

## GYNECOLOGY

# Interpersonal trauma and aging-related genitourinary dysfunction in a national sample of older women



Carolyn J. Gibson, PhD, MPH; Nadra E. Lisha, PhD; Louise C. Walter, MD; Alison J. Huang, MD, MAS

**BACKGROUND:** Among reproductive-aged women, exposure to interpersonal trauma is associated with genitourinary symptoms. Little is known about the relationship between these exposures and the genitourinary health of older women, who tend to experience different and more prevalent genitourinary symptoms because of menopause and aging.

**OBJECTIVES:** In this study, we examined relationships between common types of interpersonal trauma and aging-related genitourinary dysfunction among older women.

**STUDY DESIGN:** We analyzed data from the National Social Life, Health, and Aging Project, a national area probability sample of older community-dwelling adults born between 1920 and 1947. We used cross-sectional data from home-based study visits conducted in 2005–2006 to examine interpersonal violence exposures (any lifetime sexual assault, past-year emotional and physical abuse), and past-year genitourinary symptoms (urinary incontinence, other urinary problems, and vaginal pain/lubrication problems with sexual intercourse) among women participants. Multivariable logistic regression models were used to relate interpersonal violence and genitourinary symptoms, adjusting for age, race/ethnicity, body mass index, education, marital status, parity, hormone therapy, depressive and anxiety symptoms, and self-reported health. In exploratory models, we further adjusted for vaginal maturation, a tissue-specific marker of aging-related urogenital atrophy obtained from vaginal self-swabs.

**RESULTS:** In this national sample of 1551 older women (mean age  $69 \pm 2$  years), 9% reported sexual assault, 23% reported emotional

abuse, and <1% reported physical abuse. Urinary incontinence and other urinary problems were reported by 42% and 17%, respectively, and 42% of sexually active women ( $n = 527$ ) reported vaginal symptoms with intercourse. In multivariable regression analyses adjusted for age, race/ethnicity, education, marital status, parity, hormone therapy, anxiety, depressive symptoms, and self-reported health, women with any lifetime history of sexual assault had 2.5 times the odds (95% confidence interval, 1.0–6.3) of vaginal symptoms, while women who reported past-year emotional abuse had higher odds of urinary incontinence (odds ratio, 1.7, 95% confidence interval, 1.2–2.4) and other urinary problems (odds ratio, 1.8, 95% confidence interval, 1.2–2.8). Among women who provided vaginal self-swabs ( $n = 869$ ), adjustment for vaginal maturation—attenuated associations with other urinary problems (odds ratio, 1.6, 95% confidence interval, .9–2.6) and vaginal symptoms (odds ratio, 2.2, 95% confidence interval, 0.8–5.8).

**CONCLUSION:** Sexual assault and emotional abuse may play a role in the development or experience of aging-related genitourinary dysfunction in older women. Clinicians caring for older women should recognize the prevalence and importance of traumatic exposures in health related to menopause and aging.

**Key words:** emotional abuse, genitourinary, sexual assault, sexual dysfunction, urinary incontinence

An estimated 1 in 4 women will experience physical, emotional, or sexual abuse in their lifetimes. These interpersonal trauma exposures are related to increased risk for mental health and medical comorbidities. Research and clinical attention has historically focused on younger women, and less is known about the prevalence of interpersonal trauma in older women or the potential impact of these experiences on aging-related health.<sup>1,2</sup> However, a growing body of evidence indicates that older women not only remain at risk for

these exposures but that the effect of interpersonal trauma may be even more pronounced on their physical health outcomes.<sup>3,4</sup>

Common physical health concerns among older women include chronic and progressive genitourinary symptoms affecting daily functioning and interpersonal relationships.<sup>5</sup> The prevalence of these symptoms, including urinary incontinence, other urinary complaints, and vaginal symptoms related to sexual function, increases with aging. Although risk is primarily attributed to aging-related biological changes, medical comorbidities, and vulvovaginal atrophy secondary to estrogen loss, significant variation in the development and presentation of these symptoms remains unexplained.

Among younger women, increased risk for different but related genitourinary symptoms are associated with interpersonal trauma<sup>6,7</sup> and other

psychosocial risk factors.<sup>8</sup> The relationship between these exposures and symptoms has not been examined among older women, for whom interpersonal trauma is an underrecognized risk factor that may have an impact on a broad range of aging-related health concerns and shape genitourinary aging.

In this study, we examined associations between interpersonal trauma and genitourinary dysfunction in a nationally representative sample of older women. We hypothesized that interpersonal trauma would be associated with increased risk for urinary and vaginal symptoms, independent of other known demographic, psychosocial, and clinical risk factors.

