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Interpersonal violence and painful bladder symptoms in community-dwelling midlife to older women

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Authors' contributions. AJH, SKV, DHT, and LS conceived and designed the original study. ER and AJH developed the concept and design of this analysis. All authors worked on acquisition, analysis and interpretation of the data. ER and AJH drafted the manuscript. All authors read and approved the final manuscript.

Competing interests. The authors declare that they have no competing interests.

Ethics approval and consent to participate. This study was approved by institutional review boards from UCSF and KPNC (IRB number 10-00703)

Consent for publication. Written consent was obtained from participants during study activities.

Availability of data and materials. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Abstract

Background—Women are more likely to present with genitourinary complaints immediately after exposure to interpersonal violence, but little is known about long-term effects on women’s urologic health such as their susceptibility to bladder pain and infections.

Objective—To determine whether lifetime interpersonal violence exposure and current post-traumatic stress disorder (PTSD) symptoms are associated with prevalence or severity of painful bladder symptoms as well as greater lifetime history of antibiotic-treated urinary tract infections in community-dwelling midlife and older women.

Study Design—We examined cross-sectional data from a multiethnic cohort of community-dwelling women aged 40–80 years enrolled in a northern California integrated healthcare system. Women completed structured self-report questionnaires about their past exposure to physical and verbal/emotional intimate partner violence as well as sexual assault. Symptoms of PTSD were assessed using the PTSD Checklist for DSM-IV, Civilian Version. Additional structured self-report measures assessed current bladder pain, other lower urinary tract symptoms, and history of antibiotic-treated urinary tract infections. Multivariable logistic regression models examined self-reported interpersonal violence exposure history and current PTSD symptoms in relation to current bladder pain and antibiotic-treated urinary tract infection history.

Results—Among 1,974 women (39% non-Latina White, 21% Black, 20% Latina, and 19% Asian), 22% reported lifetime interpersonal violence exposure, 22% bladder pain, and 60% history of ever having an antibiotic-treated urinary tract infection. Lifetime experience of sexual assault (OR[95%CI] = 1.39 [1.02, 1.88]) and current PTSD symptoms (OR[95%CI] = 1.96 [1.45, 2.65]) were associated with current bladder pain. Lifetime experience of physical intimate partner violence was associated with ever having a urinary tract infection (OR[95%CI] = 1.38 [1.00, 1.86]), as was emotional IPV (OR[95%CI] = 1.88 [1.43, 2.48]), sexual assault (OR[95%CI] = 1.44 [1.09, 1.91]), and current PTSD symptoms (OR[95%CI] = 1.54 [1.16, 2.03]).

Conclusion—In this ethnically diverse, community-based cohort, lifetime interpersonal violence exposures and current PTSD symptoms were independently associated with current bladder pain and lifetime history of antibiotic-treated urinary tract infections in midlife to older women. Findings suggest that interpersonal violence and PTSD symptoms may be under-recognized markers of risk for urologic pain and infections in women, highlighting a need for trauma-informed care of these issues.

Condensation:

In a multiethnic community-based cohort of midlife-to-older women, interpersonal violence exposure and current post-traumatic stress disorder symptoms were independently associated with bladder pain and infections

Keywords

bladder pain; urinary tract infections; interpersonal violence; post-traumatic stress disorder

Introduction

Bladder pain syndrome (BPS), defined as chronic pain, pressure, or discomfort associated with the bladder, is one of the most common reasons for invasive urological or gynecologic procedures.^{1, 2} Despite research linking bladder pain syndrome to depression, inflammatory syndromes, and other chronic pain conditions,^{3–5} epidemiologic factors influencing its development and persistence are poorly understood. One potentially under-recognized risk factor for chronic bladder pain in women is exposure to interpersonal violence, including intimate partner violence (IPV). The Center for Disease Control and Prevention estimates that half of U.S. women have experienced psychological IPV and a quarter have experienced physical IPV in their lifetime.⁶

Prior studies conducted primarily in reproductive-age women have pointed to higher rates of urinary tract infections (UTI) and genitourinary symptoms in the immediate aftermath of an interpersonal violence exposure.^{4, 7} However, few studies have addressed whether lifetime interpersonal violence experiences are associated with a greater risk of urinary symptoms over the lifespan.^{8, 9}

To address these gaps, we examined associations between interpersonal violence exposures and painful bladder symptoms and UTI in a large, multiethnic cohort of midlife and older community-dwelling women. We hypothesized that lifetime interpersonal violence exposure would be associated with increased prevalence of painful bladder symptoms, as well as a greater lifetime history of UTI. Our goal was to guide potential future strategies for identifying women at high risk for urologic pain and infections related to trauma exposure to promote trauma-informed care of these conditions.

