



Original article

Intimate Partner Violence Victimization Among Women Veterans and Associated Heart Health Risks

Melissa E. Dichter, MSW, PhD^{a,*}, Catherine Cerulli, JD, PhD^b, Robert M. Bossarte, PhD^c

^a Center for Health Equity Research and Promotion, Philadelphia VA Medical Center, Philadelphia, Pennsylvania

^b University of Rochester Medical Center, Rochester, New York

^c VISN 2 Center of Excellence, Canandaigua VA Medical Center, Canandaigua, New York

Article history: Received 16 November 2010; Received in revised form 15 April 2011; Accepted 18 April 2011

A B S T R A C T

Purpose: Cardiovascular disease (CVD) is the leading cause of death for women in the United States. CVD risk factors, including depression, smoking, heavy drinking, being overweight, and physical inactivity, are associated with stress and may be linked to women's experiences of intimate partner violence (IPV) victimization. We know little about IPV and CVD risk factors among veteran women. The purpose of this study was to identify the association between lifetime IPV victimization and CVD risk factors among women, accounting for veteran status.

Methods: We used data from the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System for 2006 for the eight states that included the IPV module. We explored the associations between veteran status and lifetime IPV victimization and between IPV exposure and CVD risk factors, for veteran and non-veteran women.

Findings: Veteran women were more likely than non-veteran women to report lifetime IPV victimization (33.0% vs. 23.8%). IPV exposure was associated with depression, smoking, and heavy drinking. We did not find evidence for an association between IPV exposure and lack of exercise or being overweight or obese, when controlling for demographic characteristics and veteran status.

Conclusion: Women veterans have particularly high rates of lifetime IPV victimization. In addition, IPV victimization is associated with an increased risk of heart health risk factors. The findings suggest that we should attend to IPV exposure among veteran women and further investigate the link between IPV and military service, and the associated health impacts.

Published by Elsevier Inc.

Introduction

Cardiovascular disease (CVD) is a major health problem for women. CVD is the leading cause of death for women and is experienced by more than 35% of women aged 20 or older in the United States (Heron et al., 2009; Lloyd-Jones et al., 2010). Women are at increased risk of CVD if they have a family history of CVD or are of African or Asian descent; CVD risk also increases with age (Lloyd-Jones et al., 2010). Other CVD risk factors—including smoking, heavy drinking, obesity, lack of exercise or sedentary lifestyle, and depression—can result from emotional

and behavioral responses to stress (Ferketich, Schwartzbaum, Frid, & Moeschberger, 2000; Frasure-Smith & Lesperance, 2005; Lett et al., 2004; Lloyd-Jones et al., 2010; Mora, Cook, Buring, Ridker, & Lee, 2007; Poirier et al., 2006; Stampfer, Hu, Manson, Rimm, & Willett, 2000).

Intimate partner violence (IPV) is also a major public health problem for women (Saltzman, Green, Marks, & Thacker, 2000), with more than one in four women experiencing IPV victimization in their lifetimes (Tjaden & Thoennes, 2000). The World Health Organization has also called for greater attention to IPV. Women who experience IPV victimization suffer from stress, which can lead to emotional and behavioral heart disease risk factors, including depression (Bonomi et al., 2009; Coker et al., 2002), smoking (Black & Breiding, 2008; Bonomi et al., 2006; Bonomi et al., 2009; Jun, Rich-Edwards, Boynton-Jarrett, & Wright, 2008; McNutt, Carlson, Persaud, & Postmus, 2002), and heavy drinking or binge drinking (Black & Breiding, 2008; Bonomi et al., 2006; McNutt et al., 2002). The stress does not

* Correspondence to: Melissa E. Dichter, MSW, PhD, Center for Health Equity Research and Promotion, Philadelphia VA Medical Center, 3900 Woodland Avenue, Building 4100, Philadelphia PA 19104. Phone: 215-823-5800, ext. 3871; fax: 215-823-6330.

E-mail addresses: mdichter@sp2.upenn.edu, melissa.dichter@va.gov (M.E. Dichter).

cease once the violence has stopped. These effects can linger, and some suggest IPV be treated as a chronic health condition (Nicolaidis & Touhouliotis, 2006). There may also be an association between obesity and IPV; some studies have found higher body mass indexes among women with a history of IPV victimization (e.g., Bonomi et al., 2006; Scott-Storey, Wuest, & Ford-Gilboe, 2009) or association between IPV and poor eating habits, including overeating (McNutt et al., 2002; Wittenberg, Joshi, Thomas, & McCloskey, 2007).