## Materials and Methods

### Study population

We used data from the first wave of the National Social Life, Health, and Aging

**Cite this article as:** Gibson CJ, Lisha NE, Walter LC, et al. Interpersonal trauma and aging-related genitourinary dysfunction in a national sample of older women. *Am J Obstet Gynecol* 2019;220:94.e1-7.

0002-9378/\$36.00

© 2018 Published by Elsevier Inc.

<https://doi.org/10.1016/j.ajog.2018.09.026>

## AJOG at a Glance

**Why was this study conducted?**

- To examine relationships between interpersonal trauma exposures and the genitourinary health of older women.

**Key findings**

- Any lifetime sexual assault and past-year emotional abuse were common in this large, national sample of older women.
- Emotional abuse was associated with urinary symptoms, while sexual assault was associated with vaginal symptoms related to sexual dysfunction.
- Associations were independent of demographic and clinical risk factors and only mildly attenuated in exploratory analyses including tissue-specific markers of vaginal atrophy.

**What does this add to what is known?**

- This research adds to the limited literature examining the prevalence and health-related impact of trauma in older adults, providing new evidence to suggest that clinicians caring for older women should expand use of trauma-informed care approaches for symptoms related to menopause and aging.

Project, a nationally representative probability sample of community-dwelling adults born between 1920 and 1947.<sup>9</sup> Details about study design and sampling have been described elsewhere.<sup>10</sup> Between July 2005 and March 2006, in-person, home-based interviews were conducted with 1550 women (75.5% overall-weighted response rate). The institutional review boards of the University of Chicago and National Opinion Research Center approved the protocol; all participants provided informed consent.

**Interpersonal trauma exposures**

Interpersonal trauma exposures were assessed by trained interviewers using structured questionnaire items similar to those used in screening protocols<sup>11</sup> and other observational studies.<sup>3</sup> Any lifetime sexual assault was assessed using the question, “Thinking about your entire life so far, has anyone ever made you have sex by using force or threatening to harm you or someone close to you?” Past-year physical abuse was assessed using the question, “Is there anyone who hits, kicks, slaps, pushes or throws things at you?” Past-year emotional abuse was categorized by a positive response to questions, “Is there anyone who is too controlling over your daily decisions and life?” and/or “Is there anyone who insults

you or puts you down?” Social relationships with perpetrators were not specified in these questionnaires and could include any person that the respondent had interacted with in the previous year. All items were dichotomized to indicate the presence or absence of the exposure.

**Genitourinary outcomes****Urinary symptoms**

The presence and frequency of urinary symptoms were assessed using structured-item questions previously used in epidemiological studies of older women.<sup>12,13</sup> Women were asked, “In the past 12 months, have you had difficulty controlling your bladder, including leaking small amounts of urine, leaking when you cough or sneeze, or not being able to make it to the bathroom on time?” to assess urinary incontinence and “In the past 12 months, have you had other problems with urinating, such as incomplete emptying, a weak urinary stream, straining to begin urination, or difficulty in postponing urination?” to assess other urinary problems. Those who reported symptoms in the past 12 months were asked to categorize the frequency of their symptoms as every day or a few times a week, month, or year. Urinary symptoms that occurred at least a few times a month were considered clinically significant, consistent

with thresholds in previous studies of similar populations.<sup>14–16</sup>

**Vaginal symptoms affecting sexual activity**

All women who reported partnered, voluntary sexual activity within the past year were asked whether there was a period of several months or more that they experienced: (1) pain during intercourse and (2) vaginal lubrication difficulty during intercourse. Women were considered to have clinically significant vaginal symptoms if they endorsed pain and/or lubrication difficulty.

**Vaginal maturation**

Vaginal epithelial cytology samples from 1028 participants (66%) were collected from vaginal self-swab specimens. Details about the collection protocol<sup>17</sup> and the evaluation of samples<sup>18</sup> have been described elsewhere, and the reliability of self-swab sampling has been previously validated.<sup>19</sup> Following standard protocols, samples were used to assess the proportion of parabasal, intermediate, or superficial vaginal epithelial cells.

Consistent with other observational and interventional studies of urogenital aging,<sup>20–22</sup> findings were then used to calculate the vaginal maturation value, a standardized tissue-based marker of vaginal atrophy.<sup>18</sup> A lower maturation value may signify genitourinary syndrome of menopause, a common chronic and progressive condition characterized by vulvovaginal, urinary, and/or sexual symptoms related to estrogen loss and vulvovaginal atrophy.<sup>5</sup>

**Covariates**

Sociodemographic and health-related covariates were self-reported. Age (continuous) was calculated from interview date and date of birth. Race/ethnicity, education, self-reported health (excellent, very good, good, fair, poor), menopausal hormone therapy use, marital status (married/living with a partner vs all other responses), and parity (0, 1, 2 or more live births) were obtained with interviewer-administered questions. Depressive symptoms were assessed with an interviewer-administered Center for Epidemiologic Studies Depression Scale

(range, 0–60)<sup>23</sup> and anxiety symptoms with the Generalized Anxiety Disorder-7 Item scale (range, 0–21),<sup>24</sup> analyzed as continuous scores.

