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Authors

Le, Thu
Ensrud, Kristine
Cawthon, Peggy
et al.

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Lower Urinary Tract Symptom Severity, Urinary Bother, and Incident Life-Space Mobility Restriction among Older Men

Scott R. Bauer, MD, ScM[1,2,3], **Thu Le, MPH**[4], **Kristine E. Ensrud, MD**[5,6], **Peggy M. Cawthon, PhD, MPH**[7,8], **John C. Newman, MD, PhD**[9,10], **Anne M. Suskind, MD, MS**[2], **Kenneth Covinsky, MD**[3,10], **Lynn M. Marshall, ScD**[4],

Osteoporotic Fractures in Men (MrOS) Research Group

[1]Division of General Internal Medicine, Department of Medicine, University of California, San Francisco, CA

[2]Department of Urology, University of California, San Francisco, CA

[3]San Francisco VA Healthcare System, San Francisco, CA

[4]Oregon Health and Science University-Portland State University School of Public Health, Portland, OR

[5]Department of Medicine and Division of Epidemiology and Community Health, University of Minnesota, Minneapolis, MN

[6]Center for Care Delivery and Outcomes Research, Veterans Affairs Health Care System, Minneapolis, MN

[7]Department of Epidemiology and Biostatistics, University of California, San Francisco, CA

[8]Research Institute, California Pacific Medical Center, San Francisco, CA

[9]Buck Institute for Research on Aging, Novato, CA

[10]Division of Geriatrics, Department of Medicine, University of California, San Francisco, CA

Abstract

Corresponding Author: Scott R. Bauer, Work address: SFVA Medical Center, Division of General Internal Medicine, 4150 Clement St., Building 2, Room 135, San Francisco, CA 94121, Scott.Bauer@ucsf.edu, Phone: 415-221-4810 x24322, Twitter handle: @ScottBauerMD.

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T. Le: conception and design, acquisition of data, analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

K. Ensrud: analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

P. Cawthon: conception and design, acquisition of data, analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

J. Newman: analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

A. Suskind: analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

K. Covinsky: conception and design, analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

L. Marshall: conception and design, acquisition of data, analysis and interpretation of data, revising the article for important intellectual content, final approval of the version to be published

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Background: Life-space mobility represents distance, frequency, and independence of mobility, ranging from one's bedroom to beyond their town. Older men with lower urinary tract symptoms (LUTS) may limit their life-space to stay close to a bathroom. However, it's unknown whether LUTS severity or urinary bother are associated with risk of life-space mobility restriction.

Methods: We analyzed data from 3025 community-dwelling men age ≥71 years without life-space mobility restriction at analytic baseline (Year 7) of the Osteoporotic Fractures in Men (MrOS) study. The American Urologic Association Symptom Index (AUASI) was assessed at baseline and includes one question assessing urinary bother ("If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?"; score 0–1,2,3,4–6) and seven items to classify LUTS severity as none/mild (score 0–7), moderate (8–19), or severe (20–35). The University of Alabama Life-space Assessment was used to define life-space mobility restriction (≤60) at baseline and follow-up (Year 9). We used log-binomial regression with robust variance estimators to model adjusted risk ratios (ARR) for LUTS severity and urinary bother with incident life-space mobility restriction controlling for age, site, health-related factors, and comorbidities. We then mutually adjusted for urinary bother and LUTS severity.

Results: Overall, 2-year risk of life-space mobility restriction was 9.9%. Compared to men without urinary bother (scores 0–1), risk of life-space mobility restriction was significantly higher among men with bother scores of 4–6 (ARR=2.20, 95%CI:1.52,3.19), independent of LUTS severity and confounders. Conversely, LUTS severity was not independently associated with risk of life-space mobility restriction.

Conclusions: Urinary bother, but not LUTS severity, is independently associated with incident life-space mobility restriction among older men. To maintain life-space mobility in older men with LUTS, future studies should identify shared mechanisms and interventions that minimize urinary bother.

