

## Matters of the Heart and Mind: Interpersonal Violence and Cardiovascular Disease in Women

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While violence against women has existed throughout human history, there is a growing recognition that this global crisis not only undermines the dignity, safety, and human rights of women but is also a major public health threat. Similarly, cardiovascular disease (CVD) has been recognized as one of the most important public health issues, accounting for one third of all deaths in women.<sup>1</sup> Growing evidence, including the work by Chandan et al<sup>2</sup> in the current issue of the *Journal of the American Heart Association (JAHA)* suggests that intimate partner violence (IPV) might increase the risk of CVD. While disparities that disfavor women persist with respect to CVD diagnosis, risk stratification, management, and outcomes, recognizing nontraditional CVD risk factors is an important opportunity to improve healthcare quality in women. Furthermore, the identification of IPV, a major global health threat affecting >30% of women,<sup>3</sup> as a risk factor for CVD has widespread implications with potential to impact healthcare delivery and public policy.

IPV is defined as physical or sexual violence, emotional abuse, and stalking. In the United States, >30% of women have experienced contact physical or sexual IPV; 25% of women have experienced IPV severe enough that it resulted in injury, the need for medical care, or posttraumatic stress symptoms.<sup>4</sup> Approximately one third of men also experience IPV, although at a lower severity than women (ie, less often associated with injury/need for medical care).<sup>5</sup> Although IPV typically begins early in life, with its occurrence highest among adolescent and young-adult women,<sup>6</sup> it impacts women of all ages. Globally, IPV is the leading cause of

homicide death for women.<sup>7</sup> IPV has a well-documented adverse impact on mental and physical health in women. Women who have experienced IPV are at increased risk of multiple mental health conditions (eg, depression, anxiety, eating disorders, posttraumatic stress disorder, and substance abuse) as well as physical health (eg, chronic pain, gastrointestinal problems, sexually transmitted infections, traumatic brain injury).<sup>8,9</sup> IPV victimization is linked to CVD risk factors such as diabetes mellitus and hypertension in women<sup>10,11</sup> and possibly also in men when severe and/or when he is also the perpetrator of violence.<sup>12,13</sup> Furthermore, as demonstrated in the publication by Chandan et al,<sup>2</sup> IPV in women may also be associated with clinical CVD.

CVD is the leading cause of death in women worldwide. In the United States, CVD accounted for 299,578 deaths in women in 2017, about 1 in every 5 female deaths.<sup>14</sup> Although CVD mortality in women has declined over the past 30 years, this decline has recently plateaued, with an alarming increase in CVD mortality in women under age 55 years.<sup>15</sup> Furthermore, CVD is the second highest cause of disability-adjusted life years lost in women around the globe.<sup>16</sup> Significant healthcare disparities and gaps persist in the care and outcomes of women. Women are less likely to receive an early diagnosis of CVD than their male counterparts and less likely to receive appropriate, timely interventions.<sup>1,17</sup> Women have worse outcomes than men after acute coronary syndromes such as higher mortality rates in younger women and higher postintervention complications.<sup>18,19</sup>

The cause of these sex and gender-related disparities in CVD includes delayed onset and atypical presentations of CVD in women, nontraditional gender-specific risk factors, unconscious gender bias, and underrepresentation of women in CVD trials. Approximately 56% of women do not know their CVD risk nor appreciate its significance. This lack of awareness is more profound among women in higher-risk groups, such as racial and ethnic minorities.<sup>20</sup> Furthermore, healthcare providers continue to utilize traditional approaches to assess and manage CVD in women, which may underestimate CVD risk and miss global factors (such as IPV), likely affecting their entire spectrum of care. Thus, CVD in women remains a global burden, underscoring the importance of a more comprehensive understanding of its cause and risk factors in women.

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The present investigation by Chandan et al tested the association of IPV (termed domestic abuse) with the risk of CVD.<sup>2</sup> They conducted a retrospective cohort study of women in a cohort of 18 547 women from a UK primary care registry. IPV and CVD information was extracted for these women from electronic medical records. Cases and controls were matched on variables including socioeconomic status, age, body mass index, and smoking. Participants were on average 37 years of age, with an average of 3 and 2.2 years of follow-up among the unexposed and in the IPV-exposed group, respectively. Despite matching, women who had a history of IPV more often had excessive drinking, type 2 diabetes mellitus, hypertension, lipid-lowering use, and comorbidities than women without a history of IPV. Furthermore, IPV was associated with a 31% increased risk for later CVD (with strongest effects for ischemic heart disease at 50% increased risk), a 51% increased risk for diabetes mellitus, and a 44% increased risk for total mortality.

