=0.11) (Table 2). These results remained similar to the logistic regression model when only adjusted for age for the relation of any violence and traumatic stress with gain in waist circumference (OR=2.44, 95% CI=1.39, 4.27) or loss (OR=2.60, 95% CI=1.26, 5.38) in waist circumference (pseudo R^2=0.10).

Similar to our weight change analysis, health insurance, depressive symptoms, perceived stress, physical activity, total caloric intake, parity, alcohol use, menopausal status, and chronic health conditions were not significantly associated changes in waist circumference.

Association between Violence and Traumatic Stress and Annual Percent Change in Weight

The linear mixed effects models showed a significant positive association between violence and traumatic stress and annual percent change in weight (estimate=0.39, 95% CI= 0.09, 0.70) (Table 3). A mean 0.39% weight gain per year was associated with violence and traumatic stress when compared to women who did not report violence and traumatic stress. The results remained significant after further adjusting for age, race/ethnicity, education, marital status, and smoking (estimate=0.38, 95% CI=0.08, 0.69) or age alone (estimate=0.40, 95% CI= 0.10, 0.71).

Association between Longitudinal Violence and Traumatic stress and Annual Percent Change in Waist Circumference

Violence and traumatic stress was not significantly associated with annual percent changes in waist circumference (estimate=0.08, 95% CI= −0.22, 0.39) in our linear mixed effects model. Similarly, no significant association was observed between violence and traumatic stress and annual changes in waist circumference when adjusted for age alone (estimate=0.07, 95% CI= −0.24, 0.38), or when race/ethnicity, education, marital status, and smoking were added to the model (estimate=−0.08, 95% CI= −0.23, 0.38).

DISCUSSION

We tested the hypothesis that exposure to violence and traumatic stress (within the home or the neighborhood) would be associated with changes in weight and waist circumference. Results indicated a significant association between any violence and traumatic stress reported during follow-up in SWAN's midlife participants and increases or decreases in weight and waist circumference in both unadjusted and adjusted models (for age, race/ethnicity, marital status, smoking, study site and follow-up year). Our results are consistent with other research studies that have found a positive association between violence and weight (Sato-DiLorenzo & Sharps, 2007; Yount & Li, 2011). In the study by Sato-DiLorenzo & Sharps (2007), violence was associated with increased weight in a sample of women residing in a domestic violence shelter. However, major limitations to that study included use of self-reported measures for weight, and both the Sato-DiLorenzo & Sharps (2007) and Yount & Li (2011) studies used cross-sectional study designs that precluded determining whether the increased weight occurred before or after the violence. In our study, all SWAN sites adhered to a strict protocol for clinic measurements of weight and waist circumference. In addition, the longitudinal study design of SWAN allowed for clear determination of when violence and traumatic stress and changes in weight and waist circumference occurred, therefore reducing the likehood of temporal ambiguity between violence and traumatic stress (i.e. exposure) and changes in weight and waist circumference (i.e. outcomes).

The observed associations between violence and traumatic stress and changes in weight and waist circumference, however, may have resulted from confounding by unknown factors not measured. Because violence and traumatic stress was associated with increases or decreases in weight and waist circumference, it may be that different women respond to the stress of violence and traumatic stress differently and as a result have changes in diet (e.g. consume more or less food) and physical activity (e.g. increase or decrease activity), as well as changes in stress-related hormones (Bjorntorp, 2001; Bjorntorp & Rosmond, 2000; Cox et al., 2013). When we included calories and physical activity in our multinomial logistic regression and linear mixed effect models (results not shown), the relation of violence and traumatic stress to changes in weight and waist circumference did not change so that factors other than diet and physical activity, such as stress-related hormones, could account for the changes in weight and waist. The participants' menopausal status also changed over the study time period, but when we included menopausal status in our models, we found no statistical association between menopausal status and changes in weight and waist circumference, consistent with prior analyses of SWAN data that found no statistically significant association between menopausal status and changes in weight (Matthews et al., 2001). Similarly, health insurance did not significantly alter the association of violence and traumatic stress with changes in weight and waist circumference in our multinomial logistic regression and linear mixed effect models. Lastly, depression and stress, which may affect weight and waist circumference (Bjorntorp, 2001; Bjorntorp & Rosmond, 2000; Sutin & Zonderman, 2012), were also found not to alter significantly the association of violence and traumatic stress with changes in either weight or waist circumference in multinomial logistic regression and linear mixed effect models. Hence, a future direction of our research will be to follow the women to observe changes over time (i.e. increases in obesity), and accordingly observe changes in cardiovascular risk factors.

