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Association of Intimate Partner Violence (IPV) and Healthcare Provider-Identified Obesity

Rhian Davies, DO, MSc[1], **Erik Lehman**[2], **Amanda Perry**[3], and **Jennifer S. McCall-Hosenfeld, MD, MSc**[1,2]

[1]Division of General Internal Medicine, Department of Medicine, Pennsylvania State University College of Medicine and Milton S. Hershey Medical Center, Hershey, PA

[2]Division of Health Services Research, Department of Public Health Sciences, Pennsylvania State University College of Medicine and Milton S. Hershey Medical Center, Hershey, PA

[3]Division of Rural Sociology, Department of Agricultural Economics, Sociology, and Education, College of Agriculture, Pennsylvania State University, University Park, PA

Abstract

We examined the association of physical and non-physical IPV (intimate partner violence) with obesity. Women (n=1,179) were surveyed regarding demographics, obesity, and IPV exposure using HARK (humiliate-afraid-rape-kick), an IPV screening tool. A three-level lifetime IPV exposure variable measured physical, non-physical or no IPV. Healthcare provider-identified obesity was defined if participants were told by a medical provider within the past 5 years that they were obese. Bivariate analyses examined obesity by IPV and demographics. Multivariable logistic regression assessed odds of obesity by IPV type, adjusting for age, race/ethnicity, education and marital status. Among participants, 44% reported lifetime IPV (25% physical, 19% non-physical), and 24% reported healthcare provider-identified obesity. In unadjusted analyses, obesity was more prevalent among women exposed to physical IPV (30%) and non-physical IPV (27%), compared to women without IPV (20%, p=0.002). In multivariable models, women reporting physical IPV had 1.67 times greater odds of obesity (95% confidence interval [CI] 1.20, 2.33), and women reporting non-physical IPV had 1.46 times greater odds of obesity (95% CI 1.01, 2.10) compared to women reporting never exposure. This study extends prior data by showing not only an association between physical IPV and obesity, but also an association between obesity and non-physical IPV.

Keywords

domestic violence; spouse abuse; battered women; obesity; weight

Corresponding Author: Jennifer S. McCall-Hosenfeld, MD, MSc, Division of General Internal Medicine, Department of Medicine, Pennsylvania State University, College of Medicine and Milton S. Hershey Medical Center, Mailcode: A210, 500 University Drive, Hershey, PA 17033, jmccallhosenfeld@hmc.psu.edu, phone: 717-531-8161.

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BACKGROUND

The health of U.S. women is adversely affected by both intimate partner violence (IPV) and obesity. IPV is defined as emotional, physical, and/or sexual abuse which occurs between people in a close relationship and affects half of all women living in the U.S. (IOM 2010), with 36% of women reporting rape, physical violence or stalking and 48% reporting psychological aggression perpetrated by an intimate partner in their lifetimes (Black et al. 2010). IPV results in an estimated 4 million injuries among women yearly and is associated with numerous adverse physical and mental health consequences, such as post-traumatic stress disorder (PTSD), chronic pain, gastrointestinal disorders, depression, anxiety, and sleep disorders (Flegal et al. 2012). Women who experience both physical and non-physical IPV are at an increased risk for experiencing numerous health conditions and consequences (Black 2011; Bonomi et al. 2006). Non-physical forms of IPV include those in which the victim is controlled through humiliation, verbal abuse, threats of abuse to the victim or someone they love, and/or is made to feel afraid of her partner (Nelson, Bougatsos, Blazina 2012). Physical IPV includes rape, forced sexual activity, and other forms of physical violence including kicking, hitting, and slapping (Nelson, Bougatsos, Blazina 2012). Physical abuse occurs less frequently than non-physical IPV, and is often preceded by non-physical forms of IPV (Alpert 2010).

National data on obesity prevalence showed that one-third of U.S. adults were obese in 2009–2010, which translates to over 41 million women (Flegal et al. 2012). Illnesses with a higher prevalence among obese patients, include osteoarthritis, post-menopausal breast cancer, hypertension, coronary artery disease, and diabetes mellitus type 2 (IOM 2010) costing approximately 174 billion dollars each year (The Henry J. Kaiser Family Foundation 2002). Individuals with obesity and weight-related comorbidities identified by their healthcare provider tend to have more opportunities to participate in behavioral interventions (Waring et al. 2009; Sciamanna et al. 2000; Simkin et al. 2005). This allows the opportunity for discovery of other contributing factors to their obesity (Waring et al. 2009). Probing for conditions that may influence the patients' obesity status is an important aspect when a healthcare provider performs a history and physical, and this can be done with an open respectful dialogue (Kushner 2012).