Study strengths include its large sample size, matching, and medical-record-documented CVD outcomes. Weaknesses include its assessment of IPV, which was derived from medical records. The low rate of screening and detection of IPV in medical settings is well documented.<sup>21</sup> It is unclear whether the providers were required to screen for IPV or which coding system was implemented for IPV. It is likely, as the authors acknowledge, that only the most severe cases of physical IPV were detected here. Furthermore, IPV is not only physical: emotional IPV is common, severe, and in some studies, the form of IPV most related to disease risk.<sup>22</sup> Other limitations include the possible confounding effect of excessive alcohol drinking, more common in IPV-exposed women but not accounted for in analyses. Finally, the cohort was young and the follow-up time was limited for the detection of clinical CVD in women. Thus, the present study is based upon early or premature disease. Lastly, the study did not examine possible mechanistic explanations for the observed association.

The limitations of the study do not undermine its impact, but rather point to the importance of ongoing study of the impact of IPV on CVD risk in women. Important next steps include longitudinal cohort studies with rigorously assessed IPV via validated instruments. Follow-up into the ages in which women (seventh decade and beyond) typically develop clinical CVD is needed. Next steps should include investigation of the mechanisms underlying associations between IPV and CVD, which may include health and healthcare behaviors (eg, addictive behaviors, eating habits, sedentary behavior, disrupted sleep, adherence, and follow-up); psychological and economic factors linked to CVD risk (eg, psychological disorders, low socioeconomic attainment),<sup>23</sup> and direct biological mechanisms (eg, alterations in the hypothalamic–pituitary–adrenal axis, autonomic nervous system, chronic inflammation, epigenetic changes, and endothelial dysfunction).<sup>24</sup>

The association of 2 highly pervasive conditions in women, IPV and CVD, highlight an important opportunity to tackle these major public health issues, which often begins in the healthcare setting. However, in a national survey on IPV and sexual violence, only 21% of women disclosed their victimization to a doctor or nurse.<sup>25</sup> US Preventive Services Task Force recommendations support routine screening of all women for IPV and point to standardized instruments to do so.<sup>25,26</sup> In fact, there are several brief, well-validated screening tools for use in healthcare settings; optimal assessments address the multiple domains of IPV (physical, sexual, and emotional/psychological). The Table describes select screening tests recommended by the US Preventive Services Task Force, selected based on sensitivity, specificity, and facility of use in clinical settings.<sup>4</sup> Note that these scales have been validated for use in women, but their performance in men has not been established. Providers should be aware that IPV victims may not disclose their IPV immediately: a trusting relationship and multiple queries may be required before an individual discloses. Some research indicates a potential beneficial effect of screening alone for women experiencing IPV, yet full benefit is derived when screening is conducted in conjunction with intervention and ongoing follow-up.<sup>27</sup> Best-practices for IPV screening and intervention include training staff and providers in effective interpersonal violence assessment, educating all patients in IPV regardless of disclosure, and clear protocols in the event of a disclosure (eg, proper documentation, treatment, referrals to psychological, community, and legal services, and ongoing follow-up).<sup>28</sup> Providers should be aware of local laws surrounding mandatory reporting of IPV and disclose the limits of confidentiality. An on-site multidisciplinary team approach to care that includes social services and behavioral health providers can help address the multiple sequelae of IPV.

Prevention of IPV is also paramount. Recent global efforts recognize the significant burden of gender-based violence. The United Nations adopted the 2030 Agenda for Sustainable Development, a list of goals that provide a framework for economic, social, and environmental development around the world. One key goal identifies violence against women as a key priority in achieving gender equality around the world. Gender violence is viewed as preventable and an essential component in global advancement. Similarly, the US State Department has identified gender violence as a key priority in its commitment to advancing gender equality around the globe and has developed strategic objectives to do so. These policy efforts represent a critical component of reducing violence against women.