### Statistical analyses

Characteristics of the sample were examined using weighted descriptive statistics to account for differential probabilities of selection and response rates.<sup>10</sup> Differences in the following 3 main outcomes were examined with logistic regression models in Mplus 8.0 (Muthén & Muthén, Los Angeles, CA)<sup>25</sup>: (1) urinary incontinence, (2) other urinary problems, and (3) vaginal pain/lubrication difficulty. Data for urinary symptoms were available in the full sample, while vaginal symptoms were assessed only in women who reported past-year partnered sexual activity.

We used the full information maximum likelihood method,<sup>26,27</sup> which has been shown to produce greater accuracy in model estimations by adjusting for the uncertainty caused by missing data.<sup>28,29</sup> Primary analyses were performed using unadjusted models followed by fully adjusted multivariable models. All adjusted models controlled for age, race/ethnicity, education, body mass index, marital status, parity, hormone therapy, depressive symptoms, anxiety symptoms, and self-reported health.

In exploratory analyses, fully adjusted multivariable models were repeated in a subsample restricted to women who had provided vaginal self-swab specimens, with vaginal maturation included as an additional covariate.

Sampling weights were used to ensure correct calculation of the point estimates. As recommended by National Social Life, Health, and Aging Project, we used weight accounting for nonresponse by age and race.<sup>30</sup> Stratification and clustering statements were used to calculate standard errors along with the corresponding tests of statistical significance.

## Results

### Characteristics of the sample

The primary analytic sample included 1551 women (mean age 68.5 years, SD, 0.23) who provided self-report data on interpersonal trauma and genitourinary

Characteristic	n	weighted n (weighted %)
Past-year emotional abuse	329	329.1 (22.5)
Any lifetime sexual assault	99	113.0 (9.0)
Urinary incontinence <sup>a</sup>	599	606.7 (41.9)
Other urinary problems <sup>a</sup>	229	231.4 (16.6)
Vaginal symptoms <sup>b</sup>	221	261.5 (42.1)
Age, y <sup>c</sup>		
57–65	555	689.0 (44.5)
66–75	538	504.9 (32.6)
76–85	458	354.6 (22.9)
Race/ethnicity		
Non-Latina white	1079	124.1 (80.5)
Black or African American	285	167.1 (10.8)
Latina or Hispanic	151	103.4 (6.7)
Married/living with a partner	762	895.5 (57.8)
Education		
High school or less	831	768.3 (49.6)
College or higher	720	780.2 (50.4)
Hormone therapy	160	189.6 (12.4)
Parity		
Nulliparous	34	29.2 (2.1)
Primiparous	175	179.8 (12.6)
Multiparous	1221	1217.0 (85.3)
Self-reported health		
Excellent	174	199.3 (6.5)
Very good	441	483.3 (31.3)
Good	496	486.2 (31.5)
Fair	313	273.5 (20.8)
Poor	119	100.6 (6.5)
Depressive symptoms (CES-D $\geq$ 16) <sup>c</sup>	99	25 (4.2)
Anxiety symptoms (GAD-7 $\geq$ 8) <sup>c</sup>	235	72 (13.5)
Vaginal estrogenization (maturation mean $\pm$ SD) <sup>d</sup>	869	46.6 (0.8)

*CES-D*, Center for Epidemiologic Studies Depression Scale; *GAD-7*, Generalized Anxiety Disorder-7 item scale.

<sup>a</sup> Assessed in full sample (n = 1551); in analyses, variables dichotomized to a few times or more a month vs else; <sup>b</sup> Limited to participants who report being sexually active within the past year (n = 527); <sup>c</sup> Continuous variable used in analyses; <sup>d</sup> Limited to participants who provided adequate vaginal cytology sample (n = 869).

Gibson et al. Trauma and genitourinary symptoms related to menopause and aging. *Am J Obstet Gynecol* 2019.