Prior research has suggested a plausible mechanism linking stressors such as IPV with obesity. Stress may lead to the development of obesity through multiple mechanisms including increased hormone release, such as cortisol or glucocorticoids, which increases desire for food (Lightman 2008). Moreover, reaction to stress may include the adoption of adverse health habits such as decreased exercise and poorer diet, allowing reinforcement of obesity-promoting habits (Dallman 2010). Increases in obesity have been observed among people facing even mild stressors, this may be secondary to their desire to eat foods high in sugar and fat (Torres and Nowson 2007). Additionally, IPV is associated with fewer visits to a primary care doctor (Bonomi et al. 2006; IOM 2010), potentially leading to decreased opportunities to intervene and prevent obesity and its related health complications.

Given that both IPV and obesity are prevalent, that IPV is likely to cause stress, and that stress and obesity are strongly linked, an association between IPV exposure and obesity appears plausible. Prior literature has shown an association between increased severe chronic stress, including physical forms of IPV, and obesity (Stene et al. 2013; Yount and Li 2011). However, these studies did not investigate or did not demonstrate an association between non-physical forms of IPV and obesity (Breiding, Black and Ryan 2008); thus, a definitive link has not been demonstrated between non-physical forms of IPV and obesity. We reasoned that obesity identified by a healthcare provider is most likely to be clinically relevant. Thus, we examined healthcare provider-identified obesity among a sample of women seeking care, and hypothesized that obesity rates would differ by history of lifetime IPV exposure (physical, non-physical or never exposed).

METHODS

Sample

The study sample was identified in two different ways. First, all women ages 18–64 years with at least one visit in the past year at an outpatient family practice network, were eligible to participate. The family practice network recruitment site included 10 unique primary care family practice locations serving a geographically diverse area of south and central Pennsylvania. Of the eligible sample of 24,338 women, potential participants were stratified by rurality (to oversample rural-residing women). Rurality was assessed using the zip-code based Rural-Urban Commuting Area codes, a classification taxonomy based on the sizes of cities and towns and daily commuting practices (Hall, Kauffman, Ricketts 2006). A three-level classification was used, allowing comparison of small rural, large rural and urban areas. To maximize participation of the most rural residents and balance participation between rural and urban residents for the parent study, we sampled 100% of the small rural residents (N=228), 42% of the large rural residents (N=1136), and 5% of the urban population (N=1136).

After stratification, a random sample of 2500 women was sent an invitation letter inviting them to participate, an informed consent document to review, and a brief survey with questions about demographics, health status, and factors that affect health, including health behaviors, IPV and other stressors. Also included was information with websites and telephone numbers to consult for questions about health, stress, adverse health behaviors and mental health.

The invitation letter clearly stated that participation was voluntary and that their medical care would not be affected in any way should they choose not to participate in the study. An upfront incentive of $2 was included with the letter and up to two reminder letters were also sent to encourage response. In addition to the introductory letter and survey, an informed consent document was included in the mailed packet. Informational materials clearly requested that all potential participants review the consent document, but did not require that the informed consent document be signed and returned by potential participants because we wanted participants to have the option to return the surveys to us anonymously. However, instructions on the paper survey clearly requested that the participant review the consent information prior to completing the survey.

This survey could be completed online, by telephone, or by mail, at the preference of the participant. If the survey was completed by telephone, the interviewer verified that the participant had fully reviewed the consent information, and again reviewed the consent information with the participant over the phone to ascertain verbal consent. If the survey was completed by the participant directly online, the consent document was embedded in the online survey, and the participant was asked to indicate that she had reviewed the consent document prior to entry into the online survey. Surveys that were returned by mail also had the consent document enclosed with the survey material, with clear instructions that the consent document be reviewed by potential participants prior to completing and returning the survey.

The sample of 2500 was pre-specified to meet the enrollment goals of the parent study. Briefly, the parent study is an ongoing, longitudinal examination of women's strategic responses to recent and lifetime IPV, and the association of these responses with women's mental health. The current study analyzed data collected as part of the screening process for the parent study. The sample of 2500 women was based on the anticipated participation rates in a followup survey to be administered in the parent study among women who: 1) screened positive for IPV on the survey described in this study, 2) provided their contact information and gave the investigators permission to recontact them for participation in a followup longitudinal survey, and 3) agreed to participate in the followup survey. Surveys were received from 1191 women from the clinical sample (a 48% response rate).

To augment the sample, posters were placed within a network of 26 domestic violence shelters serving Central Pennsylvania, inviting women to participate in the survey online, by phone or by mail. These shelters serve a wide variety of women in a variety of venues including housing, walk-in services, and group and individual services. The posters would also be visible to visitors to the centers who were not seeking services, as well as employees of these centers. Thus the, actual number of eligible women who viewed these posters is unknown and could not be tracked by the centers. An additional 73 women were recruited to participate in response to these posters, yielding the final sample size of 1264 women who completed the survey.

A comparison of the women recruited from the clinical sample and from the shelter population revealed no differences in age or educational level, but the shelter sample was less likely to be white, non-Hispanic (81% vs. 92%, p=0.002), more likely to be divorced or separated (30% vs. 8%, p<.001), and more likely to have experienced physical forms of violence (73% vs. 23%, p<.001) compared to the clinical sample. Obesity data were available for 1,179 participants, which comprised the analytic sample for this manuscript.

