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The Prevalence of Lower Urinary Tract Symptoms (LUTS) and Overactive Bladder (OAB) by Racial/Ethnic Group and Age: Results From OAB-POLL

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Aims: To estimate the prevalence of LUTS and OAB in a large, ethnically diverse US study. **Methods:** This cross-sectional, population-representative survey was conducted via the Internet in the US among 10,000 men and women aged 18–70 (2,000 African-Americans [AA], 2,000 Hispanics, 6,000 whites). The LUTS tool assessed how often participants experienced LUTS during the past 4 weeks on a five-point Likert scale. OAB was defined by the presence of urinary urgency $\geq$ "sometimes" or $\geq$ "often," and/or the presence of urgency urinary incontinence (UUI). Descriptive statistics were used to evaluate group differences. Logistic regression analyses were conducted to examine the impact of racial/ethnic group on OAB. **Results:** Response rate, 56.7%. Prevalent LUTS included terminal dribble and nocturia across gender, post-micturition leaking (men), and stress incontinence (women). Prevalence of OAB $\geq$ "sometimes" and $\geq$ "often" were 17% and 8% in men and 30% and 20% in women—with significantly higher rates among AA men and women. A similar trend was found for UUI among men (AA, 10%; Hispanic and whites, 6%), while AA and white women had higher prevalence of UUI (19%) as compared to Hispanic women (16%). In logistic regression analyses, AA and Hispanic men and women were significantly more likely than whites to have OAB despite having lower prevalence of self-reported comorbid conditions and risk factors. **Conclusions:** LUTS and OAB are highly prevalent in both men and women and increase with advancing age. Further, racial/ethnic group is a robust predictor of OAB in men and women. *Neurourol. Urodynam. 32:230–237, 2013.* © 2012 Wiley Periodicals, Inc.

Key words: epidemiology; ethnic group; OAB; prevalence; race

INTRODUCTION

Lower urinary tract symptoms (LUTS), including urinary incontinence (UI), and overactive bladder (OAB)[1] are highly prevalent conditions that impact health-related quality of life (HRQL).[2–4] Estimates of OAB prevalence in population-based studies range between 7% and 27% in men and 9% and 43% in women.

Some research has evaluated the impact of racial/ethnic group on LUTS, UI,[5–7] and OAB.[8–10] While similar rates of LUTS have been found across racial/ethnic groups,[8–10] UI has been shown to be more prevalent among white women compared with African-American (AA) and Asian women,[7,11] and data on the prevalence of UI for Hispanic women in relation to other racial/ethnic groups are mixed.[7,12] OAB did not differ by racial/ethnic group in a gynecology practice of AA, Hispanic, and white women,[13] nor was racial/ethnic group a correlate of OAB in men from a urology clinic.[14] However, a secondary analysis of Epidemiology of Lower Urinary Tract Symptoms (EpiLUTS), a large, population-representative study of adults age 40 and over in the United States (US), Sweden, and United Kingdom (UK), found that the prevalence of OAB was highest among AA men and women and that Asian women were less likely to report OAB as compared to other racial/ethnic groups.[15] A multivariate analysis of EpiLUTS also demonstrated that racial/ethnic group was a robust predictor of OAB in men but not women.

Importantly, much of the research on the impact of racial/ethnic group on LUTS and OAB has been secondary data analyses or focused on UI. As such, these studies were not specifically developed—and perhaps not sufficiently powered—for evaluating LUTS and OAB symptom prevalence across racial/ethnic groups. Additional population-based studies with large minority samples are needed to better understand the impact of racial/ethnic group on urinary symptoms. The primary objectives of the OAB on Physical and Occupational Limitations (OAB-POLL) study were to estimate the prevalence of OAB and LUTS and to provide benchmark data on work productivity and physical functioning in a large, population-based, ethnically diverse sample of men, and women in the US.

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MATERIALS AND METHODS

Participant Recruitment

This large population-based, cross-sectional Internet-based survey was conducted to examine the prevalence of OAB and other LUTS by racial/ethnic group and to evaluate the impact of OAB on work productivity and physical functioning. Participants were recruited from the YouGov Internet-based panel (Palo Alto, CA). "Sample matching" was used to maximize study generalizability and involves selecting participants from the Internet-based panel for recruitment on the basis of certain characteristics to reflect the characteristics of the target sample.[16,17] A similar study approach was detailed elsewhere.[16,18] In this study, the sample was matched on age and gender within each racial/ethnic group using the most recently available census data.[19] Recruitment efforts were intensified in order to reach older minorities and to ensure the sample of 60% white, 20% AA, and 20% Hispanic men and women. When there was an overabundance of respondents with eligible surveys, surveys that were representative of the target sample and diverse with respect to education level were randomly selected from the pool of completed survey responses. Other small imbalances between the final matched sample and the target sample were corrected by sample weighting.