Materials and Methods

Study population

We analyzed cross-sectional data from the Reproductive Risks of Incontinence Study at Kaiser (RRISK), a community-based cohort study of midlife and older women enrolled in Kaiser Permanente Northern California (KPNC), an integrated healthcare delivery system.¹⁰ Inclusion criteria included being at least 40 years old, enrolled in KPNC since age 21, and reporting at least half of any childbirth events within KPNC facilities. Participants were randomly sampled from within age and race-ethnicity strata for robust representation across age and racial-ethnic groups underrepresented in prior U.S. research, particularly African-American, Asian-American, and Hispanic/Latina women. Approximately 20% were recruited from the KPNC Diabetes Registry to ensure adequate representation of women with diabetes, but women were not selected on the basis of urinary symptoms or of interpersonal trauma history. This report focused on the third data collection wave from 2008–2012 (RRISK3), which included assessment of interpersonal violence experiences. RRISK3 visits included interviews, questionnaires, and exams conducted by research assistants in participants' homes. Written informed consent was obtained from participants at the time of data collection. Study procedures were approved by the institutional review boards of the University of California, San Francisco and KPNC.

Exposure and outcome measures

Prior exposure to intimate partner violence (IPV) and sexual assault were assessed during RRISK3 visits using structured-item questionnaire measures adapted from prior studies (Table 1).¹¹ Given the community-based context, questions were designed to be easily understandable to a diverse population. For IPV, participants were asked to distinguish between physical violence (being hit, slapped, pushed, shoved, punched, or threatened with a weapon) and emotional abuse (being severely criticized, told that they were a stupid or worthless person, or threatened with harm) by an intimate partner. Sexual assault was assessed by asking about being touched in the sexual areas of the body without consent. Post-traumatic stress disorder (PTSD) symptoms were assessed using the self-administered PTSD Checklist for DSM-IV, Civilian Version, a 17-item questionnaire previously validated to assess PTSD symptoms within the last month related to past traumatic exposures. For this measure, a score of 30 has been shown to indicate probable PTSD symptoms in primary care populations.¹²

Presence and severity of bladder pain were assessed using questions adapted from validated measures including the American Urological Association Symptom Index (AUA-SI) and the Urogenital Distress Inventory (Table 1).^{13–16} Participants were asked to describe the severity of the pain/discomfort associated with their bladder over the past 3 months, ranging from no pain (0), to mild pain defined by awareness without having to suspend usual activities (3), to moderate pain defined by enough pain/discomfort to interfere with usual activities (6), to severe pain that abruptly stops all activity or tasks (9). Analyses focused on bladder pain identified as being a) at least mild, or b) at least moderate in severity.

Self-reported lifetime history of clinician-diagnosed UTI was assessed by asking women if they had ever received antibiotics for a UTI as well as antibiotic UTI treatment in the past 12 months (Table 1). Symptoms commonly associated with bladder pain such as urgency, frequency, and inability to postpone urination were assessed using AUA-SI items.¹⁷

Sociodemographic and general clinical characteristics were assessed by self-report, including age, race/ethnicity, immigration status, employment, educational attainment, parity, relationship status, general health status, and sexual activity status. Menopausal status was defined by self-reported cessation of menses for 12 months or bilateral oophorectomy. Diabetes and depression were defined by self-reported clinician diagnoses of these conditions. Pelvic surgical history was based on self-reported surgery to the bladder, uterus, ovaries, colon or rectum. Height and weight were directly measured by trained study staff to calculate body mass index (BMI).