Our institution's Institutional Review Board (IRB) reviewed and approved the study protocol and all study documents. As noted above, all women reviewed a written or verbal informed consent and consented to participate in this research. To protect participants further, and due to the sensitive nature of this study, a Certificate of Confidentiality (CC-MH-12-204) was obtained from the National Institutes of Health for this research.

Data Collection

Study data were entered and managed within REDCap (Research Electronic Data Capture), hosted by our institution. REDCap is a secure, web-based application designed to support data capture for research studies (Harris et al. 2009). Surveys were completed either directly online by the respondent or, if preferred, she could complete the survey by mail, and the data were entered by study personnel with a second study personnel performing audit verification of all data entry. Finally, if the participant requested, the survey could be completed over the phone with trained personnel reading the questions to the participant and recording her responses in the electronic data capture form.

Independent Variable

IPV exposure was determined using the humiliation-afraid-rape-kick (HARK) screening instrument, a validated 4-item screen to identify IPV in healthcare settings (Sohal, Eldridge and Feder 2007). This question was adapted to examine exposure to IPV over the respondent's adult lifetime. A three-level IPV exposure variable was created based on a lifetime IPV exposure: physical IPV (rape-kick), non-physical IPV (humiliation-afraid) or never any IPV. Created response categories were mutually exclusive, such that if a participant reported both physical and non-physical IPV (which almost always coexist), that participant was placed into the "physical IPV" category. If a participant reported non-physical IPV only, but no physical IPV, she was placed in the "non-physical IPV" category. All other respondents were considered "never IPV."

Dependent Variable

All respondents were asked to identify whether a doctor or health professional had told them they were obese within the last 5 years. This question was taken from the Kaiser Family Foundation Women's Health Survey (KFFWHS) (The Henry J. Kaiser Family Foundation 2002) and stated, "In the past 5 years has a doctor or other health professional told you that you have any of the following health problems or conditions?" Answer choices were yes/no and included the line item "Obesity?" Although self-reported or measured height and weight was not asked in this survey, we felt that healthcare-provider identified obesity represented a clinically important construct for several reasons. First, physicians are more likely to provide counseling and discuss weight management with obese or overweight patients who have associated medical co-morbidities, thus more severe and clinically relevant disease (Waring et al. 2009; Tang et al. 2012; Eaton, Goodwin, and Stange 2002). Moreover, physicians are likely to promote healthy lifestyles and promote weight loss in patients who have co-morbidities associated with obesity (Waring et al. 2009 and Tang et al. 2012). Therefore, receiving a physician diagnosis of obesity likely indicated obesity that was clinically relevant and associated with other comorbidities (Waring et al. 2009; Ferguson et al. 2010). We did not perform chart abstraction as we allowed surveys to be submitted anonymously at the participant's discretion, preventing possible links to chart abstraction for all participants.

Control Variables

Control variables, including age, education, relationship status, and race/ethnicity were selected based on strong literature linking these demographic factors to obesity (Mokdad et al. 1999; Sobal, Hanson and Frongillo 2009). Phrasing of all demographic questions were based on questions asked in population-based health surveys, including the KFFWHS, the Commonwealth Fund 1998 Survey of Women's Health (CWF 1998), and the Central Pennsylvania Women's Health Study (CePAWHS) (The Henry J. Kaiser Foundation 2002; Weisman et al. 2006). Educational attainment was determined based on the answer to the question, "What was the last grade or class completed in school?" and compiled into a 3-level variable (high school graduate or less, some college, college graduate or greater). We created a 4-level variable for current relationship status (married, partnered, divorced/separated, or widowed/single). Respondents were asked to describe their race/ethnicity by checking all which applied; options included white, African American/Black, Asian, Native American/American Indian, Native Hawaiian/Pacific Islander/Alaskan Native, or other (The Henry J. Kaiser Family Foundation 2002). Due to our sample being largely white, non-Hispanic, race/ethnicity was dichotomized into non-Hispanic white and other. Age was determined by asking the women "What is your age?", identical to the phrasing in the CePAWHS survey (Weisman et al. 2006, 216–224).

Statistical Analysis

All variables were summarized with frequencies and percentages or means, medians, and standard deviations. Bivariate analyses using logistic regression examined the association between obesity and IPV type as well as the association between obesity and other demographic variables to be used as covariates for adjustment in a multivariable model. Odds ratios were used to quantify the magnitude and direction of any significant associations.

Multivariable logistic regression assessed the odds of obesity by IPV exposure, adjusting for age, race/ethnicity, education and relationship status. Our goal was not development of a parsimonious model. Rather, we retained all variables as covariates previously selected based on their association with obesity. We tested for multicollinearity using variance inflation factor (VIF) statistics from linear regression. In our study, all of the VIF statistics were less than 3; thus, no significant multicollinearity was found. To assess model fit, we used the Hosmer-Lemeshow Goodness of Fit test. In our final model, the p-value for the Hosmer-Lemeshow test was >0.05, indicating adequate fit. All analyses were performed using SAS version 9.3.