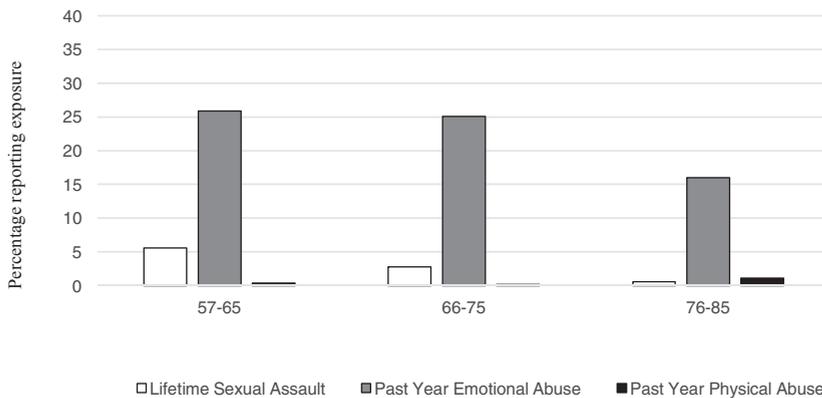
symptoms. Participants were primarily non-Latina white (80.5%), married or living with a partner (57.8%), and multiparous (85.3%). Greater than 69% reported their health as good or better, and clinically significant depressive

symptoms were reported by only 6% of participants.

### Interpersonal trauma exposures

Any lifetime sexual assault was reported by 9.0% of participants, while 22.5%

**FIGURE**  
Prevalence of interpersonal trauma exposures by age



$\chi^2$  tests of trend indicate that reported sexual assault and emotional abuse, but not physical abuse, declined with age ( $P < .01$ ,  $P < .001$ , and  $P = .92$ , respectively).

Gibson et al. Trauma and genitourinary symptoms related to menopause and aging. *Am J Obstet Gynecol* 2019.

reported past-year emotional abuse (Table 1). Past-year physical abuse was reported by 5 women (<1%) and not included in subsequent analyses because of insufficient power. Greater than 20% of the women in the sample did not provide information about sexual assault. Analyses of key variable differences between groups suggest that nonresponse to this item was more common among African-American and non-partnered women. The prevalence of any lifetime sexual assault and past-year emotional abuse declined with age (Figure).

### Genitourinary symptoms

In the full sample, 41.9% reported urinary incontinence, and 16.6% reported other urinary problems. Among participants who reported partnered sexual activity ( $n = 527$ ), 42.1% reported pain with intercourse or lubrication difficulty affecting sexual function (Table 1). All genitourinary symptoms were more common with increased age.

### Vaginal maturation

Vaginal self-swab specimens were provided by 1028 participants, with 869 specimens determined adequate for further analysis. As previously reported, participants who did not provide vaginal swab specimens were older, less likely to have graduated from high school, and

less likely to report hormone therapy use or frequent sexual activity in the previous year.<sup>18</sup> Participants who did not provide specimens were also more likely to report lifetime sexual violence exposure, but there were no differences in past-year emotional abuse. Genitourinary symptom reporting was similar in both groups.<sup>18</sup> The mean vaginal maturation value was 46.6 (SD, .8) (Table 1); 43% had a maturation value less than 50, a commonly used threshold for distinguishing clinically significant vaginal atrophy.

### Interpersonal trauma and urinary symptoms

In the full primary analytic sample ( $n = 1551$ ), any lifetime sexual assault was not associated with urinary symptoms in minimally or fully adjusted models. In contrast, past-year emotional abuse was associated with both urinary incontinence (odds ratio [OR], 1.7, 95% confidence interval [CI], 1.2–2.4) and other urinary problems (OR, 1.8, 95% CI, 1.2–2.8) (Table 2).

In sensitivity analyses, a similar but attenuated pattern of results was seen in the subsample limited to women who provided vaginal swab specimens ( $n = 869$ ), both with and without additional adjustment for vaginal maturation. Past-year emotional abuse remained significantly associated with urinary

incontinence (OR, 1.5, 95% CI, 1.0–2.4) but not other urinary problems (OR, 1.6, 95% CI, .9–2.6) (Table 3).

### Interpersonal trauma and vaginal symptoms

Among sexually active women ( $n = 527$ ), any lifetime sexual assault was associated with vaginal pain with intercourse/lubrication difficulty in fully adjusted models (OR, 2.5, 95% CI, 1.0–6.3). Past-year emotional abuse was not significantly associated with vaginal symptoms (Table 2).

In exploratory analyses, a similar pattern of results was seen among women who provided vaginal swab specimens and reported sexual activity in the previous year ( $n = 306$ ), both with and without additional adjustment for vaginal maturation. The association between any lifetime sexual assault and vaginal symptoms was similar but no longer significant (OR, 2.0, 95% CI, .7–5.9); no association was seen between past-year emotional abuse and vaginal symptoms (Table 3). Vaginal maturation was not related to vaginal symptoms (data not shown).