Our study of violence and traumatic stress and its relations to changes in weight and waist circumference had several limitations. First, no violence and traumatic stress measures were included that addressed violence and traumatic stress prior to the baseline visit, for example, lifetime adult violence or childhood violence (which had been asked only in a subset of women at one SWAN site). We were only able to measure current violence and traumatic stress in the year prior to the baseline visit and new incidences of violence and traumatic stress at each follow-up visit. This may have resulted in misclassification of women who at the baseline visit reported no violence and traumatic stress in the prior 12 months but who may have experienced violence and traumatic stress in the past, such as lifetime adult violence or childhood violence. If this type of misclassification occurred, it would have underestimated the association of violence and traumatic stress to changes in weight and waist circumference, resulting in more conservative estimates. Second, not all types of violence were measured, such as sexual and/or psychological violence, which limits our understanding of how these specific types of violence might affect changes in weight and waist circumference. Still, a major strength of our study in comparison to most other violence and traumatic stress studies is that SWAN was a prospective longitudinal study with over 10 years of annual follow-up data from both questionnaires and clinic measures. Third, we were not able to determine the number of times violence and traumatic stress may have occurred in a given year if a woman reported violence and traumatic stress. Women were asked at each visit to report whether violence and traumatic stress had occurred but were not asked to list the specific number of times violence and traumatic stress occurred during that year. Last, women were asked to self-report violence and traumatic stress and, despite assurances of confidentiality women, may have felt it was socially desirable not to report violence and traumatic stress, and thus underreporting of violence and traumatic stress may have occurred, resulting in an underestimation of the association between violence and traumatic stress and changes in weight and waist circumference.

Our study contributes to the understanding of interpersonal violence and traumatic stress and its relation to changes in weight and waist circumference in a national cohort of midlife women from multiple racial/ethnic groups, a population that is understudied in violence research. The implications from this research include the first supporting evidence that violence and traumatic stress negatively affects the health of midlife women, a cohort that tends to be the primary care providers for others. It is particularly important to prevent violence and traumatic stress and its effects on health because this group of women is often responsible for several generations, i.e. they are the 'sandwich' generation that may have older parents for whom they care and children for whom they provide. In addition, this generation of women may also provide care for even younger children, i.e., grandchildren. Because of the adverse relation of gains in weight and waist circumference to subsequent health outcomes, prevention is important. Second, while many health care providers are aware that violence and traumatic stress occurs in younger women and may query these women about violence and traumatic stress in their lives, providers' awareness that violence occurs in the lives of midlife and older women is limited. Based on our study results that a substantial proportion of midlife women experienced violence, health care providers could use their clinic visits to query these women regarding their exposure to violence and traumatic stress, provide them with health information about the negative effects that violence and traumatic stress may have on their health, and provide violence and traumatic stress preventive information. Interpersonal violence professionals and researchers can be at the forefront to encourage and promote the prevention of violence and traumatic stress for all members of our communities, the effects of violence and traumatic stress can be far-reaching and can affect the health of individuals throughout the lifespan.