RESULTS

The mean age of respondents was 44 (SD ± 13) years, 91% of whom were non-Hispanic white; 62% were married, and 45% were college graduates. The lifetime rate of reported IPV exposure was 44% (25% physical, 19% non-physical). Twenty-four percent of the sample reported that a healthcare provider had told them they were obese within the last 5 years.

Obesity rates were higher among women exposed to physical IPV (30%), and non-physical IPV (27%) compared to women who reported no lifetime IPV exposure (20%, p=0.0021) (Table 1). Obesity was more frequent with increasing age and lower educational attainment.

No significant association was observed between obesity and race/ethnicity or relationship status.

In multivariable analyses, IPV exposure retained an independent association with obesity (p=0.0057) (Table 2). Women reporting physical IPV had 1.67 times greater odds of obesity (95% confidence interval [CI] 1.20, 2.33), and women reporting non-physical IPV had 1.46 times greater odds of obesity (95% CI 1.01, 2.10), compared to women reporting no exposure to IPV. Obesity was also associated with increasing age (adjusted odds ratio [aOR]=1.02 per one-year increase, 95% CI: 1.01,1.03) and retained an independent association with lower educational attainment with 1.42 times greater odds of obesity (95% CI: 0.99,2.04) (an association that approached significance) when comparing high school graduate or less to college graduate and 1.63 times greater odds of obesity (95% CI: 1.18, 2.25) when comparing some college education to college graduates.

DISCUSSION

Our study reinforced prior evidence that women exposed to lifetime IPV had a greater likelihood of reporting obesity (Stene et al. 2013). Our findings extend this work by specifying healthcare provider-identified obesity, suggesting clinical relevance. Moreover, we broaden prior evidence to demonstrate an association between obesity and non-physical, in addition to physical forms, of IPV.

A possible mechanism for the association between IPV and obesity is the stress associated with IPV exposure in conjunction with underlying genetic and environmental predisposition. In response to an acute stressor, the hypothalamus-pituitary-adrenal axis releases stress hormones, such as cortisol. However, if chronic stress occurs, the stressed individual adapts such that cortisol levels remain elevated permanently (Lightman 2008). This heightened cortisol response may lead to an associated increase in obesity and other health-related problems, including cardiovascular risk factors, among those exposed to IPV (Foss and Dyrstad 2011).

In addition to increased likelihood of experiencing the hormonal stress response, IPV victims are less likely to pursue healthy diets and have good exercise habits (Foss and Dyrstad 2011; Mathew et al. 2012), contributing to increased odds of obesity. We suggest that these pathways are active both among women exposed to physical forms of IPV – as previously reported (Bonomi et al. 2006; Breiding, Black and Ryan, 2008) – and also active and affecting the health of women exposed to non-physical forms of IPV, as shown in our study.

We found a lifetime prevalence of IPV in our sample of 44%, which is similar to the prevalence reported in population-based studies (Black et al. 2010). The overall prevalence of IPV in our sample, as well as the frequency of physical IPV was slightly lower than was previously reported in a clinical sample by Coker et al. (2000). In that study, a total of 55.1% reported IPV, of whom 77.3% experienced physical IPV and 22.7% experienced non-physical IPV (Coker et al. 2000). This is likely due to the fact that Coker et al. used numerous assessment instruments to identify IPV exposure and type, whereas we used a single instrument, often used in clinical practice (Coker et al. 2000; Gerber et al. 2005; IOM. 2010; Nelson, Bougatsos, Blazina 2012; McCall-Hosenfeld, Chuang and Weisman 2013). Like the Coker study, we found a higher prevalence of physical IPV compared to non-physical IPV. This is likely because our sample was help-seeking (either engaged in primary care or recruited from domestic violence shelters). Thus, these individuals may be seeking care for the medical or psychosocial consequences of more severe forms of violence. In contrast to a help-seeking sample, a population-based sample, such as that represented by the CDC (Black et al. 2010), is likely to show a greater prevalence of nonphysical than physical IPV.

Our study findings also confirmed prior reports of greater obesity found among individuals with a lower educational level (Yu 2012), and among individuals with increasing age (Wang, Colditz and Kuntz 2007). Of note, we did not find a significant association between marital status and obesity in our study. This differs from a prior report which found increased obesity rates among married/cohabitating individuals compared to those who were single, divorced, or never married when controlled for age (Sobal, Rauschenbach and Frongillo 2003). The difference between our study and the prior report may be explained by the combined variable selection, as our study separated married individuals as the comparison group, whereas the Sobal study grouped both married and cohabitating women.