Study Procedures

Internet-based panel members representative of the target sample who had not participated in a survey in the past 2 weeks were emailed an introductory letter that included a study URL for log in purposes. Non-responding panelists received up to two follow-up emails. Prior to survey completion, participants were directed to an informed consent screen that outlined the purposes of the study, the basic procedures, and the risks and benefits to participants. In order to proceed to the survey, the respondent must have consented to participate by clicking on a button at the bottom of the screen. Upon completion of the survey, participants received between 1,500 and 4,000 points, which translate into a monetary value of $1.50–4.00.

Study inclusion criteria were: (i) age 18–70; (ii) provision of informed consent; (iii) ability to read English; and (iv) ability to use computer and access internet. Respondents who reported currently being pregnant or having a urinary tract infection (UTI) were excluded.

Study Measures

The OAB-POLL survey consisted of validated questionnaires as well as a few newly developed questions. Symptoms of OAB/LUTS were evaluated by the LUTS Tool, which was developed for Internet use.[18,20] Recall period was the past 4 weeks; responses for the majority of LUTS were rated on a five-point Likert scale, that is, "never," "rarely," "sometimes," "often," and "almost always". For purposes of comparison, the OAB questions from the EPIC study were also included.[3] Participants were asked questions about sociodemographics, comorbid conditions, risk factors, generic and condition-specific HRQL, physical functioning, health care seeking behavior and treatment, and work productivity. Due to the skip-out response format, the number and type of questions asked varied across participants (i.e., participants with more LUTS were asked more questions regarding the frequency and bother of each question). The median survey completion time was 19.6 min.

Statistical Analysis

Statistical analyses were performed using SAS/STAT® version 9.1.3 (SAS Institute Inc., Cary, NC). Demographic variables, comorbid conditions, risk factors, and symptom prevalence were summarized using descriptive statistics. For categorical data, Chi-square tests were used to evaluate group differences. For continuous data, statistical comparisons were made using Student's *t*-test for two group comparisons and general linear models for multiple group comparisons with Scheffe's post-hoc comparison adjustment for multiple pairwise comparisons.

Symptom presence was defined by dichotomizing the Likert responses to $\geq$ "sometimes" ("never" and "rarely" vs. "sometimes" or more). OAB was defined by the presence of urgency urinary *and/or* urgency urinary incontinence (UUI). The prevalence of UUI $\geq$ "a few times a month" was also presented among those with OAB. To examine the impact of racial/ethnic group on OAB status, logistic regression analyses were conducted separately by gender. The dependent variable was OAB status (OAB $\geq$ "sometimes" vs. no OAB), and each model controlled for age, racial/ethnic group, education level, BMI, current smoking status (yes/no), alcohol use (heavy or moderate/no use), mobility limitations, and comorbid conditions (yes/no), including arthritis, asthma, anxiety, depression, diabetes, heart disease, hypertension, neurologic conditions, history of recurrent urinary tract infections (UTI), sleep apnea, and IBS. Additional risk factors included prostate cancer, benign prostatic hyperplasia (BPH) and prostatitis for men and endometriosis and uterine prolapse for women. In order to test whether the relationship between ethnicity and OAB was dependent on age, the model was also run with the interaction term age $\times$ racial/ethnic group. Given the multiple analyses and large sample size, $P < 0.01$ was considered to be significant.

RESULTS

Survey invitations were sent to 38,469 panel members; 18,591 individuals responded (response rates: total, 56.7%; AA, 46.9%; Hispanic, 51.7%; white, 61.8%). Data collection was conducted starting on June 29, 2010 and completed on August 17, 2010. The final sample included 10,000 participants who were selected from the pool of completed respondents through "sample matching"[16] to ensure their representation of the US population with respect to age, gender, and education.

Sample sizes by racial/ethnic group were 6,000 whites (men, 2,968; women, 3,032), 2,000 AAs (men, 974; women, 1,026 women), and 2,000 Hispanics (men, 1,035; women, 965). Mean age was 41.3 for men and 42.2 for women (Table I). The majority of participants were married or living with a partner (men, 54.7%; women, 56.0%) and working full- or part-time (men, 67.7%; women, 52.9%; data on file). The majority of participants had at least a high school or some college education level 65% of men and 68.8% of women, with significant differences noted across racial/ethnic group (data on file). Hispanic men were more likely to have a high school or lower education than AA or white men, and AA women were more likely to have some college and greater education than Hispanic or white women.

White men and women reported a higher prevalence of comorbid conditions as compared to AAs and Hispanics, including arthritis, chronic anxiety, depression, fibromyalgia, heart disease, irritable bowel syndrome, mobility limitations, neurological conditions, and sleep apnea (Table I). White men also

TABLE I. Age and Comorbid Conditions by Racial/Ethnic Group[a]