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Table 1

Baseline SWAN Participant Characteristics by Violence and Traumatic Stress[a] Status (n=2870)

Characteristic	Violence n (%)	No Violence n (%)	p-value	Chi-square	Cramer's V
Age, years (mean, sd)	45.69 (2.64)	45.78 (2.68)	0.664		
CESD depressive symptoms (mean, sd)	13.66 (11.89)	9.597 (8.97)	<.0001		
Perceived Stress Score (mean, sd)	8.912 (3.05)	8.321 (2.84)	0.006		
Race/Ethnicity			0.023	9.500	0.058
Caucasian	120 (8.6)	1281 (91.4)			
African American	100 (10.8)	827 (89.2)			
Japanese	14 (5.0)	267 (95.0)			
Chinese	23 (9.2)	227 (90.8)			
Education (years)			0.126	7.200	0.050
Less than High School	9 (8.7)	94 (91.3)			
High School	51 (10.7)	426 (89.3)			
Some College	90 (9.5)	862 (90.5)			
College	39 (6.4)	572 (93.6)			
More than College	66 (9.4)	634 (90.6)			
Marital Status			<.0001	49.575	0.132
Single/never married	44 (10.9)	360 (89.1)			
Married	120 (6.5)	1735 (93.5)			
Separated/widowed/divorced	91 (15.9)	481 (84.1)			
Currently smoke			0.445	0.584	0.014
Yes	48 (9.9)	439 (90.1)			
No	206 (8.8)	2143 (91.2)			
Health Insurance			0.009	6.805	0.049
Yes	26 (14.4)	155 (85.6)			
No	231 (8.6)	2445 (91.4)			

[a] Violence and traumatic stress consists of baseline physical violence or baseline violent event.

Table 2

Association between Violence and Traumatic Stress and Overall Weight and Waist Change from Baseline to Visit 10

	Any Violence[a]		
Outcome	**Model 1 OR[b] (95% CI)[b]**	**Model 2 OR[b] (95% CI)[b]**	**Model 3 OR[b] (95% CI)[b]**
Weight Change			
Weight Gain ≥ 5%	1.91 (1.18, 3.09)	2.18 (1.20, 3.97)	2.39 (1.28, 4.47)
Weight Loss ≥ 5%	2.59 (1.45, 4.61)	3.39 (1.70, 6.74)	3.54 (1.73, 7.22)
Weight No Change <5%	referent	referent	referent
Waist Change			
Waist Gain ≥ 5%	2.03 (1.29, 3.19)	2.44 (1.39, 4.27)	2.44 (1.37, 4.37)
Waist Loss ≥ 5%	2.60 (1.46, 4.63)	2.60 (1.26, 5.38)	2.66 (1.23, 5.77)
Waist No Change < 5%	referent	referent	referent

[a] Any violence consists of baseline violence and traumatic stress and violent events ever at any visit.

[b] OR=odds ratio, 95% CI=confidence interval

Model 1: Unadjusted

Model 2: Adjusted for age, number of visits, study site.

Model 3: Adjusted for age, race/ethnicity, education, marital status, smoking, number of visits, study site.

Table 3

Longitudinal Analysis of Violence[a] on Annual Weight and Waist Change from Baseline to Visit 10

	Violence[a]		
Outcome	**Model 1 estimate[b] (95% CI)[b]**	**Model 2 estimate[b] (95% CI)[b]**	**Model 3 estimate[b] (95% CI)[b]**
Annual Weight change %	0.39 (0.09, 0.70)	0.40 (0.10, 0.71)	0.38 (0.08, 0.69)
Annual Waist change %	0.08 (−0.22, 0.39)	0.07 (−0.24, 0.38)	0.08 (−0.23, 0.38)

[a] Violence consists of baseline violence and traumatic stress and annual violent events

[b] 95% CI=confidence interval

Model 1: adjusted for years from baseline (time)

Model 2: adjusted for age, years from baseline (time), study site.

Model 3: Adjusted for age, race/ethnicity, education, marital status, smoking, years from baseline (time), study site.