Of note, a comparison of the demographics of the women participating in this study to those available for rural Pennsylvania (The Center for Rural Pennsylvania, 2015) suggest that the women in our sample were slightly more likely to be married (61% compared to 54%), were slightly more likely to be of a race/ethnicity other than white, non-Hispanic (9% compared to 5%), and were more likely to have a bachelor’s degree or higher (45%compared to 18%).

STRENGTHS

This study had several strengths to consider, including a large sample size, allowing identification of large population exposed to both physical IPV and also non-physical IPV and providing good statistical power to detect associations with meaningful magnitude as statistically significant. Examination of non-physical IPV was also an important strength because it is a more frequent form of abuse and often is associated with other forms of abuse (Fisher, Zink and Regan 2011, 254–268). To our knowledge, this is the first study to identify the association between obesity and non-physical IPV.

LIMITATIONS

A possible limitation of our study was that the information was self-reported by participants and may have been affected by inaccurate recall. Nevertheless, self-report has been widely used, and the questions used in our survey were adapted from previous surveys of this type; thus, our use of these survey questions was concordant with research standards. Additionally, the overall prevalence of physician-identified obesity in our sample, at 25%, was slightly lower than obesity rates reported in population-based national samples, in which the prevalence of obesity among women was 35.8% (Torres and Nowson 2007). This is likely due to the fact that our obesity indicator specified identification by a healthcare provider. Physician counseling regarding obesity is inadequate (Kraschnewski et al. 2013); therefore, the slightly lower obesity prevalence in our sample likely reflects inadequate physician identification, or physician reluctance to use the potentially stigmatizing term “obesity,” rather than lower than average rates of obesity in this sample. However, as the cases of obesity in our sample were identified by a health care provider, these were likely to be clinically relevant cases of obesity (Dallman 2010; Kushner 2012).

Further limitations of our study included that the data were cross-sectional; thus, temporal relations and causality cannot be assessed. Further, the population assessed in this survey was largely white, non-Hispanic, reflective of the population of central Pennsylvania (U.S. Census Bureau Population Estimates Division 2010, Center for Rural Pennsylvania 2015). However, our findings may not be representative of more racially/ethnically diverse communities. In addition, the sample was care-seeking (either through healthcare or domestic violence shelters), and may not be representative of a population-based sample.

Moreover, our study did not capture other forms of abuse, such as Adverse Childhood Experiences – a composite measure of childhood abuse and household dysfunction (Felliti et al. 1998), which are associated with subsequent abuse and may directly predict adverse health consequences in adults, including obesity. Another potential limitation was the response rate of 48% from the mailed surveys. This modest rate compares reasonably well with other mailed and web-based surveys (Shih and Fan 2008), but nevertheless could have resulted in participation bias that could affect the accuracy and generalizability of the results.

Finally, as recommended in prior research (Zhang and Wang 2004), we used educational status as the most robust and stable marker for socioeconomic status (SES). Educational status is thought to be a better marker of SES than income, because a person’s income may be affected by body weight, and is a more stable indicator of SES over time compared to income or occupation (Zhang and Wang 2004). However, it is possible that had we chosen a different indicator of SES, our results might have been affected.

CONCLUSION

In light of the recent recommendations by the U.S. Preventive Services Task Force (USPSTF), clinicians should screen all women aged 18–44 years for IPV, allowing for earlier opportunities for intervention (Moyer 2013). Although IPV identification is important in all patient populations (Sweeney et al. 2013), it may be especially important among adult women determined by healthcare providers to be obese. We found that obesity was associated with both non-physical IPV and physical IPV. Although our study was not designed to establish a causal link between IPV and obesity or to establish firmly risk factors for obesity, its results remain clinically relevant.

Healthcare providers may leverage knowledge of risk factors, such as obesity, to improve screening rates for IPV among all women and help identify IPV-exposed women, including those women exposed to non-physical forms of IPV. The results of our study support screening for both primary and secondary prevention of IPV to reduce the adverse health consequences, such as obesity.

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References

Alpert, Elaine J. [Accessed in July 2013] Intimate Partner Violence. The Clinician's Guide to Identification, Assessment, Intervention, and Prevention. Campaign against Violence. Massachusetts Medical Society Committee on Violence Intervention and Prevention. 52010. at http://www.massmed.org/partnerviolence/

Bonomi, Amy E., Thompson, Robert S., Anderson, Melissa, Reid, Robert J., Carrell, David, Dimer, Jane A., Rivara, Frederick P. Intimate partner violence and women's physical, mental, and social functioning. American journal of preventive medicine. 2006; 30(6):458–466. [PubMed: 16704938]

Breiding, Matthew J., Black, Michele C., Ryan, George W. Chronic disease and health risk behaviors associated with intimate partner violence—18 US states/territories, 2005. Annals of epidemiology. 2008; 18(7):538–544. [PubMed: 18495490]

Black, Michele C., Basile, Kathleen C., Breiding, Matthew J., Smith, Sharon G., Walters, Mikel L., Merrick, Melissa T., Chen, Jieru, Stevens, Mark R. National intimate partner and sexual violence survey (NISVS) 2010 Summary Report. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2011. at http://www.cdc.gov/violenceprevention/pdf/nisvs_executive_summary-a.pdf [Accessed in May 2013]

Black, Michele C. Intimate partner violence and adverse health consequences: implications for clinicians. American journal of lifestyle medicine. 2011; 5:428–439.