	Men				Women			
	African-American (N = 974)	Hispanic (N = 1,035)	White (N = 2,968)	*P*-value	African-American (N = 1,026)	Hispanic (N = 965)	White (N = 3,032)	*P*-value
Age (mean years, SD)[b]	38.2 (13.7)	34.9 (12.5)	44.6 (14.1)	<0.0001	39.7 (13.5)	35.9 (12.6)	45.1 (14.0)	<0.0001
Comorbid Conditions (n, %)								
Arthritis	94 (9.7%)	83 (8.0%)	501 (16.9%)	<0.0001	148 (14.4%)	84 (8.7%)	660 (21.8%)	<0.0001
Asthma	133 (13.7%)	128 (12.4%)	329 (11.1%)	0.0788	143 (14.0%)	131 (13.6%)	412 (13.6%)	0.9561
Bladder cancer	0 (0.0%)	0 (0.0%)	6 (0.2%)	0.1243	0 (0.0%)	1 (0.1%)	5 (0.2%)	0.3593
Chronic anxiety	21 (2.1%)	33 (3.2%)	172 (5.8%)	<0.0001	42 (4.1%)	57 (5.9%)	309 (10.2%)	<0.0001
Chronic constipation	9 (0.9%)	12 (1.2%)	17 (0.6%)	0.1409	16 (1.6%)	15 (1.5%)	77 (2.5%)	0.0697
Chronic fatigue syndrome	7 (0.8%)	5 (0.5%)	34 (1.1%)	0.1506	12 (1.1%)	19 (2.0%)	87 (2.9%)	0.0039
Depression	95 (9.8%)	137 (13.2%)	538 (18.1%)	<0.0001	168 (16.4%)	179 (18.6%)	837 (27.6%)	<0.0001
Diabetes	86 (8.8%)	80 (7.7%)	270 (9.1%)	0.3859	77 (7.5%)	68 (7.0%)	223 (7.4%)	0.9213
Fibromyalgia	3 (0.3%)	7 (0.7%)	33 (1.1%)	0.0351	21 (2.1%)	23 (2.4%)	138 (4.6%)	<0.0001
Heart disease	25 (2.6%)	19 (1.8%)	150 (5.0%)	<0.0001	20 (2.0%)	8 (0.8%)	81 (2.7%)	0.0020
Hypertension	297 (30.5%)	199 (19.3%)	871 (29.3%)	<0.0001	290 (28.3%)	114 (11.8%)	643 (21.2%)	<0.0001
Interstitial cystitis/painful bladder syndrome	1 (0.1%)	3 (0.3%)	1 (0.0%)	0.1590	2 (0.1%)	4 (0.4%)	27 (0.9%)	0.0216
Irritable Bowel Syndrome	16 (1.7%)	23 (2.2%)	106 (3.6%)	0.0033	34 (3.3%)	39 (4.1%)	291 (9.6%)	<0.0001
Mobility limitations	35 (3.6%)	27 (2.6%)	154 (5.2%)	0.0011	52 (5.1%)	25 (2.6%)	200 (6.6%)	<0.0001
Neurological conditions	21 (2.1%)	11 (1.1%)	77 (2.6%)	0.0177	21 (2.0%)	12 (1.3%)	98 (3.2%)	0.0014
Recurrent urinary tract infections	7 (0.8%)	8 (0.8%)	12 (0.4%)	0.2420	20 (1.9%)	34 (3.5%)	123 (4.1%)	0.0060
Sleep apnea or sleep disorder	105 (10.8%)	101 (9.7%)	438 (14.8%)	<0.0001	78 (7.6%)	53 (5.5%)	276 (9.1%)	0.0013
Male-specific comorbidities								
Prostate cancer	15 (1.5%)	2 (0.2%)	27 (0.9%)	0.0050				
Prostate enlargement/BPH	29 (3.0%)	14 (1.4%)	153 (5.2%)	<0.0001				
Prostatitis/prostatic inflammation	8 (0.8%)	11 (1.0%)	56 (1.9%)	0.0228				
Female-specific conditions								
Uterine prolapse					3 (0.3%)	4 (0.4%)	47 (1.5%)	0.0003
Endometriosis					27 (2.6%)	26 (2.7%)	147 (4.9%)	0.0006

[a]All N's presented are weighted to the US census within each racial/ethnic group; subgroups may or may not equal total N due to rounding or weighted values.

[b]Significant differences of $P < 0.001$ for each pairwise comparison using Scheffe's test adjusting for multiple comparisons. Pairwise comparisons were: AA versus Hispanic; AA versus white; and Hispanic versus white.

reported a higher prevalence of prostate enlargement/BPH and prostatitis, while white women had a higher prevalence of uterine prolapse, endometriosis, and recurrent UTI. By contrast, prostate cancer was highest among AA men, and hypertension was highest in AA men and women.

White men and women reported significantly higher prevalence of risk factors as compared to AA and Hispanic men and women, including currently smoking, drinking alcohol four or more times a week, and consuming caffeine (Tables IIa and IIb). AA women had a significantly greater mean BMI and weighed more than Hispanic or white women.

The most prevalent LUTS among men and women was terminal dribble, which was reported by 36.8% of men and 33.4% of women. Other common LUTS included post-micturition leaking and nocturia among men and nocturia, urgency, stress urinary incontinence (SUI), incomplete emptying, and UUI among women. As expected, the majority of all LUTS tended to increase by age group. Statistically significant differences were found across racial/ethnic groups among men for nine LUTS (Table IIIa). Among women, most LUTS were similar across racial/ethnic group, with the exception of nocturia, split stream, and UUI, which were highest among AA women, and SUI and leak for no reason, which were highest among white women (Table IIIb).