Keywords

Aging; Epidemiology; Benign Prostatic Hyperplasia; Mobility; Activities of Daily Living

INTRODUCTION

Lower urinary tract symptoms (LUTS) affect almost half of men after age 70 years[1,2] and are associated with increased risk of falls, mobility and functional limitations, and mortality.[3–9] LUTS are a complex syndrome of overlapping and chronic symptoms that occur during urine storage (urgency, frequency, nocturia, incontinence), urine voiding (slow/weak or intermittent stream, hesitancy, straining), or immediately after voiding (sensation of incomplete bladder emptying).[10] Older men with greater LUTS severity are also more likely to be depressed and phenotypically frail.[2,11] The combination of these physical and psychological comorbidities plus the need to remain in close proximity to a bathroom to avoid episodes of urgency urinary incontinence may cause older men with LUTS to avoid leaving their home. Life-space mobility, defined as the "movement extending from within one's home to movement beyond one's town or geographic region," attempts to capture the type of enacted mobility within an individual's own environment that could be compromised

by the presence and impact of LUTS.[12,13] However, the relationship between LUTS and life-space mobility restriction among older community-dwelling men remains unknown.

Maintaining mobility is critical to the well-being and independence of older adults, including older men with LUTS. Older men who are able to avoid life-space mobility restriction have lower risk of functional decline, institutionalization, and mortality as well as lower healthcare utilization.[14–17] Importantly, life-space mobility measures account for the various demographic, biological, medical, psychological, sociological, and environmental factors that influence how frequently and how far someone travels beyond their bedroom. Therefore, life-space mobility is a more comprehensive and integrated measure of both intrinsic and extrinsic causes of mobility limitations among older men with LUTS compared to performance-based (e.g. gait speed) or self-reported (e.g., ability to walk 2–3 blocks) measures.

LUTS severity (frequency of urinary symptoms) and urinary bother (degree of bother due to urinary symptoms) are overlapping, but distinct, measures of urologic health. Although they are correlated,[18–22] some men with moderate-to-severe LUTS report little or no urinary bother and some men with mild LUTS report significant urinary bother.[18,20,22] Thus, coping skills, personality traits, or greater physical functioning may be protective against changes in life-space mobility by minimizing urinary bother despite more severe LUTS. Alternatively, older men could be more affected by the frequency of LUTS when deciding whether or not to leave their home, independent of urinary bother.

In order to address this gap in knowledge, we evaluated the association of baseline LUTS severity and urinary bother with incident life-space mobility restriction in a large cohort of older, community-dwelling men. We hypothesized that men with more severe LUTS and greater urinary bother at baseline would have a higher risk of developing new life-space mobility restriction within 2 years and that these associations would be independent of each other.

METHODS

Participants

The Osteoporotic Fractures in Men (MrOS) study is a large, multicenter cohort study of 5,994 community-dwelling men age 65 years or older at enrollment as previously described.[23,24] Briefly, this cohort was designed to collect comprehensive data to study older men's health, including urologic symptoms, with a particular focus on falls and fractures. Men were recruited from March 2000 to April 2002 from six academic medical centers in Birmingham, Alabama; Minneapolis, Minnesota; Palo Alto, California; Pittsburgh, Pennsylvania; Portland, Oregon; and San Diego, California. All eligible surviving participants were invited to return to the clinic during Year 7 (March 2007 – March 2009) and to complete an interim questionnaire during Year 9 (March 2009 – February 2011). Year 7 was the first visit at which men were administrated a life-space assessment. The analytic cohort for this study included 3,025 men who attended the Year 7 clinic visit and completed the Year 9 questionnaire, completed the life-space assessment at both Year 7 and 9, completed LUTS assessments and reported no life-space mobility

restriction (defined below) at Year 7 (Supplemental Figure 1). All participants gave written informed consent and Institutional Review Boards at each participating institution approved the study.

LUTS Severity and Urinary Bother Assessment

LUTS were assessed during Year 7 using the validated and widely used American Urological Association Symptom Index (AUASI)[25], including seven individual items on urinary frequency, urgency, intermittency, straining, weak urinary stream, incomplete bladder emptying, and nocturia. Responses to each item are on an ordinal scale with values ranging from 0 to 5 (higher = more frequent symptoms) and total scores range from 0 to 35. For example, to evaluate the storage symptom of urgency men were asked “Over the past month, how often have you found it difficult to postpone urination?” and to evaluate the voiding symptom of incomplete emptying men were asked “Over the past month, how often have you had a sensation of not emptying your bladder completely after you finish urinating?” Response options included “Not at all”, “Less than 1 time in 5”, “Less than half the time”, “About half the time”, “More than half the time”, or “Almost always”. The AUASI has clinically relevant categories of LUTS severity: 0 to 7 (none/mild), 8 to 19 (moderate), and 20 to 35 (severe).[26] For sensitivity analyses, we also calculated psychometrically-validated AUASI subscores separately for storage symptoms (urgency, frequency, nocturia) and for voiding symptoms (incomplete emptying, intermittency, weak stream, straining).[27]

Urinary bother was assessed using a single global question also included in the AUASI.[25,28] Men were asked “If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?” and response options included “Delighted” (score 0), “Pleased” (1), “Mostly Satisfied” (2), “Mixed” (3), “Mostly Dissatisfied” (4), “Unhappy” (5), or “Terrible” (6). We collapsed the lowest two and three highest scores due to small cell sizes and categorized men into 4 levels of urinary bother (score 0–1, 2, 3, and 4–6).