An analysis of data from the Centers for Disease Control and Prevention (CDC)'s Behavioral Risk Factor Surveillance System (BRFSS) for 2005 found, among women, positive associations between lifetime IPV victimization and high blood cholesterol, history of heart attack, heart disease, current smoking, and heavy or binge drinking (CDC, 2008). That study did not find a significant association between lifetime IPV victimization and high body mass index.

Women who serve in the military may be a unique population, with health needs that differ from the larger population of women. In particular, some women veterans may have joined the military to escape violent environments (Sadler, Booth, Nielson, & Doebbeling, 2000) and may be more prone to experiencing trauma owing to combat experience and other interpersonal trauma before or during military service (Chaumba & Bride, 2010; Zinzow, Grubaugh, Monnier, Suffoletta-Maierle, & Frueh, 2007). The bulk of our knowledge about IPV experiences among women is from studies that do not separate out veteran women from the larger sample of women; given that veterans make up a very small proportion of all women, these studies may fail to detect relationships unique to veteran women. There is a small literature base around veteran women and IPV, yet these studies typically draw their samples from veterans who use the Veterans Health Administration (VHA; e.g., Caralis & Musialowski, 1997; Coyle, Van Horn, & Wolan, 1996; McIntyre et al., 1999; Murdoch & Nichol, 1995) and, therefore, cannot be generalized to the larger population of women veterans who do not receive VHA services. As Washington, Yano, Simon, and Sun (2006) have shown, there are both similarities and differences between the populations of women veterans who do and do not use VHA care. Additionally, studies rarely include samples that can allow for comparison between veteran and non-veteran women.

This study fills a gap in the literature for both veteran and non-veteran women. The purpose of the present study was to identify the association between lifetime IPV victimization and heart health risk factors among women, stratified by veteran status. In particular, we sought to identify 1) the proportion of non-veteran women and the proportion of veteran women who report experiencing lifetime IPV victimization and 2) the extent to which lifetime IPV victimization is associated with depression, smoking, heavy drinking, high body mass index, and lack of exercise, accounting for veteran status.

Methods

Data Source

We used data from the CDC's BRFSS for 2006. The BRFSS is an annual, nation-wide, state-administered telephone survey of noninstitutionalized adults (age ≥ 18) in the United States, containing "core" questions as well as optional modules that states may elect to include. Veteran status is a core question in the 2006 survey, asked by all states. In 2006, eight states (Arkansas,

Hawaii, Louisiana, Montana, Nevada, the U.S. Virgin Islands, Virginia, and West Virginia) included the optional IPV module. Using the BRFSS data from these states, we included all cases of women respondents that did not have missing data on the IPV or veteran variables. Six women were excluded for missing data on veteran status, bringing the final sample to 21,162.

Variables

Veteran status was measured by an affirmative response to the following question: "Have you ever served on active duty in the United States Armed Forces, either in the regular military or in a National Guard or military reserve unit?" Lifetime IPV victimization was defined as having reported ever experiencing actual or threatened physical violence, or unwanted sex, from an intimate partner (defined as a current or former spouse, boyfriend, or girlfriend). Demographic variables, used as controls, included age (18-34, 35-55, 45-54, and ≥ 55 years), race (non-Hispanic White vs. non-White or Hispanic), income (annual household income $< \$25,000$, $\$25,000-49,999$, $\geq \$50,000$), and education ($<$ college graduate, college graduate). Current CVD risk factors included depression symptoms (as measured by a score of ≥ 10 on the Patient Health Questionnaire depression scale; Kroenke et al., 2009), current smoking (smoked ≥ 100 cigarettes in lifetime and currently smoke on some or all days), binge or heavy drinking (four or more alcoholic drinks on one occasion in the past 30 days or average of more than one alcoholic drink per day in the past 30 days), lack of exercise (no regular exercise in the past 30 days), and being overweight or obese (body mass index > 25).