The overall prevalence of OAB $\geq$ "sometimes" was 16.4% among men and 30.0% among women. The prevalence of OAB in the total US population age 18–70 was 23.2%. OAB prevalence was significantly higher for AA men (20.2%) compared to Hispanic (18.1%) and white (14.6%) men (Fig. 1a,b). Similarly, AA women had a higher prevalence of OAB (32.6%) as compared to Hispanic (29.0%) and white (29.4%) women. Among men, UUI (defined as $\geq$ a few times a month) was most prevalent among AA men (AA, 6.7%; Hispanic, 4.3%; whites, 4.2%) and across age groups. Among women overall, the prevalence of UUI was higher among AA and white women (14.2% and 14.9%, respectively) compared to Hispanic women (10.6%), while some differences in this trend were found across age groups.

The multivariate logistic regression analyses revealed a number of significant associations (data on file). Among men, statistically significant predictors of OAB were increasing age, AA and Hispanic racial/ethnic group, smoking, arthritis, depression, heart disease, hypertension, mobility limitations, neurological conditions, recurrent UTI, BPH, and prostatitis. Among women, significant predictors of OAB were increasing age, BMI, AA and Hispanic racial/ethnic group, post-graduate or 4-year educational attainment, smoking, arthritis, depression, IBS, neurological conditions, recurrent UTI, sleep apnea, and the age $\times$ racial/ethnic group interaction. Importantly, AA and Hispanic men were 3.7 and 5.8 times more likely to have OAB than white men, and AA and Hispanic women were 3.4 and 4.7 times more likely to have OAB than white women—indicating that AA and Hispanic men and women were significantly more likely to have OAB despite having lower prevalence of self-reported comorbid conditions and risk factors associated with OAB.

TABLE IIa. Risk Factors of Participants by Racial/Ethnic Group: Men[a]

	African-American (N = 974)	Hispanic (N = 1,035)	White (N = 2,968)	*P*-value
Cigarette use				
Current smoker (n, %)	161 (16.6%)	168 (16.2%)	552 (18.6%)	<0.0001
Ex-smoker (n, %)	160 (16.5%)	174 (16.8%)	900 (30.3%)	
Non-smoker (n, %)	652 (66.9%)	694 (67.0%)	1,516 (51.1%)	
Alcohol consumption (n, %)				
Never	309 (31.8%)	279 (27.0%)	775 (26.1%)	<0.0001
Monthly or less	277 (28.4%)	307 (29.7%)	703 (23.7%)	
2–4 times a month	183 (18.8%)	222 (21.4%)	534 (18.0%)	
2–3 times a week	127 (13.0%)	147 (14.2%)	478 (16.1%)	
4 or more times a week	78 (8.0%)	80 (7.7%)	475 (16.0%)	
Alcohol consumption per day when drinking (n, %)				
1 or 2	367 (55.8%)	343 (45.4%)	1,304 (59.7%)	<0.0001
3 or 4	200 (30.3%)	235 (31.1%)	553 (25.3%)	
5 or 6	71 (10.8%)	94 (12.4%)	232 (10.6%)	
7 to 9	15 (2.3%)	46 (6.1%)	58 (2.6%)	
10 or more	6 (0.8%)	38 (5.0%)	36 (1.6%)	
Alcohol consumption of six or more drinks on one occasion (n, %)				
Never	326 (49.3%)	267 (35.3%)	959 (43.8%)	<0.0001
Less than monthly	200 (30.2%)	275 (36.5%)	766 (34.9%)	
Monthly	82 (12.4%)	112 (14.8%)	246 (11.2%)	
Weekly	45 (6.9%)	89 (11.7%)	167 (7.6%)	
Daily or almost daily	8 (1.2%)	13 (1.7%)	54 (2.5%)	
Caffeine consumption (n, %)				
Never	154 (15.8%)	111 (10.7%)	174 (5.9%)	<0.0001
Monthly or less	147 (15.1%)	132 (12.8%)	139 (4.7%)	
2–4 times a month	168 (17.3%)	126 (12.2%)	172 (5.8%)	
Once a week or more	505 (51.8%)	666 (64.3%)	2,480 (83.6%)	
Height (mean inches, SD)[b,c]	70.5 (3.2)	68.9 (3.1)	70.6 (2.9)	<0.0001
Weight (mean pounds, SD)[b,d]	208.0 (53.0)	198.1 (47.0)	208.7 (48.2)	<0.0001
Body mass index (mean, SD)	29.4 (6.8)	29.4 (6.5)	29.4 (6.3)	0.9639

[a]All N's presented are weighted to the US census within each racial/ethnic group; subgroups may or may not equal total N due to rounding or weighted values.
[b]Pairwise comparisons between means were performed using Scheffe's test adjusting for multiple comparisons; *P*-values are: *<0.05, **<0.01, ***<0.001.
[c]Significant differences between height: *** AA versus Hispanic; Hispanic versus White.
[d]Significant differences between weight: *** AA versus Hispanic; Hispanic versus White.