Life-Space Mobility Assessment

Life-space mobility was assessed for the first time at Year 7 and again at Year 9 using the University of Alabama at Birmingham Life-space Assessment[13] administered by trained clinic staff via interview. This life-space assessment tool asks participants to characterize their movement across the following 5 levels during the prior month:

1. “Other rooms of your home besides the room where you sleep?”
2. “An area outside your home such as your porch, deck, or patio, hallway (of an apartment building), or garage, in your own yard or driveway?”
3. “Places in your neighborhood, other than your own yard or apartment building?”
4. “Places outside your neighborhood, but within your town?”
5. “Places outside your town?”

For each level, respondents identify how frequently they traveled to that area and whether they required assistance or equipment to facilitate movement in that area. A composite life-space score is tabulated by multiplying the level number (1–5) by the factor for required assistance (2=no assistance, 1.5=use of equipment only, 1=use of another person with/without equipment) and the factor for frequency (0=never, 1=less than once/week, 2=1–3 times/week, 3=4–6 times/week, 4=daily). Total life-space scores range from 0 (completely restricted to one's own bedroom) to 120 (daily travel beyond one's hometown without any assistance). Although there is no standardized definition for life-space mobility restriction, we used a score of ≤60 since this appears to be the threshold at which lower scores are consistently associated with increased mortality risk in both older women[29] and men[16]. We also conducted sensitivity analyses using a lower score of ≤40 to define life-space mobility restriction.

Other Measurements

All covariate measures were collected at the Year 7 visit except demographics, which were collected at enrollment. These included age, study site, body mass index (BMI) and selected variables from four groups: demographics (education, self-reported race, and marital status), health-related behaviors (smoking, alcohol intake, and physical activity), cardiovascular comorbidities (self-reported history of physician-diagnosed myocardial infarction, angina, heart failure, and hypertension), and other medical comorbidities (self-reported history of physician-diagnosed diabetes mellitus, chronic obstructive pulmonary disease, and stroke or Parkinson's disease). Additional covariate details are in Supplementary Methods 1.

Statistical Analysis

In this analytic cohort, defined in part by the absence of life-space restriction at Year 7, the 2 primary independent variables were LUTS severity and urinary bother at Year 7 and the dependent variable was incident life-space restriction at Year 9. We first compared distributions of established LUTS and life-space mobility risk factors across clinical categories of LUTS severity (none/mild, moderate, and severe) and urinary bother scores (0–1, 2, 3, and 4–6) in order to determine if the prevalence of potential confounders varied similarly across levels of LUTS severity and urinary bother prior to building final multivariable models. We then visualized the distribution of AUASI scores using box plots stratified by urinary bother score and calculated Spearman's rank correlation coefficient between continuous AUASI and urinary bother scores to determine if there was sufficient variability to analyze these variables separately. We then modeled associations of LUTS severity and urinary bother categories with incident life-space mobility restriction using risk ratios (RR) estimated from a modified Poisson regression model with robust error variance.[30] Lastly, we modeled associations of LUTS severity and urinary bother categories with 2-year change in life-space mobility score using mean change estimates from a multivariate linear regression model.

To identify and control for confounding factors, we applied a change in estimate criteria.[31] First, we forced age (continuous in years) and study site into the model. Next, we fit a full multivariable model including age, site, and measured variables from four groups of potential confounders: demographics, health-related behaviors, cardiovascular

comorbidities, and other medical comorbidities. We then successively removed groups of variables from the full model and each time calculated the % change in the beta coefficients compared to the full model, with a change of ≥5% used to indicate important confounding.[32] Only health-related behaviors and other medical comorbidities met this criteria. The final multivariable model for all dependent variables included age, study site, BMI, smoking, alcohol intake, physical activity, and self-reported diabetes mellitus, stroke or Parkinson's disease, and chronic obstructive pulmonary disease. We tested for effect modification of the association between urinary bother and incident life-space mobility restriction by including a cross product term with age or any LUTS treatment (medication or surgery) and urinary bother as a four-level variable (0–1, 2, 3, 4–6).