Analysis

We first conducted a bivariate cross-tab analysis to describe the sample demographics (age, race, income, education), for veterans and non-veterans. We used Chi-square analysis to test for significant differences between the two groups. Next, we explored the association between veteran status and lifetime IPV victimization, using cross-tab analysis to obtain numbers and rates of IPV victimization for each group and multivariate logistic regression to obtain the odds of IPV victimization (dependent variable), by veteran status (independent variable), controlling for demographic characteristics. Finally, to assess for an association between IPV victimization and heart health risks (depression, smoking, heavy drinking, lack of exercise, high body mass index), we again used bivariate cross-tab analysis to obtain numbers and rates of each type of risk factor, by IPV history and separately for veterans and non-veterans, and then multivariate logistic regression to obtain odds of each type of risk factor (dependent variable), by IPV history (independent variable), controlling for demographic characteristics and veteran status. All analyses were adjusted to compensate for sample design and non-response and were conducted using SAS version 9 (SAS, Inc., Cary NC).

Results

Sample

The sample included 21,162 women, 503 of whom reported that they had served on active duty in the United States Armed Forces (veterans). Demographic characteristics are presented in Table 1. As a group, the veterans were younger than the non-veterans, with 62.1% under the age of 45 (compared with $< 50\%$ of non-veterans under < 45 years old). The veterans were also

Table 1
Demographic Characteristics—Total and Comparison of Non-Veterans and Veterans

	Total (n = 21,162)		Non-Veteran (n = 20,659)		Veteran (n = 503)	
	n	%*	n	%*	n	%*
Age (yrs) [†]						
18–34	3,715	30.2	3,715	30.1	3,715	37.2
35–44	3,740	19.4	3,740	19.3	3,740	24.9
45–54	4,526	19.2	4,526	19.1	4,526	22.0
≥55	8,988	31.2	8,988	31.5	8,988	15.8
Missing	193	0.9	193	0.9	193	0.4
Race [‡]						
White, non-Hispanic	14,358	72.6	14,358	72.8	14,358	63.6
Non-White or Hispanic	6,551	27.4	6,551	27.2	6,551	36.4
Missing	253	1.2	253	1.2	253	1.6
Income (\$)						
<25,000	5,976	27.1	5,976	27.2	5,976	20.4
25,000–49,999	5,474	27.5	5,474	27.5	5,474	29.2
≥50,000	6,724	45.4	6,724	45.3	6,724	50.4
Missing	2,988	14.1	2,988	14.2	2,988	10.7
Education						
<College graduate	14,611	67.6	14,611	67.8	14,611	63.0
≥College graduate	6,520	32.4	6,520	32.2	6,520	37.0
Missing	31	0.1	31	0.2	31	0.0

* Percent of nonmissing.

[†] p < .05.

[‡] p < .01.

more likely than the non-veterans to be non-White or Hispanic (36.4% vs. 27.2%). There were no differences between the two groups on annual household income or education. For both groups, about 50% had an annual household income of less than \$50,000 and more than 60% had not graduated college.

Association Between Veteran Status and Lifetime IPV Victimization

Nearly one third of the veterans reported experiencing lifetime IPV victimization, compared with fewer than one quarter of the non-veterans ($p < .01$; Table 2). Similarly, when adjusting for demographic characteristics (age, race, income, and education), the veterans had increased odds of experiencing lifetime IPV (adjusted odds ratio [AOR], 1.6; 95% confidence interval [CI], 1.1–2.6).

Association Between IPV and Heart Health Risks, Non-Veterans, and Veterans

The frequency and rates of health risk factors by IPV history, for non-veterans and veterans, are presented in Table 3. Among non-veterans, more than one quarter of those who had experienced IPV reported symptoms of depression (compared with 6.7% of those who had not experienced IPV); more than one third reported smoking (vs. 15.1% of those who had not experienced

Table 2
Association Between Veteran Status and Lifetime IPV Victimization

	Non-Veteran (n = 20,659)		Veteran (n = 503)		Adjusted OR (95% CI)*
	n	%	n	%	
IPV	4,975	23.8	171	33.0	1.6 (1.1, 2.6)

Abbreviations: CI, confidence interval; IPV, intimate partner violence; OR, odds ratio.

* Controlling for age, race, income, and education.

Table 3
Association Between Heart Health Risk Factors and Lifetime IPV Victimization, by Veteran Status*

	Non-Veterans		Veterans	
	IPV (n = 4,975)	No IPV (n = 15,684)	IPV (n = 171)	No IPV (n = 332)
	%	%	%	%
Depression	25.1 [‡]	6.7	12.8	7.4
Smoking	37.6 [‡]	15.1	28.2	16.9
Binge or heavy drinking	15.2 [‡]	9.1	18.7	8.6
Lack of exercise	27.9	26.6	14.6	18.1
Overweight or obese	56.8	54.6	66.4 [†]	48.5

Abbreviation: IPV, intimate partner violence.