Statistical analyses

Descriptive statistics, including frequencies and percentages for categorical data and mean values with standard deviations for continuous data, were used to summarize key exposure and outcomes variables and co-variables. Differences in prevalence of exposure and outcomes variables across racial/ethnic groups were examined with chi-square analyses. In multivariable logistic regression analyses, each type of interpersonal violence (physical IPV, emotional IPV, and sexual assault) was separately modeled as an exposure associated

with each type of urologic problem (any bladder pain, moderate to severe bladder pain, lifetime history of antibiotic-treated UTI, and antibiotic-treated UTI in the last 12 months) as outcomes. Similarly, separate multivariable logistic regression models were conducted to examine the association of clinically significant PTSD symptoms to each type of urologic problem. Models were adjusted for age, self-reported race/ethnicity, immigration status, overall health, sexual activity, menopausal status, prior pelvic surgery, diabetes, and obesity (BMI>30 kg/m²), as factors identified a priori from the literature as being likely to confound the association between interpersonal violence or trauma experiences and bladder pain or UTI history.^{18–22} Additional exploratory models further adjusted for depression as a potential confounder of relationships between interpersonal violence experience and bladder pain.⁸ All analyses were conducted using SAS version 9.4. A formal correction for multiple comparisons was not conducted.

Results

Characteristics of the sample

Of the 4,819 women notified about the opportunity to participate in the RRISK3 study, 3,438 (72%) met eligibility criteria based on 10-year age strata and race/ethnicity. Of these potentially eligible women, 2,016 (59%) agreed to enroll in the study and completed a study visit. Of these, 1,974 (98%) provided data about interpersonal violence exposure and either bladder pain or UTI history. Within this analytic sample, 39% were non-Latina White, 21% Black, 20% Latina/Hispanic, and 19% Asian or Pacific Islander. Mean [SD] age was 60.2 [9.5] years, and most women were born in the United States (70%), college-educated (86%), married or living as married (65%), and sexually active (58%) (Table 2). Few reported fair or poor overall health (14%), but 20% reported having any pelvic surgery. The majority were postmenopausal (90%) and overweight or obese (73%). Almost a fifth reported prior diagnosis with depression (18%).

Prevalence of traumatic exposures

Sixteen percent of women reported prior exposure to physical IPV, 22% emotional IPV, and 20% sexual assault (Table 3). Seventeen percent of women reported a history of two or more forms of interpersonal abuse. Fifteen percent met criteria for clinically significant PTSD symptoms. Self-reported interpersonal violence exposures differed by race/ethnicity ($P<.0001$ for all), with Asian and Pacific Islander women reporting the lowest exposure (Table 3). However, no significant racial/ethnic differences in the prevalence of clinically significant PTSD symptoms were detected ($P=.85$). Amongst participants with a physical IPV exposure, 95% reported exposures occurring prior to the last 12 months. For emotional IPV, 86% of participants reported exposures occurring prior to the last 12 months. For sexual assault, mean [SD] age of first occurrence was 14.5 [9.4] years old, and mean [SD] age of last occurrence was 20.7 [12.8] years old.

Prevalence of bladder pain

Less than a quarter of participants reported bladder pain in the past 3 months, including 22% reporting any bladder pain and 15% reporting moderate to severe bladder pain (Table 4). Prevalence of bladder pain did not differ significantly by race/ethnicity ($P=.80$ for

any current bladder pain, $P=.65$ for moderate bladder pain). Overlap with other urinary symptoms was common, with 98% of women with any bladder pain reporting any urge symptoms, 91% reporting any increased urinary frequency, and 80% reporting any difficulty postponing urination (Supplemental table 1).

Prevalence of urinary tract infections

Of the 1,956 women who provided data about UTI history, 60% reported any history of an antibiotic-treated UTI, while 13% reported an antibiotic-treated UTI in the past 12 months (Table 4). Self-report of any prior antibiotic-treated UTI differed by race/ethnicity ($P<.001$), with Asian/Pacific Islander women with the lowest proportion. Of women with antibiotic-treated UTI in the last 12 months, 85% reported any urge symptoms, 78% any increased urinary frequency, and 62% any difficulty postponing urination (Supplemental table 1). Amongst women who had experienced a UTI, 341 women (29%) reported experiencing more than five UTIs during their lifetime.

Associations between traumatic exposure and bladder pain

No significant associations between physical or emotional IPV exposure and bladder pain were detected in multivariate analyses (Table 5). However, women with a history of sexual assault had increased odds of reporting any bladder pain (odds ratio [OR] [95% confidence interval (CI)] = 1.39 [1.02, 1.88]) and moderate to severe bladder pain (OR[CI]=1.29 [0.90,1.84]). Current PTSD symptoms were even more strongly associated with bladder pain (OR[CI]= 1.96 [1.45, 2.65] for any and OR[CI]= 2.30 [1.64, 3.22] for moderate bladder pain). After additional adjustment for depression, associations between PTSD and bladder pain remained significant (OR[CI]= 1.93 [1.41, 2.64] for any bladder pain; OR[CI] = 2.47 [1.73, 3.55] for moderate to severe bladder pain).