The Center for Rural Pennsylvania. [accessed 1/22/2105] About Rural PA. available at: http://www.rural.palegislature.us/about.html

Coker, Ann L., Smith, Paige Hall, McKeown, Robert E., King, Melissa J. Frequency and Correlates of Intimate Partner Violence by Type: Physical, Sexual, and Psychological Battering. American journal of public health. 2000; 90(4):553. [PubMed: 10754969]

Collins, Karen S., Schoen, Cathy, Joseph, Susan, Duchon, Lisa, Simantov, Elisabeth, Yellowitz, Michele. Health Concerns Across A Woman's Lifespan: The Commonwealth Fund 1998 Survey of Women's Health. New York: The Commonwealth Fund; 1999. at http://www.commonwealthfund.org/~/media/Files/Publications/Fund%20Report/1999/May/Health%20Concerns%20Across%20a%20Womans%20Lifespan%20%20The%20Commonwealth%20Fund%201998%20Survey%20of%20Womens%20Health/Healthconcerns__surveyreport%20pdf.pdf [Accessed in January 2013]

Dallman, Mary F. Stress-Induced Obesity and the Emotional Nervous System. Trends in endocrinology and metabolism. Mar; 2010 21(3):159–165. [Accessed in July 2013] at http://ac.els-cdn.com/S1043276009001763/1-s2.0-S1043276009001763-main.pdf?_tid=5674561c-2d2d-11e4-a6d0-00000aab0f6c&acdnat=1409063527_6670133d1f24a2c5db9538aa4e3b745d. [PubMed: 19926299]

Eaton, Charles B., Goodwin, Meredith A., Stange, Kurt C. Direct observation of nutrition counseling in community family practice. American journal of preventive medicine. 2002; 23(3):174–179. doi: http://dx.doi.org/10.1016/S0749-3797(02)00494-4. [PubMed: 12350449]

Edelman, Linda S., Yang, Rumei, Guymon, Maughan, Olson, Lenora M. Survey methods and response rates among rural community dwelling older adults. Nursing research. Jul-Aug;2013 62(4):286–291. [PubMed: 23817286]

Ferguson, Christine, Langwith, Casey, Muldoon, Anna, Leonard, Jennifer. Improving Obesity Management in Adult Primary Care. George Washington University; Mar 16. 2010 http://www.stopobesityalliance.org/wp-content/assets/2010/03/STOP-Obesity-Alliance-Primary-Care-Paper-FINAL.pdf [Accessed September 2014]

Fisher, Bonnie S., Zink, Therese, Regan, Saundra L. Abuses against older women: Prevalence and health effects. Journal of interpersonal violence. Jan.2010 :254–268. [PubMed: 20457844]

Felitti, Vincent J., Anda, Robert F., Nordenberg, Dale, Williamnson, David F., Spitz, Allison M., Edwards, Valarie, Koss, Mary P., Marks, James S. Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults – The Adverse Childhood Experiences (ACE) Study. American Journal of Preventive Medicine. 1998; 14(4):245–258. [PubMed: 9635069]

Flegal, Katherine M., Carroll, Margaret D., Kit, Brian K., Ogden, Cynthia L. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999–2010. The Journal of the American Medical Association (JAMA). Feb; 2012 307(5):491–497.

Foss, Brynjar, Dyrstad, Sindre M. Stress in obesity: cause or consequence? Medical hypotheses. Jul; 2011 77(1):7–10. [PubMed: 21444159]

IOM (Institute of Medicine). Committee on Women's Health Research. Washington, DC: The National Academies Press; 2010. Women's Health Research: Progress, Pitfalls, and Promise. at http://www.nap.edu/openbook.php?record_id=12908 [Accessed in June 2013]

Gerber, Megan R., Ganz, Michael L., Lichter, Erika, Williams, Corrine M., McCloskey, Laura A. Adverse health behaviors and the detection of partner violence by clinicians. Archives of internal medicine. May; 2005 165(9):1016–1021. [PubMed: 15883240]

Hall, Susan A., Kaufman, Jay S., Ricketts, Thomas C. Defining urban and rural areas in US epidemiologic studies. Journal of Urban Health. Mar; 2006 83(2):162–175. [PubMed: 16736366]

Harris, Paul A., Taylor, Robert, Thielke, Robert, Payne, Jonathon, Gonzalez, Nathaniel, Conde, Jose G. Research electronic data capture (REDCap) - a metadata-driven methodology and workflow process for providing translational research informatics support. Journal of biomedical informatics. 2009; 42(2):377–381. [PubMed: 18929686]

Kraschnewski, Jennifer L., Sciamanna, Christopher N., Stuckey, Heather L., Chuang, Cynthia H., Lehman, Erik B., Hwang, Kevin O., Sherwood, Lisa L., Nembhard, Harriet B. A silent response to the obesity epidemic: decline in US physician weight counseling. Medical care. 2013; 51(2):186–192. [PubMed: 23047128]

Kushner, Robert F. Clinical Assessment and Management of Adult Obesity. Circulation, Journal of the American Heart Association. 2012; 126 [Accessed September 18 2014] at http://circ.ahajournals.org/content/126/24/2870.extract.