DISCUSSION

This large population-based study found a high prevalence of LUTS and OAB among men and women aged 18–70 and significant differences by racial/ethnic group. Consistent with prior research,[3,4] LUTS and OAB were shown to increase with advancing age, and gender differences were most striking for those with and without UUI. Estimates of OAB using the LUTS tool were 17% in men and 30% in women using the cutpoint $\geq$ "sometimes." Results based on questions from the EPIC survey were remarkably similar (men, 18%; women, 31%). These findings were consistent with EpiLUTS, where the prevalence of OAB overall was higher given the older age of the sample (men, 27%; women, 43%).[15]

Prior epidemiological studies in the US and Europe have found somewhat lower prevalence rates of OAB that were similar across gender.[3,4,21,22] The prevalence of UUI in OAB-POLL (4.7% in men; 14% in women) was also higher than reported in a prior US study (Noble),[4] in which the prevalence of OAB with UUI was 2.6% among men and 9.3% among women. These discrepant findings may reflect differences in modes of administration, questions used to define OAB, and study populations. Additionally, criteria for OAB in Noble predated current ICS guidelines and included presence of *either* "more than eight micturitions per day" *or* "the use of coping strategies" in addition to the presence of urgency with or without UUI. This difference—coupled with the use of a telephone interview, which may result in a bias toward socially acceptable responses to sensitive questions—also may account for the lower prevalence reported in Noble.

The oversampling of minorities in OAB-POLL allowed for the prevalence of LUTS and OAB to be evaluated across the three largest racial/ethnic groups in the US. In contrast prior research showing that LUTS other than UI are similar across racial/ethnic groups,[8–10] OAB-POLL found statistically significant differences by racial/ethnic group for several LUTS among men and for a few LUTS among women. The prevalence of OAB was highest among AA men and women (20% and 33%). In men, this was followed by Hispanics (18%) and whites (15%), while rates were comparable among Hispanic and white women (29%).

As demonstrated for the first time in this large, multi-ethnic study, AA and Hispanic men and women were significantly more likely to have OAB despite having a lower prevalence of self-reported comorbid conditions and risk factors associated with OAB. Interestingly, several behavioral risk factors were also higher in white as compared to AA and Hispanic men and women. Although the risk factors and comorbid conditions associated with LUTS and OAB have been well-documented, few studies examining the prevalence of OAB/UI across racial/ethnic groups have adjusted for these factors.

A secondary analysis of EpiLUTS found that OAB was most common among AA men and women.[15] However, after controlling for comorbid conditions and risk factors, racial/ethnic

TABLE IIb. Risk Factors of Participants by Racial/Ethnic Group: Women[a]

	African-American (N = 1,026)	Hispanic (N = 965)	White (N = 3,032)	*P*-value
Cigarette use				
Current smoker (n, %)	180 (17.6%)	105 (10.9%)	695 (23.0%)	<0.0001
Ex-smoker (n, %)	132 (12.9%)	152 (15.8%)	788 (26.0%)	
Non-smoker (n, %)	712 (69.6%)	706 (73.3%)	1,544 (51.0%)	
Alcohol consumption (n, %)				
Never	397 (38.7%)	316 (32.8%)	988 (32.6%)	<0.0001
Monthly or less	335 (32.7%)	379 (39.3%)	906 (29.9%)	
2–4 times a month	167 (16.3%)	174 (18.0%)	547 (18.1%)	
2–3 times a week	90 (8.8%)	63 (6.5%)	338 (11.1%)	
4 or more times a week	36 (3.5%)	33 (3.4%)	252 (8.3%)	
Alcohol consumption per day when drinking (n, %)				
1 or 2	483 (77.3%)	428 (66.1%)	1,523 (74.7%)	<0.0001
3 or 4	114 (18.3%)	165 (25.4%)	367 (18.0%)	
5 or 6	23 (3.7%)	35 (5.4%)	118 (5.8%)	
7 to 9	4 (0.7%)	15 (2.3%)	23 (1.1%)	
10 or more	0 (0.0%)	5 (0.8%)	8 (0.4%)	
Alcohol consumption of six or more drinks on one occasion (n, %)				
Never	431 (68.4%)	392 (60.8%)	1,318 (64.6%)	0.0178
Less than monthly	158 (25.1%)	183 (28.4%)	523 (25.6%)	
Monthly	25 (4.0%)	49 (7.6%)	111 (5.4%)	
Weekly	11 (1.8%)	18 (2.8%)	75 (3.7%)	
Daily or almost daily	4 (0.7%)	3 (0.4%)	15 (0.7%)	
Caffeine consumption (n, %)				
Never	126 (12.3%)	81 (8.5%)	214 (7.1%)	<0.0001
Monthly or less	165 (16.1%)	118 (12.2%)	141 (4.6%)	
2–4 times a month	177 (17.3%)	105 (10.9%)	190 (6.3%)	
Once a week or more	557 (54.3%)	659 (68.4%)	2,484 (82.0%)	
Height (mean inches, SD)[b,c]	64.8 (2.8)	63.5 (2.8)	64.5 (2.9)	<0.0001
Weight (mean pounds, SD)[b,d]	182.3 (56.1)	162.2 (46.0)	168.3 (47.0)	<0.0001
Body mass index (mean, SD)[b,e]	30.5 (9.1)	28.3 (7.6)	28.5 (7.6)	<0.0001
Post-Menopausal (n, %)	239 (23.3)	149 (15.5)	1,136 (37.5)	<0.0001
Hysterectomy (n, %)	149 (14.5)	70 (7.3)	533 (17.6)	<0.0001