### Comment

We examined associations between interpersonal trauma and genitourinary symptoms in a nationally representative sample of older, community-dwelling women. While few women reported physical abuse in the past year, at least 1 in 5 women reported past-year emotional abuse, and almost 1 in 10 reported any lifetime history of sexual assault. Accounting for known risk factors, any lifetime history of sexual assault was associated with more than a 2-fold increased odds of vaginal symptoms affecting sexual function, while past-year emotional abuse was associated with a greater than 70% increased odds of urinary incontinence and other urinary symptoms.

This study adds to a growing body of evidence demonstrating that older women remain at risk for interpersonal trauma, affecting mortality and declining physical functioning.<sup>3</sup> A recent review of the existing literature suggests that the risk for emotional abuse remains

**TABLE 2**  
**Associations between interpersonal maltreatment and genitourinary symptoms (n = 1551)**

Variables	Any lifetime sexual assault, OR (95% CI)	Past-year emotional abuse, OR (95% CI)
Urinary incontinence (n = 1551)	1.0 (.6–1.6)	1.7 (1.2–2.4) <sup>a</sup>
Other urinary problems (n = 1551)	0.8 (.4–1.3)	1.8 (1.2–2.8) <sup>a</sup>
Vaginal symptoms (n = 527) <sup>b</sup>	2.5 (1.0–6.3) <sup>c</sup>	1.6 (1.0–2.6)

Full information maximum likelihood models, adjusted for age, race/ethnicity, body mass index, education, marital status, parity, hormone therapy, depressive symptoms, anxiety symptoms, and self-reported health.

CI, confidence interval; OR, odds ratio.

<sup>a</sup>  $P < .01$ ; <sup>b</sup> Vaginal symptoms assessed only among women who reported partnered sexual activity in the previous 12 months; <sup>c</sup>  $P < .05$ .

Gibson et al. Trauma and genitourinary symptoms related to menopause and aging. *Am J Obstet Gynecol* 2019.

stable across the life span, while recent physical abuse may be less common among older women.<sup>4</sup> Our research is consistent with these findings, with nearly a quarter of older women reporting recent emotionally abusive experiences, whereas physical abuse was rarely reported. Despite the prevalence of emotional abuse among older women in this and other studies, emotional abuse tends to receive less attention in clinical settings and research endeavors than physical and sexual abuse. However, our findings suggest that this common and often underrecognized exposure has independent effects on genitourinary symptoms that may have a negative impact on the quality of life and daily functioning.

These findings advance our knowledge of the health-related impact of trauma among older women, identifying novel associations between trauma and common genitourinary symptoms. The specific links we observed between emotional abuse and urinary symptoms, as well as between sexual assault and vaginal symptoms related to sexual function, are consistent with some past research focused on reproductive-aged women. Increased risk for vaginal symptoms and associated sexual dysfunction has been observed among reproductive-aged women who report a history of childhood and/or adulthood sexual assault.<sup>31–33</sup>

Similarly, studies of women in younger age groups have shown an

association between emotional intimate partner violence and self-reported urinary incontinence and general genitourinary symptoms.<sup>34,35</sup> However, past studies have also demonstrated a relationship between sexual assault and lower urinary tract symptoms in reproductive-aged women,<sup>6,34,36–38</sup> which was not seen in our study.

Differences between findings in the current study and the previous literature may be due to the different etiology and expression of genitourinary symptoms in older women and/or differences in the timing of sexual assault experiences occurring in older vs younger women. Urinary symptoms are more common among older women, with increased risk related in part to the cumulative effects of childbirth, chronic medical conditions such as diabetes and cardiovascular disease, declining physical function, and atrophic changes related to estrogen loss.

Given these risk factors related to menopause and aging, interpersonal trauma may not play a unique role in the pathophysiology of these symptoms in older women as they do in younger women. Additionally, the relationship between sexual assault and genitourinary outcomes may change over time. Sexual assault was assessed only as an exposure that had occurred at any point in a participant's lifetime, and it was not possible to account for time elapsed since this experience.

The observed relationships between trauma and genitourinary symptoms may be due to behavioral and/or biological pathways, which cannot be fully determined from this assessment. However, our findings indicate that the effects of interpersonal trauma on genitourinary dysfunction appear to be independent of sociodemographic differences as well as differences in general self-reported health and mood symptoms. Furthermore, our findings do not indicate that associations between interpersonal trauma exposures and genitourinary symptoms are primarily mediated by tissue-specific markers of urogenital atrophy.

After adjustment for vaginal maturation, a marker of vaginal cellular atrophy related to estrogen loss, we still observed

**TABLE 3**  
**Associations between interpersonal maltreatment and genitourinary symptoms (subsample limited to women with vaginal cytology data, n = 869)**

Variables	Any lifetime sexual assault, OR (95% CI)	Past-year emotional abuse, OR (95% CI)
Urinary incontinence (n = 869)	1.6 (.9–2.6)	1.6 (1.1–2.4) <sup>a</sup>
Other urinary problems (n = 869)	0.6 (.3–1.0)	1.6 (.9–2.6)
Vaginal symptoms (n = 306) <sup>b</sup>	2.0 (.7–5.9)	1.7 (.9–3.3)

Full information maximum likelihood models, adjusted for age, race/ethnicity, body mass index, education, marital status, parity, hormone therapy, depressive symptoms, anxiety symptoms, self-reported health, and vaginal maturation.