We conducted sensitivity analyses further adjusting for variables that could be confounders or mediators including Geriatric Depression Scale (GDS), multimorbidity, self-reported general health status, frailty phenotype, and social integration measures (variables defined in the Supplementary Methods 1). To maximize adjustment for frailty, we simultaneously included each of the following frailty phenotype criterion as separate variables: gait speed (continuous), grip strength (continuous), PASE (continuous), exhaustion (SF-12 question that asks, "Did you have a lot of energy?"; categorical), and unintentional weight loss of ≥5% since prior visit (binary). The following social integration measures were simultaneously included in the model: living arrangement (alone, with spouse/partner, with other), social network score (1 point each for having ≥3 living children versus ≤2, and for having ≥1 confidants versus none), and social engagement score (1 point each for working, caregiving, volunteering, and participating in non-religious and religious social groups; range 0–4). We conducted additional sensitivity analyses excluding men with cognitive impairment (Teng 3MS<80 or Trails B>226 seconds), urinary incontinence (at least weekly), or history of prostate cancer. Lastly, since there are no universally accepted definitions of life-space mobility restriction or urinary bother, we conducted sensitivity analyses with life-space mobility score ≤40 as the dependent variable and alternative categories of urinary bother score.

P-value <0.05 was considered statistically significant. All analyses were performed using STATA version 15.1 (StataCorp LLC, College Station, TX). This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cohort studies.

RESULTS

General characteristics of the 3,025 community-dwelling men in this prospective cohort are reported by urinary bother score in Table 1. Within this analytic cohort, 1130 (37%) men had a urinary bother score of 0–1, 944 (31%) had a bother score of 2, 612 (20%) had a bother score of 3, and 339 (11%) had a bother score of 4–6, whereas 1611 (53%) men had none/mild LUTS, 1202 (40%) had moderate LUTS, and 212 (7%) had severe LUTS. Mean time between the baseline and follow-up assessment of life-space mobility was 2.0 (standard deviation 0.1) years. During follow-up, the cumulative incidence of new life-space mobility restriction was 9.9%. The mean change in life-space mobility score was −36.5 (standard

deviation 20.5) points among men who developed new life-space mobility restriction versus −1.3 (standard deviation 17.6) among men with preserved life-space mobility.

LUTS severity and urinary bother were moderately correlated in this study (Spearman's ρ=0.66, P<0.001; Figure 1). Among men without urinary bother (scores 0–1), 154 (13%) had moderate LUTS and 7 (3%) had severe LUTS (Supplemental Table 1). Conversely, among men with urinary bother scores of 4–6, 196 (16%) had moderate LUTS and 31 (2%) had none/mild LUTS.

Associations of baseline urinary bother and LUTS severity with incident life-space mobility restriction are shown in Figure 2. Overall, 7.2% of men without urinary bother (scores 0–1), 9.6% of men with a urinary bother score of 2, 10.3% of men with a urinary bother score of 3, and 18.6% of men with urinary bother scores 4–6 developed new life-space mobility restriction during follow-up (Table 2). Compared to men with urinary bother scores of 0–1, risk of incident life-space mobility restriction was 18% higher among men with a score of 2, 23% higher among men with a score of 3, and 86% higher among men with scores of 4–6, although only the association with the highest category of urinary bother scores reached statistical significance. Further adjustment for LUTS severity led to larger RR estimates but otherwise did not alter the association of urinary bother with greater risk of new life-space mobility restriction.

Overall, 8.9% of men with none/mild LUTS, 10.0% of men with moderate LUTS, and 16.5% of men with severe LUTS developed new life-space mobility restriction during follow-up (Table 2). After multivariable adjustment, overall LUTS severity was not significantly associated with risk of incident life-space mobility restrictions. After further adjustment for urinary bother score, higher LUTS severity appeared to be associated with a lower risk of developing life-space mobility restriction, but confidence intervals were wide and included 1.00 (P >0.05 for all). The pattern of associations was similar when AUASI storage and voiding subscores were examined separately, although higher voiding subscore was more consistently associated with lower risk of incident life-space mobility restriction after adjusting for urinary bother (Supplemental Table 2).