[a]All N's presented are weighted to the US census within each racial/ethnic group; subgroups may or may not equal total N due to rounding or weighted values.
[b]Pairwise comparisons between means were performed using Scheffe's test adjusting for multiple comparisons; *P*-values are: *<0.05, **<0.01, ***<0.001.
[c]Significant differences between height: *** AA versus Hispanic; Hispanic versus White.
[d]Significant differences between weight: *** AA versus Hispanic; Hispanic versus White.
[e]Significant differences between BMI: *** AA versus Hispanic; AA versus White.

group was significantly associated with OAB among men but not women. By contrast, Tennstedt et al.[6] found that racial/ethnic group was a significant correlate of weekly UI among women but not in men. Thom et al.[7] found that differences in the risk of UUI between AA, Hispanic, and Asian American women were negligible after adjustment for multiple risk factors, while the risk of SUI in white women was almost twice that of Asian-American women and almost three times the risk of AA women. Finally, Townsend et al.[11] found that the overall incidence of incontinence was significantly higher in white women compared with AA after controlling for other risk factors.

Thus, these findings add to a growing body of research showing that some LUTS—most notably OAB and UI—vary across racial/ethnic groups even when covariates are controlled. However, further epidemiologic research with large minority samples is needed to confirm these results. In addition, biological data are needed to pinpoint potential etiological factors. Differences by racial/ethnic group may reflect genetic influences or cultural differences that affect other potentially pathogenetic mechanisms, such as age at childbirth, number of births, and familial environmental exposures[23] While this study accounted for some of these behavioral health factors—such as smoking habits, physical activity level, and BMI—the construct of racial/ethnic group may be acting as a proxy for other unmeasured risk factors of OAB and LUTS. Being a member of a minority racial/ethnic group may increase the likelihood of having said risk factors as well as affect access to financial and social supports to cope with OAB.

This study has limitations. Presence of OAB and comorbid conditions was based on participant self-report rather than clinician diagnosis. Participants were recruited on the Internet, which may result in a sample bias toward younger, White participants with higher education levels. In a Norwegian study designed to compare web-based- and postal survey recruitment for evaluating the prevalence of urinary incontinence, Klovning et al.[24] found that the sample recruited via the Internet was biased toward younger respondents and attracted participants with more severe urinary symptoms. The present study was designed with an awareness of these limitations, and recruitment efforts were intensified to reach the target sample, particularly with respect to older minorities. Still, the use of "opt-in" recruitment rather than random selection may have resulted in bias. It is possible that participants with urinary symptoms were more likely to complete the survey. Alternatively, the Internet-based format might reduce socially desirable responses to these sensitive

TABLE IIIa. Prevalence of Incontinence and Lower Urinary Tract Symptoms (LUTS) ≥ Sometimes by Racial/Ethnic Group: Men[a]

	African-American (N = 974)	Hispanic (N = 1,035)	White (N = 2,968)	*P*-value
LUTS				
Nocturia ≥ 2 (n, %)	279 (28.9%)	259 (25.0%)	587 (19.8%)	<0.0001
Perceived frequency (n, %)	123 (12.7%)	171 (16.5%)	374 (12.6%)	0.0045
Urgency (n, %)	161 (16.5%)	164 (15.9%)	392 (13.2%)	0.0122
Urgency with a fear of leaking (n, %)	88 (9.1%)	104 (10.0%)	212 (7.2%)	0.0069
Incomplete emptying (n, %)	145 (14.9%)	189 (18.3%)	453 (15.3%)	0.0523
Weak stream (n, %)	128 (13.2%)	159 (15.4%)	540 (18.3%)	0.0005
Terminal dribble (n, %)	327 (33.8%)	370 (35.8%)	1,130 (38.1%)	0.0370
Intermittency (n, %)	96 (9.8%)	132 (12.8%)	386 (13.0%)	0.0265
Hesitancy (n, %)	112 (11.6%)	180 (17.4%)	491 (16.6%)	0.0003
Split stream (n, %)	151 (15.6%)	184 (17.8%)	427 (14.4%)	0.0343
Straining (n, %)	47 (4.9%)	72 (7.0%)	147 (5.0%)	0.0351
Incontinence "yes" (n, %)				
Post-micturition leaking	305 (31.3%)	326 (31.5%)	902 (30.4%)	0.7353
Urgency incontinence	92 (9.5%)	62 (6.0%)	180 (6.1%)	0.0007
Stress incontinence (laughing, sneezing, coughing)	39 (4.0%)	42 (4.0%)	36 (1.2%)	<0.0001
Stress incontinence (physical activities)	15 (1.5%)	19 (1.8%)	31 (1.0%)	0.1122
Leak for no reason	7 (0.7%)	30 (2.9%)	39 (1.3%)	<0.0001
Nocturnal enuresis	18 (1.9%)	33 (3.2%)	58 (2.0%)	0.0531
Leak during sexual activity	16 (1.6%)	20 (1.9%)	14 (0.5%)	<0.0001