CI, confidence interval; OR, odds ratio.

<sup>a</sup>  $P < .05$ ; <sup>b</sup> Vaginal symptoms assessed only among women who reported partnered sexual activity in the previous 12 months.

Gibson et al. Trauma and genitourinary symptoms related to menopause and aging. *Am J Obstet Gynecol* 2019.

a strong relationship between emotional abuse and urinary incontinence and a nonsignificant but related pattern between emotional abuse and other urinary problems, suggesting that the relationship between trauma and genitourinary dysfunction is largely or entirely mediated by other mechanisms. Although the relationship between sexual assault and vaginal symptoms was attenuated to nonsignificance in equivalent models, the pattern of results remained the same. The loss of statistical significance may have been due to reduced power and selection bias in this constrained subsample, which was limited to a fraction of the larger sample who both remained sexually active and provided cytology specimens.

Women who reported any lifetime sexual violence were also less likely to provide specimens, which may have contributed to underestimated risk in this subsample. These findings do not negate a role of vaginal maturation in genitourinary dysfunction. However, this exploratory analysis suggests that for many women, the subjective experience of genitourinary symptoms is related to psychosocial factors and not dependent on tissue-specific evidence of atrophy.

These findings should be interpreted in light of several limitations. Information about vaginal symptoms was assessed only among women who reported partnered sexual activity in the previous year, precluding examination of these relationships among women who are no longer sexually active. Women who remain sexually active well into their 70s, 80s, and 90s may be a unique population with limited generalizability because partnered sexual activity reflects a level of health as well as availability of partners.

The urinary symptom measures in this study have not undergone psychometric validation against voiding diaries, although they have previously been used to demonstrate associations with other health-related outcomes in older women.<sup>12,13</sup> Only 66% of participants provided vaginal self-swabs, limiting our ability to interpret exploratory analyses that included vaginal maturation in this subsample. Differences in vaginal

maturation may be expected in those who did not provide self-swabs, who tended to be older, less likely to use hormone therapy, and less likely to be sexually active.

Information about the use of lubricants and/or vaginal estrogen therapy, which may affect vaginal symptom presentation and vaginal cytology, was not available. The duration of interpersonal trauma exposures, as well as the relationship of the perpetrator(s) to the participants, cannot be determined in these data.

Emotional and physical abuse assessment was limited to past-year exposures, while no specificity of timing was available for history of sexual assault. The items used to define emotional abuse are dependent on subjective interpretations of interpersonal experiences, which may not accurately reflect abusive behaviors. Some women chose not to respond to these questions, particularly those related to sexual assault; although we used statistical approaches to account for missing data, this may reflect the sensitive nature of these disclosures, especially because they were assessed in home-based interviews in which partners, family members, and potential perpetrators may have been present.

This study also has a number of strengths, including a large, nationally representative sample of community-dwelling older women, a population that is understudied in relation to trauma as well as sexual health. We accounted for a wide array of demographic, psychosocial, and clinical factors, thus minimizing the likelihood that observed associations were caused by confounding. The study also includes the characterization of multiple aspects of common and disruptive aging-related genitourinary symptoms, assessed with both self-report measures and tissue-specific markers of vulvovaginal atrophy.

### Conclusion

Our findings from a national cohort of older women indicate that sexual assault and emotional abuse may play a role in the development and experience of aging-related genitourinary complaints in older women, independent of demographic or

clinical factors. Although these exposures are not typically considered in the clinical care of older women, our research suggests that they are both prevalent and important in shaping the experience of genitourinary aging for older women. These findings highlight the importance of additional research to clarify the role of different types of interpersonal trauma exposures in women's health across the life span. They also call attention to the need for greater recognition of the prevalence and importance of traumatic exposures by clinicians caring for older women and the expanded use of both routine screening for traumatic exposures and trauma-informed care approaches for symptoms related to menopause and aging. ■

### Acknowledgment

Dr Gibson was responsible for the initial study concept and design, interpretation of data, and manuscript preparation and revision. Dr Lisha designed and conducted all data analyses, guided interpretation of data, and contributed to critical revision of the manuscript. Dr Walter contributed to the interpretation of data and critical revision of the manuscript. Dr Huang guided the study concept and design and contributed to the interpretation of data and critical revision of the manuscript. All authors provided final approval of the submitted version of this manuscript.