Associations between traumatic exposure and urinary tract infection

All interpersonal violence exposures and clinically significant PTSD symptoms were associated with increased odds of lifetime antibiotic-treated UTI (OR[CI]= 1.38 [1.00,1.86] for physical IPV, OR[CI]= 1.88 [1.43, 2.48] for emotional IPV, OR[CI]= 1.44 [1.09, 1.91] for sexual assault, OR[CI]= 1.54 [1.16, 2.03] for PTSD), although none were associated with increased odds of antibiotic-treated UTI in the past 12 months (Table 5). In exploratory analyses adjusting additionally for depression, the association between physical IPV and lifetime history of antibiotic-treated UTI was attenuated (OR[CI] = 1.35 [0.99, 1.83]), while other associations remained significant (OR[CI] = 1.82 [1.38, 2.40] for emotional IPV; OR[CI] = 1.41 [1.07, 1.86] for sexual assault, and OR[CI] = 1.44 [1.08, 1.93] for PTSD).

Comment

Principal Findings

In this multiethnic, community-based sample of midlife to older women, women with a history of sexual assault were more likely to report current bladder pain, and women with a history of any type of intimate partner violence or sexual assault were more likely to have been treated with antibiotics for UTI. Current PTSD symptoms were even more strongly associated with both current bladder pain and UTI history, even after additional adjustment

for a wide variety of sociodemographic and clinical characteristics, including depression history. These findings suggest that interpersonal trauma is a potentially independent marker for risk of painful bladder symptoms and treatment for bladder infection in women across the lifespan, and that PTSD symptoms are a particular strong marker of risk.

Results in the Context of What is Known

Until recently, exploration of relationships between interpersonal abuse and subsequent bladder symptoms has focused primarily on childhood or adolescent abuse, and most prior studies have involved referral or specialty patient populations rather than community-based samples. A recent study in older women seen in an academic urology practice found that adverse childhood experiences including abuse were associated with current lower urinary tract symptoms, including bladder pain.²³ A case-control study found that women diagnosed with interstitial cystitis/bladder pain syndrome were more likely to report adverse childhood experiences and exposure to abuse.²⁴ Another case control study of patients recruited from multiple U.S. academic medical centers reported that women with interstitial cystitis/bladder pain syndrome were more likely to report adverse childhood events.²⁵ However, one community-based study, the Boston Area Community Health (BACH) cross-sectional survey, reported associations between history of three or more simultaneous types of adolescent or adult abuse (physical, emotional, and sexual) with painful bladder symptoms.²⁶ Our research provides even more robust evidence of lifetime and persistent relationships between traumatic exposures and painful bladder symptoms among diverse women living in the community, regardless of whether women are diagnosed with conditions such as interstitial cystitis or receive specialty care.

Clinical Implications

Our findings further support the need for implementation of trauma-informed care in both primary care settings and specialty clinics for women presenting with bladder pain or recurrent bladder infections. Given higher rates of interpersonal abuse and current PTSD symptoms, providers caring for these women should consider screening more systematically for current and past interpersonal abuse and PTSD symptoms. This may in turn pave the way for a more trauma-informed approach to care of these conditions, including creation of a calm clinical environment that allows women to discuss the potential contribution of trauma to their experiences, and provision of education and resources to address the health impacts of traumatic experiences.²⁷ For patients presenting with bladder pain or infections in the aftermath of interpersonal trauma, providers should consider a team-based approach to care, including involvement of mental health providers, to promote inter-professional collaborations that may be important in the care of such patients.

Research Implications

Our findings point to the need for more research on the mechanisms linking interpersonal trauma exposure and bladder pain and infections in women. Several possible pathophysiological processes may provide an explanatory model for the association of prior sexual assault and PTSD with current bladder pain in midlife to older women. Activation of the hypothalamic-pituitary-adrenal (HPA) axis through stress is hypothesized to lead to inflammation and development of pain syndromes.²⁸ Tissue damage from sexual

trauma may also lead to local neuropathological changes, resulting in activation of silent C-fiber afferent innervation and altered nociception contributing to chronic urogenital pain.²⁸ Additionally, sexual trauma resulting in hypercontraction of the pelvic floor muscles may lead to chronic bladder pain through myofascial trigger points that persist despite elimination of the original pain source.²⁸