[a]All N's presented are weighted to the US census within each racial/ethnic group; subgroups may or may not equal total N due to rounding or weighted values.

questions.[25,26] Importantly, all recruitment methods suffer from threats to generalizability, and Internet surveys may be preferable to mail or telephone surveys when appropriate for the survey topic and when general applicability from the study sample to the target population can be achieved.[27] A strength of the approach used in this Internet-based study is the use of "sample matching," a methodology for selection of representative samples from non-randomly selected pools of respondents.[17]

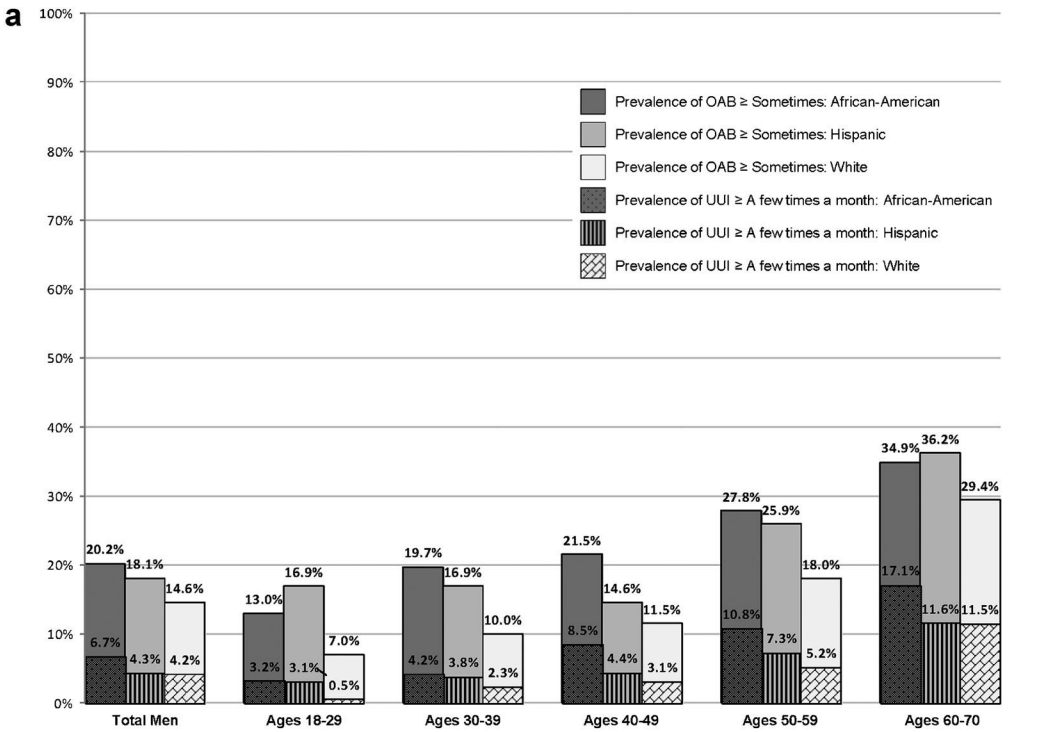
Another limitation concerns the assignment of racial/ethnic group, which was based on a prior report from the YouGov online panel in which respondents self-identified as Black, White, or Hispanic, respectively. While these categories are not consistent with current US Census delineations, sample targets were obtained by race, age, and gender group based on the 2007 US Census American Community Survey. The exclusion of Asian-Americans from this study to focus on the most prevalent ethnic minorities in the US prevents comparison of results to some prior studies. Although this analysis provides important information on the associations between factors that impact the prevalence of OAB and LUTS across the major racial/ethnic groups, the cross-sectional design prohibits delineation of cause and effect.

Importantly, many risk factors and comorbid conditions associated with OAB/LUTS are modifiable by a healthy lifestyle of increased physical activity and weight loss.[28–30]

TABLE IIIb. Prevalence of Incontinence and Lower Urinary Tract Symptoms (LUTS) ≥ Sometimes by Racial/Ethnic Group: Women[a]