The study by Chandan et al provides an important opportunity for the scientific community to shift its paradigm from traditional assumptions and models of CVD that place women at a disadvantage to a more comprehensive approach

**Table.** Screening Tools for IPV in Women

Screening Tool	Questions	Scoring
Humiliation, Afraid, Rape, Kick (HARK)	<p>Within the past year have you been:</p> <ol style="list-style-type: none"> <li>1. Humiliated or emotionally abused by a partner or ex-partner?</li> <li>2. Afraid of your partner or ex-partner?</li> <li>3. Raped or forced to have any sexual activity by your partner or ex-partner?</li> <li>4. Kicked, hit, slapped, or physically hurt by your partner or ex-partner?</li> </ol>	<p>Yes/no responses One point for every yes response, items summed Positive for IPV <math>\geq 1</math></p>
Extended-Hurt, Insult, Threaten, Scream (E-HITS)	<p>Over the last 12 months, how often did your partner:</p> <ol style="list-style-type: none"> <li>1. Physically hurt you?</li> <li>2. Insult you or talk down to you?</li> <li>3. Threaten you with harm?</li> <li>4. Scream or curse at you?</li> <li>5. Force you to have sexual activities?</li> </ol>	<p>Answers based on a 5-point Likert scale:</p> <p>1=never 2=rarely 3=sometimes 4=fairly often 5=frequently</p> <p>Likert scores summed across items Positive for IPV: <math>\geq 7</math></p>
Partner Violence Screen (PVS)	<p>Within the past year:</p> <ol style="list-style-type: none"> <li>1. Have you been hit, kicked, punched, or otherwise hurt by someone in the past year? If so, by whom?</li> <li>2. Do you feel safe in your current relationship?</li> <li>3. Is there a partner from a previous relationship who is making you feel unsafe now?</li> </ol>	<p>Yes/no responses One point for every yes response, items summed Positive for IPV: <math>\geq 1</math></p>

IPV indicates Intimate Partner Violence.

in order to reduce barriers and improve healthcare quality in women. As the impact of trauma and violence on chronic disease risk is increasingly documented, the time has come to consider a more expansive approach that considers the complex role of biological, social, and psychosocial stressors on the health and wellness of women. Only then can we improve existing public health policies and healthcare practices at a global level to improve the lives of millions of women around the world.

## Disclosures

None.

## References

1. Madonis SM, Skelding KA, Roberts M. Management of acute coronary syndromes: special considerations in women. *Heart*. 2017;103:1638–1646.
2. Chandan JS, Thomas T, Bradbury-Jones C, Taylor J, Bandyopadhyay S, Nirantharakumar K. Risk of cardiometabolic disease and all-cause mortality in female survivors of domestic abuse. *J Am Heart Assoc*. 2020;9:e014580. DOI: 10.1161/JAHA.119.014580.
3. World Health Organization. Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. World Health Organization. 2013. Available at: <https://apps.who.int/iris/handle/10665/85239>. Accessed December 22, 2019.
4. Smith SG, Chen J, Basile KC, Gilbert LK, Merrick MT, Patel N, Walling M, Jain A. The national intimate partner and sexual violence survey (NISVS): 2010–2012 state report. 2017.
5. US Preventive Services Task Force. Screening for intimate partner violence, elder abuse, and abuse of vulnerable adults: US Preventive Services Task Force Final Recommendation Statement. *JAMA*. 2018;320:1678–1687.
6. Breiding MJ CJ, Black MC. *Intimate Partner Violence in the United States—2010*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2014.
7. Devries KM, Mak JYT, Garcia-Moreno C, Petzold M, Child JC, Falder G, Lim S, Bacchus LJ, Engell RE, Rosenfeld L, Pallitto C, Vos T, Abrahams N, Watts CH. The global prevalence of intimate partner violence against women. *Science*. 2013;340:1527–1528.
8. Bonomi A, Thompson RS, Anderson M, Reid RJ, Carrell D, Dimer JA, Rivara FP. Intimate partner violence and women's physical mental and social functioning. *Am J Prev Med*. 2006;30:458–46676.
9. Breiding MJ, Black MC, Ryan GW. Chronic disease and health risk behaviors associated with intimate partner violence-18 U.S. States/territories. *Ann Epidemiol*. 2005;18:538–544.
10. Mason SM, Wright RJ, Hibert EN, Spiegelman D, Forman JP, Rich-Edwards JW. Intimate partner violence and incidence of hypertension in women. *Ann Epidemiol*. 2012;22:562–567.
11. Mason SM, Wright RJ, Hibert EN, Spiegelman D, Jun HJ, Hu FB, Rich-Edwards JW. Intimate partner violence and incidence of type 2 diabetes in women. *Diabetes Care*. 2013;36:1159–1165.
12. Clark CJ, Everson-Rose SA, Alonso A, Spencer RA, Brady SS, Resnick MD, Borowsky IW, Connett JE, Krueger RF, Suglia SF. Effect of partner violence in adolescence and young adulthood on blood pressure and incident hypertension. *PLoS ONE*. 2014;9:e92204.
13. Clark CJ, Alonso A, Everson-Rose SA, Spencer RA, Brady SS, Resnick MD, Borowsky IW, Connett JE, Krueger RF, Nguyen-Feng VN, Feng SL, Suglia SF.