* Comparing heart health risk factors by IPV exposure, separately for veterans and non-veterans.

[†] p < .05.

[‡] p < .01.

IPV), and more than 15% reported unhealthy drinking behaviors (vs. 9.1% of those without IPV). The proportions of non-veteran women who reported lack of exercise or being overweight or obese did not differ between those who had and had not experienced IPV, but these conditions were prevalent in both groups with proportions of more than one quarter and more than one half, respectively.

Among veteran women, nearly two thirds of those who experienced IPV reported being overweight or obese, compared with fewer than half of those who did not experience IPV. Other heart health risk factors did not differ significantly between veteran women with and without IPV victimization histories.

Table 4 presents the odds of heart health risks based on lifetime IPV history, controlling for demographic characteristics of age, race, income, and education, as well as veteran status. IPV was associated with current depression symptoms (AOR, 3.8), current smoking (AOR, 2.8), and heavy drinking (AOR, 1.8). There were no significant associations between lifetime IPV victimization and lack of exercise or being overweight or obese.

Discussion

This study found that veteran women differ from non-veteran women in their exposure to IPV victimization, with women veterans having increased odds of exposure. We found that nearly one quarter of the non-veteran women reported experiencing IPV victimization in their lifetime, which is not inconsistent with findings of lifetime IPV victimization rates among women in the general population (Tjaden & Thoennes, 2000). Our study revealed, however, that veteran women have even higher rates of reported lifetime IPV exposure, with nearly one in

Table 4
Association Between Lifetime IPV Victimization and Heart Health Risks

	Adjusted OR (95% CI)*
Depression	3.8 (3.2–4.5) [†]
Smoking	2.8 (2.4–3.2) [†]
Binge or heavy drinking	1.8 (1.5–2.1) [†]
Lack of exercise	0.9 (0.8–1.1)
Overweight or obese	1.1 (0.9–1.2)

Abbreviations: CI, confidence interval; OR, odds ratio.

* Each OR reflects a separate regression with IPV as the independent variable and controlling for age, race, income, education, and veteran status.

[†] p < .01.

three veteran women reporting having experienced lifetime IPV victimization. Our finding of nearly one third of veteran women reporting lifetime IPV is consistent with previous studies of active duty military women. Both [Campbell et al. \(2003\)](#) and [O'Campo et al. \(2006\)](#) found that 30% of active duty military women reported lifetime physical or sexual IPV victimization. Studies of veteran women, using samples from VA medical facilities, have found elevated rates of reported IPV victimization (e.g., [Caralis & Musialowski, 1997](#); [McIntyre et al., 1999](#); [Murdoch & Nichol, 1995](#)), which is typical of health care-seeking populations.

Our findings also show that IPV is associated with an increased odds of heart health risks, including depression, smoking, and heavy or binge drinking, consistent with previous literature ([Black & Breiding, 2008](#); [Bonomi et al., 2006](#); [Bonomi et al., 2009](#); [CDC, 2008](#); [Jun et al., 2008](#); [McNutt et al., 2002](#)). Non-veteran women who have experienced IPV seem to also have relatively high rates of heart health risk factors and, among veteran women, nearly 20% who have experienced IPV report binge or heavy drinking, more than one quarter report smoking, and nearly two thirds are overweight or obese.

Limitations

When interpreting these findings, it is important to consider the methodological limitations of this study. As with all self-report surveys, this study is subject to recall and reporting bias because participants may fail to accurately report on past experiences or current behaviors. Given that the methodology was exactly the same for veteran and non-veteran women, however, there is not a problem with comparing these two groups. Analyses were limited to data obtained from the eight states participating in the BRFSS IPV module and may not be generalizable to participants from other areas.

This was a cross-sectional study looking at lifetime IPV victimization, current (at the time of data collection) heart health risks, and veteran status. We do not know the timing of IPV victimization relative to military service—that is, whether the individual experienced IPV victimization before, during, or after serving in the military—nor do we know how recent to the survey the individuals experienced IPV victimization or whether the victimization was ongoing/current. There may be a relationship between timing of victimization and health effects; for example, [Bonomi et al. \(2006\)](#) found that rates of depression were greater among women who had experienced IPV in the past 5 years versus those who had more remote IPV experiences.

We also do not know from this study about respondents' experiences with other forms of trauma, such as sexual violence or child abuse, which may also be associated with current heart health risk factors. Furthermore, in focusing exclusively on 'actual or threatened physical violence' or 'unwanted sex,' the measures of IPV in the survey may have failed to identify some forms of psychological violence or sexual coercion, therefore leading to a potential underreporting of IPV.