	African-American (N = 1,026)	Hispanic (N = 965)	White (N = 3,032)	*P*-value
LUTS				
Nocturia ≥ 2 (n, %)	383 (37.6%)	259 (26.9%)	753 (24.9%)	<0.0001
Perceived frequency (n, %)	168 (16.4%)	182 (19.0%)	523 (17.2%)	0.2959
Urgency (n, %)	265 (25.9%)	223 (23.1%)	739 (24.4%)	0.3665
Urgency with a fear of leaking (n, %)	199 (19.5%)	172 (17.9%)	634 (21.0%)	0.1041
Incomplete emptying (n, %)	212 (20.7%)	198 (20.6%)	639 (21.1%)	0.9141
Weak stream (n, %)	133 (13.1%)	130 (13.5%)	423 (14.0%)	0.7524
Terminal dribble (n, %)	345 (33.8%)	294 (30.6%)	1,034 (34.2%)	0.1137
Intermittency (n, %)	107 (10.4%)	118 (12.3%)	368 (12.1%)	0.3072
Hesitancy (n, %)	127 (12.4%)	108 (11.2%)	388 (12.8%)	0.4244
Split stream (n, %)	120 (11.8%)	87 (9.0%)	257 (8.5%)	0.0068
Straining (n, %)	48 (4.6%)	37 (3.9%)	155 (5.1%)	0.2767
Incontinence "yes" (n, %)				
Post-micturition leaking	167 (16.3%)	134 (13.9%)	426 (14.1%)	0.1740
Urgency incontinence	198 (19.3%)	149 (15.5%)	582 (19.2%)	0.0271
Stress incontinence (laughing, sneezing, coughing)	255 (24.8%)	364 (37.7%)	1,217 (40.1%)	<0.0001
Stress incontinence (physical activities)	52 (5.0%)	106 (11.0%)	469 (15.5%)	<0.0001
Leak for no reason	35 (3.4%)	48 (5.0%)	179 (5.9%)	0.0061
Nocturnal enuresis	57 (5.5%)	34 (3.6%)	137 (4.5%)	0.1105
Leak during sexual activity	35 (3.4%)	35 (3.6%)	78 (2.6%)	0.1421

[a]All N's presented are weighted to the US census within each racial/ethnic group; subgroups may or may not equal total N due to rounding or weighted values.



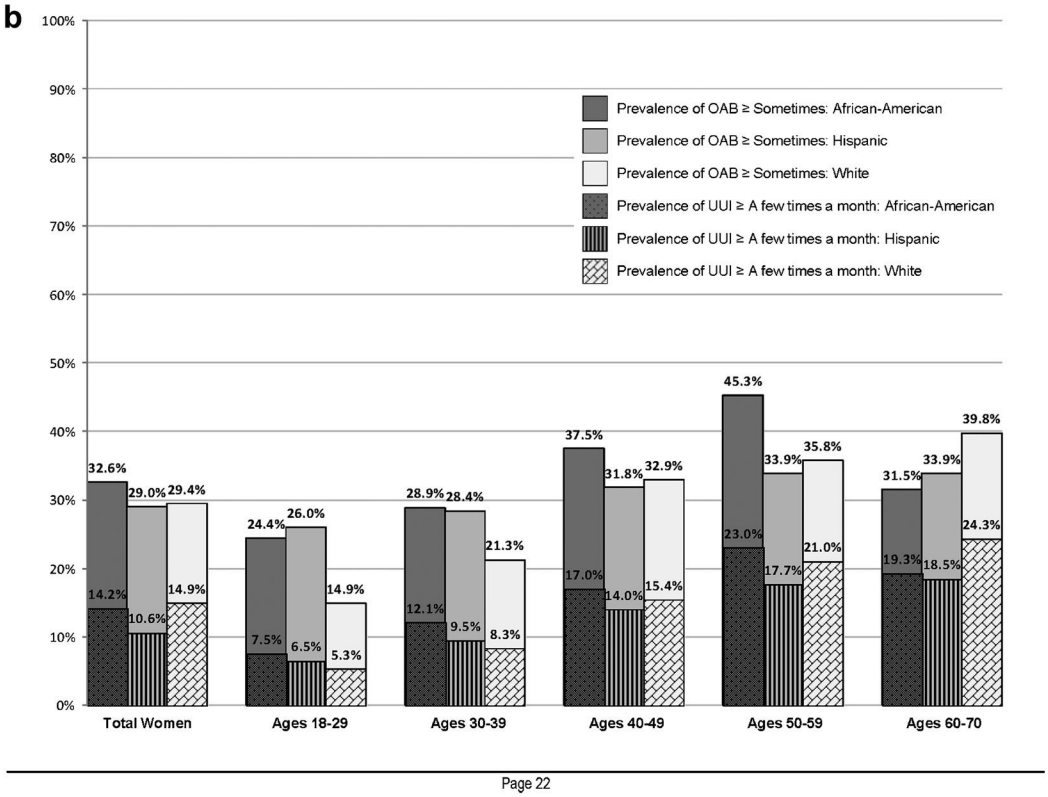


Fig. 1. Prevalence of OAB ≥ Sometimes and Prevalence of UUI by Race and Age: (**a**) Men and (**b**) Women.

Longitudinal studies would help clinicians to better understand the pathophysiology of OAB/LUTS and associated risk factors and comorbid conditions across different ethnicities.

CONCLUSIONS

This study provides new insights into the prevalence of LUTS and OAB by racial/ethnic group. Consistent with prior research, OAB is highly prevalent in both men and women and increases with advancing age. AA and Hispanic men and women were significantly more likely to have OAB despite having a lower prevalence of self-reported comorbid conditions and risk factors associated with OAB.

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