Associations of baseline urinary bother and LUTS severity categories with change in life-space mobility scores are reported in Table 3. These results were similar in direction and magnitude of association as incident life-space mobility restriction, although mean differences in change in life-space mobility scores were not statistically significant. For example, reduction in life-space mobility scores were 3.05 points greater on average among men with urinary bother scores of 4–6 compared to 0–1, however confidence intervals included 0.

In sensitivity analyses, further adjustment one at a time for potential mediators or confounders produced RRs for the association of urinary bother with incident life-space restriction that were attenuated but remained statistically significant (Supplemental Table 3). Specifically, the adjusted RR for urinary bother scores of 4–6 compared to 0–1 decreased from 1.87 to 1.49 after adding self-reported general health status, 1.48 after adding frailty phenotype components, and 1.54 after adding Geriatric Depression scale. The attenuation

was less pronounced when social integration measures and multimorbidity were added to the multivariable model or after excluding men with urinary incontinence, prostate cancer, or cognitive impairment. Lastly, adjusted RRs were larger in sensitivity analyses using an alternative definition of life-space mobility restriction (score ≤40; Supplemental Table 4) and were modestly attenuated but remained statistically significant using alternative categories of urinary bother score (Supplemental Table 5). We did not observe evidence of a consistent interaction between urinary bother and age or LUTS treatment (data not shown).

DISCUSSION

In this multicenter, prospective cohort study, we found that older community-dwelling men with greater urinary bother had a higher risk of developing new life-space mobility restriction within two years. This association was independent of LUTS severity, age, health-related behaviors, and comorbidities and persisted among men without urinary incontinence or cognitive impairment. Observed associations were partially, but not completely, explained by greater phenotypic frailty, greater depressive symptoms, and poorer self-related general health status among men with urinary bother. In contrast, we found no association of overall LUTS severity (based on symptom frequency) with new life-space mobility restriction, irrespective of whether analyses were or were not adjusted for urinary bother.

We found no other reports evaluating associations between LUTS severity or urinary bother and life-space mobility in older men and only one study among older women. Among 70 community-dwelling older women seeking non-surgical urinary incontinence treatment, life-space mobility scores decreased over time and were inversely associated with greater age and depression, but were not associated with treatment-related improvements in urinary distress or incontinence severity.[33] Although life-space mobility itself has not been previously assessed among older men with LUTS, let alone longitudinally, cross-sectional data from multiple large, international studies demonstrate that greater LUTS severity is consistently associated with greater interference with daily and recreational activities[21,34–36], decreased social engagement[36,37], and decreased physical and mental health-related quality of life[21,38,39], which are all likely contributors to decreased life-space mobility. However, only a few studies have examined longitudinal relationships with these surrogates of life-space mobility. Among 1688 community-dwelling Dutch men followed for a mean of 4.2 years, change in LUTS severity accounted for <2% of the variability of the change in the social interaction and leisure time and the recreational activity domains of the Sickness Impact questionnaire.[40] Results from randomized, placebo-controlled trials of medications for LUTS caused by bladder outlet obstruction (α-blockers and 5α-reductase inhibitors) have been mixed; some trials have observed statistically significant but modest effects of treatment in reducing LUTS-related interference in activities or social engagements.[41–43] Overall, older men with LUTS almost certainly engage in fewer physical and social activities outside their home, but it remains unknown whether reducing the severity or psychological impact of LUTS results in increased life-space or proxies of life-space mobility.

Consistent with our study, LUTS severity and urinary bother are moderately to highly correlated in both cross-sectional studies[18–22] and moderately correlated in longitudinal

studies.[44,45] Urinary bother is associated with LUTS treatment-seeking among men, independent of LUTS severity.[46] In this study, we confirmed our hypothesis that urinary bother is associated with incident life-space mobility restriction independent of LUTS severity as well as other suspected confounders. This relationship was partially explained by greater phenotypic frailty, greater depressive symptoms, and lower self-related general health status among men with greater urinary bother. Conversely, LUTS severity defined by total AUASI score was not significantly associated with incident life-space mobility restriction before and particularly after adjustment for urinary bother. There are several possible causal explanations for the observed associations, although these findings must be confirmed in follow-up studies and randomized controlled trials of interventions that effectively decrease urinary bother. Urinary bother due to storage LUTS could cause men to restrict their life-space due to fear of urine leakage during unpredictable urgency episodes, a desire to avoid bathrooms that are unfamiliar, in unknown locations, or unpleasant, or a decreased enjoyment of activities outside their home due to frequent interruptions to urinate. Urinary bother due to voiding LUTS could cause men to restrict their life-space due to the uncomfortable sensation of an incompletely empty bladder, potential social embarrassment of longer duration of bathroom trips, standing at a urinal, or dribbling urine on pants due to a weak urinary stream, or men may not leave their house if they believe it is not safe because that something is “wrong” with their prostate. If these causal explanations are true then any intervention that sufficiently decreases urinary bother should also decrease risk of life-space mobility restriction. This is a worthwhile and highly testable hypothesis but unfortunately we are not aware of any randomized controlled trials of LUTS medications that measured life-space mobility. Alternatively, if the observed associations are due to confounding by an unmeasured cause of both urinary bother and life-space mobility restriction, then targeting other causes of life-space mobility restriction, such as depression or sarcopenia, may be a more effective approach.