- Intimate partner violence in late adolescence and young adulthood and subsequent cardiovascular risk in adulthood. *Prev Med*. 2016;87:132–137. DOI: 10.1016/j.ypmed.2016.02.031. [Epub 2016 Feb 24].
14. Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed February 18, 2019.
  15. Wilmot KA, O’Flaherty M, Capewell S, Ford ES, Vaccarino V. Coronary heart disease mortality declines in the United States from 1979 through 2011: evidence for stagnation in young adults, especially women. *Circulation*. 2015;132:997–1002.
  16. Mosca L, Mochari-Greenberger H, Dolor RJ, Newby LK. Global, regional, and national comparative risk assessment of 84 behavioral, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392:1923–1994.
  17. Vaccarino V, Parsons L, Peterson ED, Rogers WJ, Kiefe CI, Canto J. Sex differences in mortality after acute myocardial infarction: changes from 1994 to 2006. *Arch Intern Med*. 2009;169:1767–1774.
  18. Redfors B, Angerås O, Råmunddal T, Petursson P, Haraldsson I, Dworeck C, Odenstedt J, Ioaness D, Ravn-Fischer A, Wellin P, Sjöland H, Tokgozoglu L, Tygesen H, Frick E, Roupe R, Albertsson P, Omerovic E. Trends in gender differences in cardiac care and outcome after acute myocardial infarction in western Sweden: a report from the Swedish Web System for Enhancement of Evidence-Based Care in Heart Disease Evaluated According to Recommended Therapies (SWEDEHEART). *J Am Heart Assoc*. 2015;4:e001995DOI: 10.1161/JAHA.115.001995.
  19. Pagidipati NJ, Peterson ED. Acute coronary syndromes in women and men. *Nat Rev Cardiol*. 2016;13:471–480.
  20. Mosca L, Hammond G, Mochari-Greenberger H, Towfighi A, Albert MA; American Heart Association Cardiovascular Disease and Stroke in Women and Special Populations Committee of the Council on Clinical Cardiology, Council on Epidemiology and Prevention, Council on Cardiovascular Nursing, Council on High Bloo. Fifteen-year trends in awareness of heart disease in women: results of a 2012 American Heart Association national survey. *Circulation*. 2013;127:1254–1263, e1–29.
  21. Alvarez C, Fedock G, Grace KT, Campbell J. Provider screening and counseling for intimate partner violence: a systematic review of practices and influencing factors. *Trauma Violence Abuse*. 2017;18:479–495.
  22. Low CA, Thurston RC, Matthews KA. Psychosocial factors in the development of heart disease in women: current research and future directions. *Psychosom Med*. 2010;72:842–854.
  23. Breiding MJ, Smith SG, Basile KC, Walters ML, Chen J, Merrick MT. Prevalence and characteristics of sexual violence, stalking, and intimate partner violence victimization—national intimate partner and sexual violence survey, United States, 2011. *Morb Mort Wkly Rep*. 2014;63:1–18.
  24. Thurston RC, Barinas-Mitchell E, von Kanel R, Chang Y, Koenen KC, Matthews KA. Trauma exposure and endothelial function among midlife women. *Menopause*. 2018;25:368–374.
  25. Nelson HD, Bougatsos C, Blazina I. Screening women for intimate partner violence: a systematic review to update the U.S. Preventive services task force recommendation. *Ann Intern Med*. 2012;156:796–808.
  26. Feltner C, Wallace I, Berkman N, Kistler CE, Middleton JC, Barclay C, Higginbotham L, Green JT, Jonas DE. Screening for intimate partner violence, elder abuse, and abuse of vulnerable adults: evidence report and systematic review for the UA preventive services task force. *JAMA*. 2018;320:1688–1701.
  27. Burge SK, Ferrer RL, Foster EL, Becho J, Talamantes M, Wood RC, Katerndahl DA. Research or intervention or both? Women’s changes after participation in a longitudinal study about intimate partner violence. *Fam Syst Health*. 2017;32:259–270.
  28. Miller E, McCaw B, Humphreys BL, Mitchell C. Integrating intimate partner violence assessment and intervention into healthcare in the United States: a systems approach. *J Womens Health*. 2015;24:92–99.

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