Our results also support the need for greater scientific understanding of the potential links between trauma exposure and urologic infection history, given that past medical record-based studies have also linked interpersonal violence experience or PTSD to diagnoses of UTI.^{8, 9, 29} Potential host-related mechanisms include involvement of the HPA axis, such as stress-induced cortisol suppression of the immune system by inhibition of pro-inflammatory cytokines.³⁰ Alternately, activation of the sympathetic adrenal medullary axis may lead to altered immune response.²⁹ Additionally, recent research has suggested that individuals experiencing traumatic events or PTSD undergo epigenetic changes, leading to an altered immune activation.³¹ Moreover, in response to host-related stress, microbial community composition may shift, leading to colonization by pathogens and loss of protective bacteria.³² On the patient level, women who experience IPV or PTSD may also engage in health-related behaviors differently, possibly increasing their infection risk.

Strengths and Limitations

Our research benefits from a large community-based, ethnically-diverse sample of women, assessment of multiple types of interpersonal violence, evaluation of PTSD symptoms using a previously validated measure, and assessment of both bladder pain and UTI as outcomes. Nevertheless, this is a cross-sectional analysis, which prevents us from drawing conclusions about causality. While interpersonal violence or trauma exposure may have led to bladder pain or UTIs, a reverse causal relationship may be possible. The measures of bladder pain used in this cohort included single questions extracted from standardized questionnaires and derived from other epidemiologic studies. They did not include recently developed instruments designed to capture a broader spectrum of urologic pelvic pain.³³ Additionally, the questions used to assess IPV did not quantify the seriousness of women's IPV exposure and required participants to recall past exposures over time.³⁴ However, any associated recall bias would likely have biased results towards the null, as prior studies suggest that IPV is underreported by midlife women.³⁵ Participants provided limited information about the timing or duration of all interpersonal violence exposures, restricting conclusions regarding length of impact of these experiences on bladder pain later in life or lifetime UTI. Given that prior diagnosis of anxiety was not assessed, we could not test the impact of anxiety on the association between IPV and PTSD on current bladder pain and lifetime UTI. Instead, we included exploratory models adjusting for prior diagnosis of depression. This study did not assess the impact of IPV on sexual pain; this may be a future area of study. Moreover, a formal correction for multiple comparisons was not included. Lastly, we relied on self-report of clinician-treated UTI, without microbiology laboratory confirmation of UTI. This may have led to misclassification of women with urinary symptoms caused by other urological disorders or with incidental asymptomatic bacteriuria who were diagnosed with and treated for UTI, although the UTI prevalence in this sample was comparable to reports from other populations.³⁶ While the number of UTI episodes in one's lifetime was assessed, these data

may be affected by recall bias, particularly among the 29% of women reporting more than five lifetime UTIs.

Conclusions

Our findings from a multiethnic, community-based cohort suggest that interpersonal trauma exposure and PTSD may be important long-term markers of risk for urologic pain and infections among midlife and older women. This may provide evidence to support more systematic screening of women complaining of bladder pain or UTI for interpersonal violence and PTSD, as well as strategies for trauma-informed clinical care of these problems among women across the lifespan. If these associations are indeed causal, then future research should examine the mechanisms by which trauma exposure can lead to bladder pain and infections and assess whether interventions designed to reduce the immediate consequences of trauma may be effective in preventing or ameliorating urologic pain in women.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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3)

AJOG at a Glance:**Why was this study conducted?**

Prior studies conducted in reproductive-age women have pointed to higher rates of urinary tract infections and genitourinary symptoms in the immediate aftermath of an interpersonal violence exposure. This study addresses whether lifetime interpersonal violence experiences are associated with a greater risk of urinary symptoms later in life.

What are the key findings?

Lifetime interpersonal violence exposure and current post-traumatic stress disorder symptoms were independently associated with current bladder pain symptoms and ever having an antibiotic-treated urinary tract infection in multiethnic, community-based midlife to older women.

What does this study add to what is already known?

Interpersonal violence and post-traumatic stress disorder may be under-recognized markers of risk for urologic pain and infections, highlighting a need for trauma-informed care of these issues.

Table 1.