Lightman, Stafford L. The neuroendocrinology of stress: a never ending story. Journal of neuroendocrinology. Jun; 2008 20(6):880–884. [Accessed in September 2013] at http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2826.2008.01711.x/abstract. DOI: 10.1111/j.1365-2826.2008.01711.x [PubMed: 18601712]

Mathew, Anitha Elizabeth, Marsh, Brittany, Smith, L Shakiyla, Houry, Debra. Association between intimate partner violence and health behaviors of female emergency department patients. Western Journal of Emergency Medicine. Aug; 2012 13(3):278–282. [PubMed: 22900126]

McCall-Hosenfeld, Jennifer S., Chuang, Cynthia H., Weisman, Carol S. Prospective Association of Intimate Partner Violence with Receipt of Clinical Preventive Services in Women of Reproductive Age. Women's Health Issues: official publication of the Jacobs Institute of Women's Health. Mar-Apr;2013 23(2):e109–e116.

Mokdad, Ali H., Serdula, Mary K., Dietz, William H., Bowman, Barbara A., Marks, James S., Koplan, Jeffrey P. The spread of the obesity epidemic in the United States, 1991–1998. JAMA: The Journal of the American Medical Association. Oct; 1999 282(16):1519–1522. [PubMed: 10546690]

Moyer, Virginia A. Screening for intimate partner violence and abuse of elderly and vulnerable adults: US Preventive Services Task Force recommendation statement. Annals of internal medicine. 2013; 158(6):478–486. [Accessed in August 2014] at http://annals.org/article.aspx?articleid=717260. [PubMed: 23338828]

Nelson, Heidi D., Bougatsos, Christina, Blazina, Ian. Evidence Synthesis No. 92. Rockville, MD: Agency for Healthcare Research and Quality; May. 2012 Screening Women for Intimate Partner Violence and Elderly and Vulnerable Adults for Abuse: Systematic Review to Update the 2004 U.S. Preventive Services Task Force Recommendation. AHRQ Publication No. 12-05167-EF-1. at http://www.ncbi.nlm.nih.gov/books/NBK97297/pdf/TOC.pdf [Accessed in June 2013]

Sciamanna, Christopher N., Tate, Deborah F., Lang, Wei, Wing, Rena R. Who reports receiving advice to lose weight? results from a multistate survey. Archives of Internal Medicine. 2000; 160(50): 2334–2339. [PubMed: 10927731]

Shih, Tse-Hau, Fan, Xitao. Comparing Response Rates from Web and Mail Surveys: A Meta-Analysis. Field Methods. Aug; 2008 20(3):249–271. DOI: 10.1177/1525822X08317085

Simkin-Silverman, Laurey R., Gleason, Katherine A., King, Wendy C., Weissfeld, Lisa A., Buhari, Alhaji, Boraz, Miriam A., Wing, Rena R. Predictors of weight control advice in primary care practices: Patient health and psychosocial characteristics. Preventive Medicine. 2005; 40(1):71–82. [PubMed: 15530583]

Sobal, Jeffery, Hanson, Karla L., Frongillo, Edward A. Gender, ethnicity, marital status, and body weight in the United States. Obesity. 2009; 17(12):2223–2231. [PubMed: 19300431]

Sobal, Jeffery, Rauschenbach, Barbara, Frongillo, Edward A. Marital status changes and body weight changes: a US longitudinal analysis. Social Science & Medicine. Apr; 2003 56(7):1543–1555. [PubMed: 12614704]

Sohal, Hardip, Eldridge, Sandra, Feder, Gene. The Sensitivity and Specificity of Four Questions (HARK) to Identify Intimate Partner Violence: A Diagnostic Accuracy Study in General Practice. BMC Family Practice. 2007; 8(1):49. [PubMed: 17727730]

Stene, Lise Eilin, Jacobsen, Geir Wenberg, Dyb, Grete, Tverdal, Aage, Schei, Berit. Intimate partner violence and cardiovascular risk in women: a population-based cohort study. Journal of Women's Health. 2013; 22(3):250–258.

Sweeney, Alison C., Weitlauf, Julie C., Manning, Elizabeth A., Sze, Jocelyn A., Waldrop, Angela E., Hasser, Caitlin. Intimate partner violence: perspectives on universal screening for women in VHA primary care. Women's Health Issues: official publication of the Jacobs Institute of Women's Health. Mar-Apr;2013 23(2):e73–e76.