Predictors of increased urinary bother include older age, psychological distress, self-perception of general health status, and impact of LUTS on recreational and social activities.[18,47] Among Black men with LUTS, less social support and poor mental health appear to be the strongest predictors of urinary bother after adjusting for age and LUTS severity.[48] Based on qualitative studies, uncertainty about the cause or natural history of LUTS also contributes to greater urinary bother.[49] Accordingly, several multidisciplinary experts and funders have called for more comprehensive frameworks to include these non-urologic factors associated with greater urinary bother when evaluating the causes and consequences of LUTS.[50] The Prevention of Lower Urinary Tract Symptoms (PLUS) Consortium also acknowledges the importance of measures beyond LUTS severity in their recently updated definition of bladder health as “A complete state of physical, mental, and social well-being related to bladder function and not merely the absence of LUTS.”[51] Our data support the use of more holistic definitions of urologic health in older men and future work to determine whether interventions that decrease urinary bother by minimizing psychological distress and supporting the continuation of important activities (recreational and social) are effective for maintaining life-space mobility among older men with LUTS.

We recognize several limitations to our study. First, MrOS is a cohort of predominantly healthy, White, community-dwelling older men. Thus, the results may not be generalizable

to younger men or to institutionalized, less healthy, or more racially diverse men. Second, this is an observational study and residual confounding may explain the observed associations. For example, certain personality traits or types of psychological distress may be positively associated with both urinary bother and risk of new life-space mobility restriction. However, we performed several sensitivity analyses adjusting for mood and self-perceived health status which did not fully explain the observed associations. Lastly, urinary bother was assessed at a single visit using a single question. Although the urinary bother question has been validated for use as a standalone questionnaire item,[25,28] this may have limited our ability to detect associations with lower yet clinically meaningful levels of urinary bother as well as persistent versus transient symptoms.

In conclusion, older men with greater urinary bother have an increased risk of incident life-space mobility restriction within 2 years, independent of LUTS severity. Observed associations were partially attenuated but remained statistically significant after adjustment for phenotypic frailty, depressive symptoms, and self-related general health status and persisted among men without urinary incontinence or cognitive impairment. In contrast, LUTS severity was not associated with risk of new life-space mobility restriction. Further studies are needed to investigate the mechanistic basis of this association and to identify which interventions are most effective for preserving life-space mobility among older men with urinary bother.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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KEY POINTS

- Older men who are bothered by lower urinary tract symptoms have an increased risk of developing new life-space mobility restriction within 2 years, regardless of symptom severity.

Why does this matter?

Identifying older men at risk of developing life-space restriction may help target preventative treatments to those at greatest risk.