Questions assessing interpersonal violence, bladder pain and urinary tract infections in the Reproductive Risks for Incontinence Study at Kaiser

Exposures	Questions
Physical interpersonal violence	Have you ever been physically abused by being hit, slapped, pushed, shoved, punched or threatened with a weapon by a current or former spouse or intimate partner? Has this occurred in the past 12 months?
Emotional interpersonal violence	Have you ever been verbally abused by being made fun of, severely criticized, told you were a stupid or worthless person, or threatened with harm to yourself, your possessions, or your pets, by a current or former spouse or intimate partner? Has this occurred in the past 12 months?
Sexual interpersonal violence	Has anyone ever touched sexual parts of your body after you said or showed that you didn't want them to, or without your consent (for example being groped, fondled or raped)? How old were you the first time this happened? How old were you the last time this happened?
Outcomes	Questions
Bladder pain (any=>1, moderate to severe=>6)	During the past 3 months, on a scale from 0 to 9, how would you rate the pain/discomfort associated with your bladder?
Ever having a UTI	Have you ever taken antibiotics for a bladder infection (also called urinary tract infection or cystitis)?
UTI in the past 12 months	How many times in the last 12 months have you been treated with antibiotics for a bladder infection?
Urinary urgency	During the past month, how often have you found it difficult to postpone urination?
Urinary frequency	During the past month, how often have you had to urinate again less than 2 hours after you finished urinating?

Note: Answer options for questions on exposures were: no, yes, don't know, refused. Answers for timing of sexual interpersonal violence were numeric and continuous. Answer options for bladder pain were categorized on a Likert scale of 0 to 9, with 0 representing "none, no pain/discomfort, 3 representing "mild pain/discomfort, awareness of pain/discomfort but it is easily tolerated and you can continue with your usual activity or tasks", 6 representing "moderate pain/discomfort, enough pain/discomfort that it interferes with or shortens your usual activity or tasks", and 9 representing "severe pain/discomfort, extreme pain/discomfort that abruptly stops all activity or tasks". Answer options for questions on ever having a UTI were: no, yes. Answers for UTI in the past 12 months were numeric; they were operationalized to capture having at least 1 UTI in the past 12 months. Answer options for questions on urinary urgency and frequency were categorized on a Likert scale from 0 to 6 representing: not at all, less than 1 time in 5, less than half the time, about half the time, more than half the time, and almost always.

Table 2.

Demographic and health characteristics of participants

	Women, N (%) N = 1974
Mean age (SD)	60.2 (\pm 9.5)
Race ethnicity	
White/European/Middle Eastern	778 (39)
Black/African-American	416 (21)
Latina/Hispanic	394 (20)
Asian/Pacific Islander	381 (19)
Immigration status	
Born in US	1389 (70)
Employment	
Full time	636 (33)
Part time	210 (11)
Retired	1002 (52)
None of the above	88 (5)
Household income	
<\$30,000	229 (12)
\$30,000–\$59,999	509 (26)
\$60,000–\$89,999	429 (23)
\$90,000–\$119,999	295 (15)
\$120,000+	443 (23)
Education	
Did not complete high school	38 (2)
Completed high school	262 (14)
Some or completed college	1100 (57)
Some or completed graduate/professional school	542 (29)
Relationship and sexual activity status	
Single	184 (9)
Married/Living as married/involved in a significant relationship	1252 (65)
Separated/Divorced/Widowed	506 (26)
Sexual activity in the past 3 months	1103 (58)
Health history	
Poor/fair overall health	250 (14)
Diabetes mellitus	469 (24)
Depression	346 (18)
Number of births mean (SD)	2.1 (\pm 1.4)
Any pelvic surgery history	397 (20)
Hysterectomy	80 (4)
Oophorectomy	84 (4)
Appendectomy	30 (2)
Uterine procedure (D&C, abortion)	102 (5)

	Women, N (%) N = 1974
Surgical management of urinary incontinence	34 (2)
Surgical management for pelvic organ prolapse	40 (2)
Surgery on anus	12 (1)
Surgery on colon	24 (1)
Postmenopausal	1736 (90)
Taking hormone replacement therapy	177 (9)
Body mass index (BMI)	
Underweight/normal weight (BMI<25.0)	523 (26)
Overweight (BMI 25.0–29.9)	582 (29)
Obese (BMI ≥30.0)	869 (44)

Note: body mass index (BMI), dilation and curettage (D&C), standard deviation (SD). Missing data for race/ethnicity (n=4), employment (n=6), household income (n=69), sexual activity in the past 3 months (n=35), diabetes (n=2); postmenopausal status (n=23), hormone replacement therapy (n=3), oophorectomy (n=8), appendectomy (n=4), surgical management of urinary incontinence and pelvic organ prolapse (n=2).