### References

1. Tracy EE, Speakman E. Intimate partner violence: not just a concern of the reproductive ages. *Menopause* 2012;19:3-5.
2. Karakurt G, Silver KE. Emotional abuse in intimate relationships: the role of gender and age. *Violence Vict* 2013;28:804-21.
3. Cannell MB, Weitlauf JC, Garcia L, Andresen EM, Margolis KL, Manini TM. Cross-sectional and longitudinal risk of physical impairment in a cohort of postmenopausal women who experience physical and verbal abuse. *BMC Womens Health* 2015;15:98.
4. Knight L, Hester M. Domestic violence and mental health in older adults. *Int Rev Psychiatry* 2016;28:464-74.
5. Gandhi J, Chen A, Dagur G, et al. Genitourinary syndrome of menopause: evaluation, sequelae, and management. *Am J Obstet Gynecol* 2016;215:704-11.
6. Bradley CS, Nygaard IE, Mengeling MA, et al. Urinary incontinence, depression and post-traumatic stress disorder in women veterans. *Am J Obstet Gynecol* 2012;206:502.e501-8.
7. Yehuda R, Lehrner A, Rosenbaum TY. PTSD and Sexual dysfunction in men and women. *J Sex Med* 2015;12:1107-19.

8. Cohen BE, Maguen S, Bertenthal D, Shi Y, Jacoby V, Seal KH. Reproductive and other health outcomes in Iraq and Afghanistan women veterans using VA health care: association with mental health diagnoses. *Womens Health Issues* 2012;22:e461–71.
9. Waite LJ, Laumann EO, Levinson W, Lindau ST, O’Muircheartaigh CA. National Social Life, Health, and Aging Project (NSHAP): Wave 1. Ann Arbor, MI: Inter-university Consortium for Political and Social Research; 2014.
10. O’Muircheartaigh C, Eckman S, Smith S. Statistical design and estimation for the national social life, health, and aging project. *J Gerontol B Psychol Sci Soc Sci* 2009;64(Suppl 1):i12–9.
11. Hussain N, Sprague S, Madden K, Hussain FN, Pindiprolu B, Bhandari M. A comparison of the types of screening tool administration methods used for the detection of intimate partner violence: a systematic review and meta-analysis. *Trauma Violence Abuse* 2015;16:60–9.
12. Yip SO, Dick MA, McPencow AM, Martin DK, Ciarleglio MM, Erekson EA. The association between urinary and fecal incontinence and social isolation in older women. *Am J Obstet Gynecol* 2013;208:146.e141–7.
13. Erekson EA, Ciarleglio MM, Hanissian PD, Strohbehm K, Bynum JP, Fried TR. Functional disability and compromised mobility among older women with urinary incontinence. *Female Pelvic Med Reconstr Surg* 2015;21:170–5.
14. Waetjen LE, Xing G, Johnson WO, Melnikow J, Gold EB. Study of Women’s Health Across the N. Factors associated with seeking treatment for urinary incontinence during the menopausal transition. *Obstet Gynecol* 2015;125:1071–9.
15. Suskind AM, Cawthon PM, Nakagawa S, et al. Urinary incontinence in older women: the role of body composition and muscle strength: from the Health, Aging, and Body Composition Study. *J Am Geriatr Soc* 2017;65:42–50.
16. Townsend MK, Curhan GC, Resnick NM, Grodstein F. The incidence of urinary incontinence across Asian, black, and white women in the United States. *Am J Obstet Gynecol* 2010;202:378.e371–7.
17. Lindau ST, Hoffmann JN, Lundeen K, Jaszczak A, McClintock MK, Jordan JA. Vaginal self-swab specimen collection in a home-based survey of older women: methods and applications. *J Gerontol B Psychol Sci Soc Sci* 2009;64(Suppl 1):i106–18.
18. Lindau ST, Dude A, Gavrilova N, Hoffmann JN, Schumm LP, McClintock MK. Prevalence and correlates of vaginal estrogenization in postmenopausal women in the United States. *Menopause* 2017;24:536–45.
19. Hess R, Austin RM, Dillon S, Chang CC, Ness RB. Vaginal maturation index self-sample collection in mid-life women: acceptability and correlation with physician-collected samples. *Menopause* 2008;15(4 Pt 1):726–9.
20. Simon J, Nachtigall L, Gut R, Lang E, Archer DF, Utian W. Effective treatment of vaginal atrophy with an ultra-low-dose estradiol vaginal tablet. *Obstet Gynecol* 2008;112:1053–60.
21. Carmignani LO, Pedro AO, Montemor EB, Arias VA, Costa-Paiva LH, Pinto-Neto AM. Effects of a soy-based dietary supplement compared with low-dose hormone therapy on the urogenital system: a randomized, double-blind, controlled clinical trial. *Menopause* 2015;22:741–9.
22. Davila GW, Singh A, Karapanagiotou I, et al. Are women with urogenital atrophy symptomatic? *Am J Obstet Gynecol* 2003;188:382–8.
23. Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. *Appl Psychol Measure* 1977:385–401.
24. Spitzer RL, Kroenke K, Williams JB, Lowe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;166:1092–7.
25. Muthén L, Muthén B. MPlus user’s guide, Fifth ed. Los Angeles, CA: Muthén & Muthén; 2007.
26. Little RJA, Rubin DB. *Statistical analysis with missing data*. New York, NY: John Wiley & Sons; 1987.
27. Rubin DB. *Inference and missing data*. *Biometrika* 1976;63:581.
28. Collins LM, Schafer JL, Kam CM. A comparison of inclusive and restrictive strategies in modern missing data procedures. *Psychol Methods* 2001;6:330–51.
29. McArdle JJ, Hamagami F. Modeling incomplete longitudinal and cross-sectional data using latent growth structural models. *Experimental Aging Research* 1992;18:145–66.
30. O’Muircheartaigh C, English N, Pedlow S, Kwok PK. Sample design, sample augmentation, and estimation for Wave 2 of the NSHAP. *J Gerontol B Psychol Sci Soc Sci* 2014;69(Suppl 2):S15–26.
31. Golding JM, Wilsnack SC, Learman LA. Prevalence of sexual assault history among women with common gynecologic symptoms. *Am J Obstet Gynecol* 1998;179:1013–9.
32. Campbell R, Wasco SM. Understanding rape and sexual assault: 20 years of progress and future directions. *J Interpers Violence* 2005;20:127–31.
33. Meana M, Binik YM, Khalife S, Cohen D. Psychosocial correlates of pain attributions in women with dyspareunia. *Psychosomatics* 1999;40:497–502.
34. Link CL, Lutfey KE, Steers WD, McKinlay JB. Is abuse causally related to urologic symptoms? Results from the Boston Area Community Health (BACH) survey. *Eur Urol* 2007;52:397–406.
35. Johnson JK, John R, Humera A, Kukreja S, Found M, Lindow SW. The prevalence of emotional abuse in gynaecology patients and its association with gynaecological symptoms. *Eur J Obstet Gynecol Reprod Biol* 2007;133:95–9.
36. Bradley CS, Nygaard IE, Hillis SL, Torner JC, Sadler AG. Longitudinal associations between mental health conditions and overactive bladder in women veterans. *Am J Obstet Gynecol* 2017;217:430.e431–8.
37. Bradley CS, Nygaard IE, Torner JC, Hillis SL, Johnson S, Sadler AG. Overactive bladder and mental health symptoms in recently deployed female veterans. *J Urol* 2014;191:1327–32.
38. Klausner AP, Ibanez D, King AB, et al. The influence of psychiatric comorbidities and sexual trauma on lower urinary tract symptoms in female veterans. *J Urol* 2009;182:2785–90.