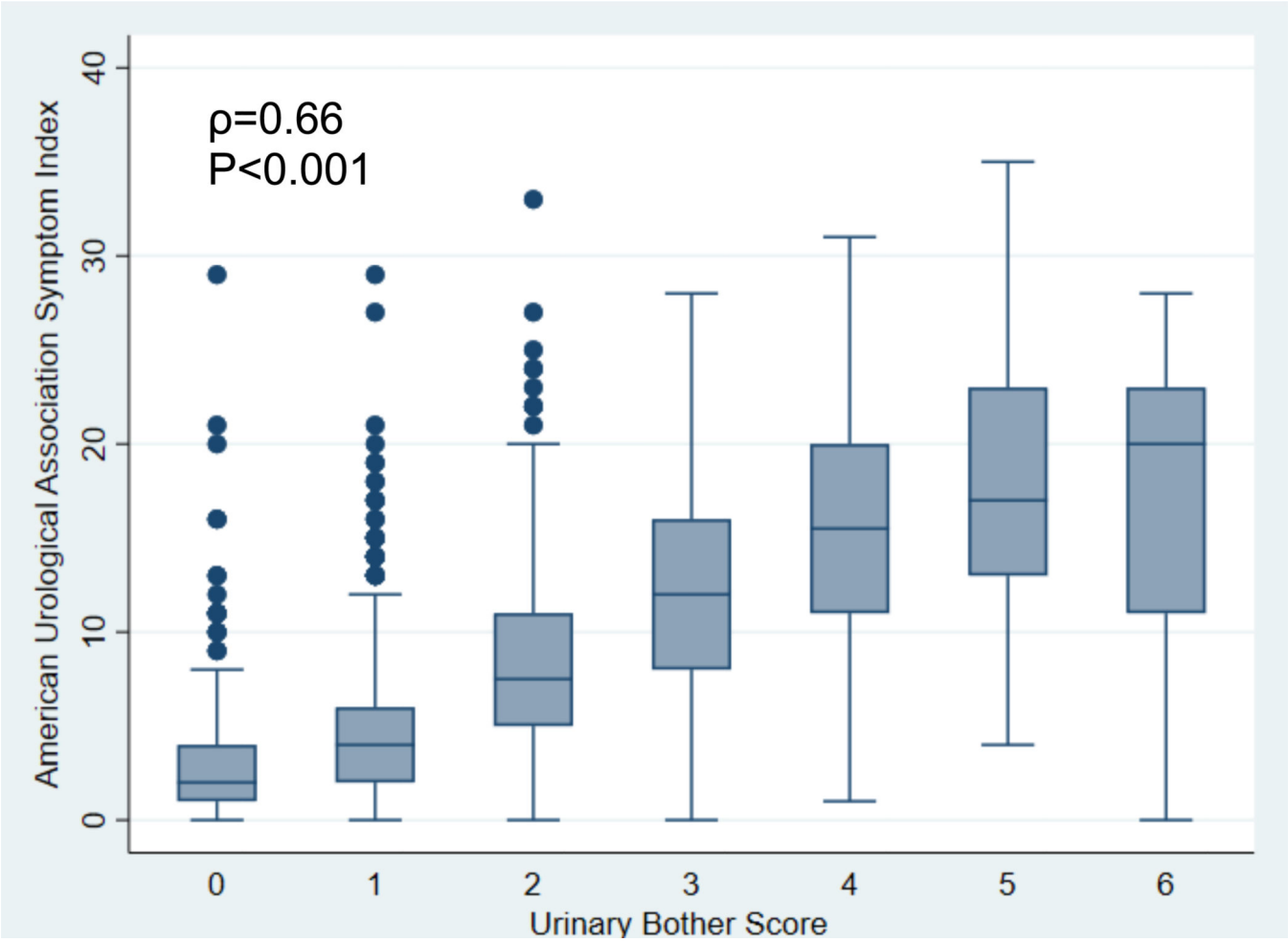

Figure 1.

Box plot of American Urological Association Symptom Index, stratified by urinary bother score.

Footnote: American Urological Association Symptom Index (AUASI) score range is 0 to 35 and higher scores indicate more frequent symptoms. Urinary bother score is based on the AUASI bother question (“If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?”) with a response range of 0 (“Delighted”) to 6 (“Terrible”).