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Table 3.

Lifetime interpersonal violence exposures and clinically significant PTSD symptoms by race/ethnicity

	Women, N (%)					p-value
	Total (N=1970)	Asian/Pacific Islander (N=381)	Black/African- American (N=416)	Latina/Hispanic (N=394)	White/European/ Middle Eastern (N=778)	
Interpersonal violence type						
Physical IPV	316 (16)	23 (6)	98 (24)	77 (20)	118 (15)	<.0001
Emotional IPV	423 (22)	33 (9)	103 (25)	97 (25)	190 (25)	<.0001
Sexual assault	382 (20)	33 (9)	95 (23)	78 (20)	176 (23)	<.0001
Two or more types of IPV exposures	333 (17)	21 (5)	98 (23)	90 (20)	124 (18)	<.0001
Clinically significant PTSD symptoms ^a	299 (15)	56 (15)	69 (17)	55 (14)	119 (15)	.85

Note: IPV: intimate partner violence. For all women: missing data for physical IPV (n=5), emotional IPV (n=7), and sexual assault (n=21). For Asian/Pacific Islander women: missing data for physical IPV (n=2) and sexual IPV (n=4). For Black/African-American women: missing data for physical IPV (n=1), emotional IPV (n=3), and sexual assault (n=6). For Latina/Hispanic women: missing data for physical IPV (n=1) and sexual assault (n=4). For White/European/Middle Eastern women: missing data for physical IPV (n=1), emotional IPV (n=4), and sexual IPV (n=7).

^aDefined by PTSD Civilian Checklist score of 30 or higher

Table 4.

Self-reported bladder pain symptoms and urinary tract infection history by race/ethnicity

	Women, N (%)					p-value
	Total (N=1970)	Asian/Pacific Islander (N=381)	Black/African- American (N=416)	Latina/Hispanic (N=394)	White/European/ Middle Eastern (N=778)	
Bladder pain symptoms						
Any current	441 (22)	86 (23)	85 (20)	88 (22)	182 (23)	.80
Moderate-severe	292 (15)	60 (16)	56 (13)	66 (17)	110 (14)	.65
Antibiotic-treated urinary tract infections						
Ever/lifetime UTI	1171 (60)	192 (51)	242 (59)	237 (60)	499 (65)	<.001
UTI in the past 12 months	264 (13)	43 (11)	42 (10)	59 (15)	120 (16)	.06

Note: For all women: data missing for ever having a UTI (n=13) and for UTI in the past 12 months (n=14). For Asian/Pacific Islander women: data missing for both UTI outcomes (n=3). For Black/African-American women: data missing for both UTI outcomes (n=3). For White/European/Middle Eastern women: data missing for ever having a UTI (n=7) and for UTI in the past 12 months (n=8).

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Table 5.

Association between interpersonal violence, clinically significant PTSD symptoms, bladder pain, and antibiotic-treated urinary tract infection

	Odds Ratio (95% confidence interval)			
	Interpersonal violence type			Clinically significant PTSD symptoms ^a
	Physical IPV	Emotional IPV	Sexual assault	
Bladder pain symptoms				
Any	1.08 (0.77, 1.54)	1.19 (0.88, 1.61)	1.39 (1.02, 1.88) *	1.96 (1.45, 2.65) ***
Moderate-severe	1.25 (0.84, 1.85)	1.18 (0.83, 1.68)	1.29 (0.90, 1.84)	2.30 (1.64, 3.22) ***
Antibiotic-treated urinary tract infections				
Ever/lifetime UTI	1.38 (1.00, 1.86) *	1.88 (1.43, 2.48) ***	1.44 (1.09, 1.91) **	1.54 (1.16, 2.03) **
UTI in the past 12 months	1.12 (0.73, 1.72)	1.03 (0.71, 1.50)	0.85 (0.57, 1.28)	1.01 (0.68, 1.51)

Note: Odds ratios obtained from logistic regressions. Model adjusts for age, race/ethnicity, immigration status, general health, sexual activity in past 3 months, menopausal status, prior pelvic surgery, diabetes, and BMI. IPV: intimate partner violence, UTI: urinary tract infection

* P<.05

** P<.01

*** P<.001

^a Defined by PTSD Civilian Checklist score of 30 or higher

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