Tang, Joyce W., Kushner, Robert F., Cameron, Kenzie A., Hicks, Brent, Cooper, Andrew J., Baker, David W. Electronic Tools to Assist with Identification and Counseling for Overweight Patients: a Randomized Controlled Trial. Journal of general internal medicine. 2012; 27(8):933–939. DOI: 10.1007/s11606-012-2022-8 [PubMed: 22402982]

The Commonwealth Fund. Study No. 628127. New York: 1998. Women's Health II Survey. at http://www.commonwealthfund.org/~/media/files/surveys/1998/1998-womens-and-mens-health-survey/mens_womens_1998_questionnaire-pdf.pdf [Accessed January 2013]

Torres, Susan J., Nowson, Caryl A. Relationship between stress, eating behavior, and obesity. Nutrition. Nov-Dec;2007 23(11):887–894. [PubMed: 17869482]

U.S. Census Bureau Population Estimates Division, 2012 Detailed State and County Population Estimates. Research Brief. In: Pennsylvania State Data Center. , editor. The Commonwealth’s Official Source for Population and Economic Statistics. Harrisburg: Penn State; 2010.

Wang, Y Claire, Colditz, Graham A., Kuntz, Karen M. Forecasting the obesity epidemic in the aging US population. Obesity. Nov; 2007 15(11):2855–2865. [PubMed: 18070778]

Waring, Molly E., Roberts, Mary B., Parker, Donna R., Eaton, Charles B. Documentation and management of overweight and obesity in primary care. The Journal of the American Board of Family Medicine. 2009; 22(5):544–552. [PubMed: 19734401]

Weisman, Carol S., Hillemeier, Marianne M., Chase, Gary A., Dyer, Anne-Marie, Baker, Sara A., Feinberg, Mark, Downs, Danielle Symons, et al. Preconceptional health: Risks of adverse pregnancy outcomes by reproductive life stage in the Central Pennsylvania Women’s Health Study (CePAWHS). Women's Health Issues : official publication of the Jacobs Institute of Women's Healt. Jul-Aug;2006 16(4):216–224.

Women’s Health in the United States: Health Coverage and Access to Care. The Henry J. Kaiser Family Foundation; CA: May. 2002 at http://www.kff.org/womenshealth/womens_survey_questionnaire_with_covers.pdf [accessed April 2013]

Yount, Kathryn M., Li, Li. Domestic violence and obesity in Egyptian women. Journal of Biosocial Science. Jan; 2011 43(01):85–99. [PubMed: 20809993]

Yu, Yan. Educational differences in obesity in the United States: a closer look at the trends. Obesity. Apr; 2012 20(4):904–908. [PubMed: 21996666]

Zhang, Qi, Wang, Youfa. Trends in the Association between Obesity and Socioeconomic Status in U.S. Adults: 1971 to 2000. Obesity A Research Journal. Oct; 2004 12(10):1622–1632.

Table 1

Bivariate analyses of IPV status and demographics by obesity

Characteristics	Total (N=1179)	Obese (N=286)	Non-Obese (N=893)	*p**
IPV type				0.0021
No IPV exposure	656	134 (20%)	522 (80%)	
Non-physical IPV	223	61 (27%)	162 (73%)	
Physical IPV	300	91 (30%)	209 (70%)	
Age, years (mean +/− std dev.)	43.5 ± 12.8	46.4 ±11.4	42.6 ±13.1	<0.0001
Relationship Status				0.1630
Married	721	178 (25%)	543 (75%)	
Partnered	194	36 (19%)	158 (81%)	
Divorced/Separated	109	32 (29%)	77 (71%)	
Widowed/Single	141	36 (26%)	105 (74%)	
Education				0.0010
High school graduate or less	271	77 (28%)	194 (72%)	
Some college	366	105 (29%)	261 (71%)	
College graduate or more	528	101 (19%)	427 (81%)	
Race/Ethnicity				0.7310
White, non-Hispanic	1053	259 (25%)	794 (75%)	
Other	104	24 (23%)	80 (77%)	

*P-values from logistic regression

Table 2

Multivariable analysis assessing the relation of lifetime IPV exposure to odds of obesity, adjusting for age, relational status, and educational status

	Adjusted Odds Ratio*	95% Confidence Interval	
IPV Exposure			
Non-physical IPV vs. No IPV exposure	1.46	1.01	2.10
Physical IPV vs. No IPV exposure	1.67	1.20	2.33
Age (per one-year increase)	1.02	1.01	1.03
Relationship Status			
Partnered vs. Married	0.77	0.50	1.18
Divorced/separated vs. Married	1.01	0.63	1.60
Widowed/single vs. Married	1.14	0.73	1.78
Educational Status			
High school graduate or less vs. College graduate	1.42	0.99	2.04
Some college vs. College graduate	1.63	1.18	2.25
Race/Ethnicity			
White, non-Hispanic vs. Other	1.05	0.64	1.71

*Odds ratios from multivariable logistic regression