### Author and article information

From the San Francisco Veterans Affairs Health Care System (Drs Gibson and Walter) and the Division of General Internal Medicine, Department of Medicine, University of California, San Francisco (Drs Lisha, Walter, and Huang), San Francisco, CA.

Received May 2, 2018; revised July 25, 2018; accepted Sept. 21, 2018.

The views expressed herein are those of the authors and do not necessarily represent the official views of the Department of Veterans Affairs.

Dr Gibson received travel support from NORC at the University of Chicago to present the initial study concept and design for this manuscript at the 2016 National Social Life, Health, and Aging Project Data Users’ Conference. Dr Huang has received research grants from Pfizer Inc and Astellas through the University of California, San Francisco, to conduct research unrelated to this manuscript. Drs Lisha and Walter report no conflict of interest. This research was supported in part by the Veterans Affairs Advanced Fellowship Program in Women’s Health at the San Francisco Veterans Affairs Health Care System (to Dr Gibson).

The initial study design, methods, subject recruitment, and data collection for the National Social Life, Health, and Aging Project was funded by the National Institutes of Health, including the National Institute on Aging, the Office of Women’s Health Research, the Office of AIDS Research, and the Office of Behavioral and Social Sciences Research (R01AG021487) and was conducted by the nonpartisan and objective research organization NORC at the University of Chicago. The sponsor was not involved in the analysis or preparation of this manuscript.

An abstract from this research was presented at the 2018 annual meeting of the Society for General Internal Medicine, Denver, CO, April 11–14, 2018.

Corresponding author: Carolyn Gibson, PhD, MPH. Carolyn.Gibson2@va.gov