Implications

Despite these limitations, the study findings have important implications for our understanding of IPV victimization among women and associated health risks and, in particular, the unique population of women veterans. The findings suggest that IPV is associated with health risks among women, regardless of veteran status, but also that women veterans may have unique

clinical presentations and risks. Women who join the military may have characteristics different from those who do not, which impact their health risks. Alternatively, the experience of military training or service might alter the relationship between IPV and health risk outcomes, or may overpower the influence of IPV on the health risk outcomes. Future research should seek to identify the mechanism between military experience and IPV—why there is an association between military service and IPV experience as well as the mechanisms between IPV experience and health behaviors among women veterans.

The findings lend support to veteran women being screened for IPV, in addition to other possible traumatic experiences that may be associated with the same risk factors. The VHA currently routinely screens all patients for exposure to sexual assault or harassment during military service, which may or may not have been perpetrated by a current or former intimate partner. [Frayne, Skinner, Sullivan, and Freund \(2003\)](#) found that women veterans seeking care from the VHA who had experienced sexual assault during their military service were more likely than those who did not experience such assault to be obese, smoke cigarettes, report problem alcohol use, and have a sedentary lifestyle. Frayne's study did not measure non-sexual assault or any assault occurring outside of military service. Given that multiple victimizations can result in a higher severity of negative outcomes ([Follette, Polusny, Bechtel, & Naugle, 1996](#)), it is important to also screen more broadly for multiple forms interpersonal violence.

It is important to note, however, that screening alone may be insufficient for addressing patients' IPV-related needs (see [MacMillan et al., 2009](#)). Identification of IPV in the health care setting, whether through screening or spontaneous disclosure, must be coupled with assessment of the patient's safety and needs, and effective treatment or intervention through health care and other social services as necessary.

The findings may also impact policy beyond screening and assessment. The same risk factors that can lead to CVD risk behaviors can also serve to inhibit an individual's ability self-manage heart disease following diagnosis, a critical component to prevent relapse. [Mead, Andres, Katch, Sigel, and Regenstein \(2010\)](#) reported on factors that CVD patients identified as associated with the diagnosis and inhibiting their ability to effectively self-manage their disease, including negative emotional states (depression, fear, anger, and hostility), chronic life stressors, and social factors, such as social isolation. These same factors are associated with IPV victimization ([Barnett, Martinez, & Keyson, 1996](#); [Bonomi et al., 2009](#); [Coker et al., 2002](#); [Coohey, 2007](#); [El-Bassel, Gilbert, Rajah, Foleno, & Frye, 2001](#)). IPV victimization, therefore, can also exacerbate barriers to effective CVD management.

In caring for women patients, both veterans and non-veterans, providers should recognize IPV as a prevalent health concern and a potentially aggravating factor for a variety of chronic conditions, including CVD. Practice recommendations and guidelines for addressing IPV in the health care setting are documented by medical societies (e.g., American Medical Association, American College of Obstetricians and Gynecologists), anti-violence organizations (e.g., Family Violence Prevention Fund), and outlined in the literature (e.g., [Mitchell & Anglin, 2009](#); [Nicolaidis, 2004](#)). Veteran women may present with clinical profiles different from non-veteran women and veteran status should thus be considered in identifying risks in both clinical practice and research. Future research should investigate the mechanisms of such differences between these two groups of women.

Acknowledgments

The contents of this article do not necessarily represent the views of the U.S. Department of Veterans Affairs or the United States Government. The authors thank Dr. Diane Richardson for statistical guidance, as well as two anonymous reviewers for their feedback on an earlier version of this manuscript.

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Author Descriptions

Melissa E. Dichter is a Postdoctoral Fellow in Health Services Research at the Center for Health Equity Research and Promotion at the Philadelphia VA Medical Center. Her research focuses on the experience of IPV and associated health and social service needs.

Catherine Cerulli is Director of the Laboratory of Interpersonal Violence and Victimization, Associate Professor, in the Department of Psychiatry at the University of Rochester. Her work focuses on the intersection of IPV, mental health, law, and policy.

Robert Bossarte is Assistant Professor in the Department of Psychiatry at the University of Rochester and Chief of Epidemiology and Population Intervention Research at the VA Center of Excellence at Canandaigua. His research focuses on epidemiology and etiology of violence.