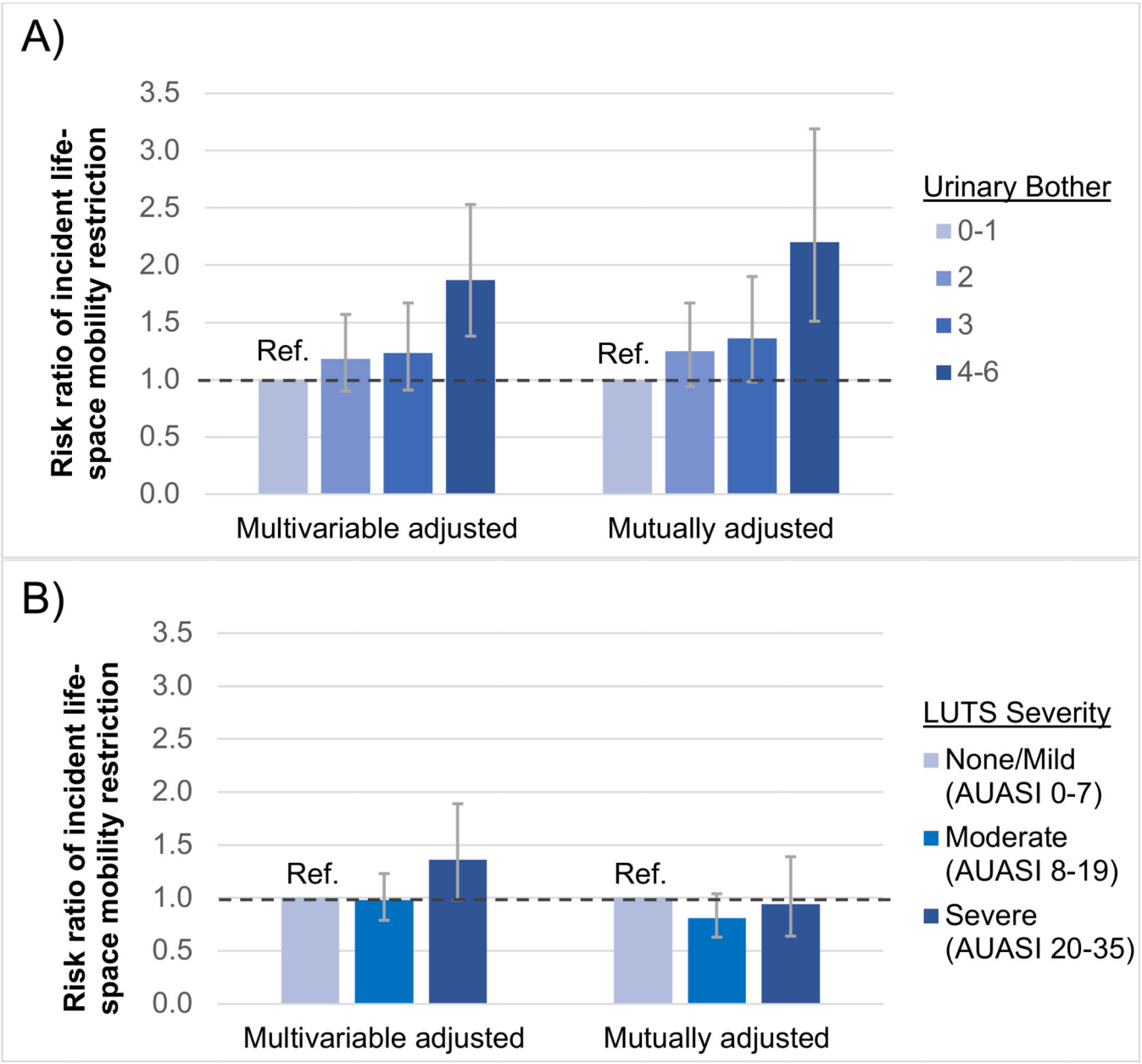

Figure 2.

2-year risk of incident life-space mobility restriction by categories of A) urinary bother, and B) lower urinary tract symptom severity.

Footnote: Life-space mobility restriction defined as a life-space mobility score ≤60. Risk ratios and 95% confidence intervals calculated using Poisson regression. Multivariable model adjusted for age, study site, body mass index, alcohol consumption, smoking pack-years, physical activity, chronic obstructive pulmonary disease, diabetes, and stroke or Parkinson's disease. Mutually adjusted model further adjusted for LUTS severity and/or urinary bother.

Table 1.

Characteristics of 3025 MrOS participants without life-space mobility restriction at analytic baseline, by urinary bother score.

Variable	Urinary Bother Categories			
	0–1	2	3	4–6
Sample size, n (%)	1130 (37.4)	944 (31.2)	612 (20.2)	339 (11.2)
Demographics				
Age, years, mean (SD)	78.3 (4.7)	78.5 (4.8)	78.9 (4.8)	79.1 (5.0)
College education, n (%)	631 (56)	599 (64)	361 (59)	192 (57)
Married status, n (%)	915 (81)	769 (82)	484 (79)	271 (80)
Self-reported race, n (%)				
White	1048 (93)	868 (92)	560 (92)	308 (91)
Black or African American	26 (2)	19 (2)	12 (2)	8 (2)
Asian	26 (2)	33 (4)	21 (3)	10 (3)
American Indian or Alaskan Native	2 (0.2)	0 (0)	2 (0.3)	0 (0)
Native Hawaiian or Pacific Islander	1 (0.1)	1 (0.1)	1 (0.2)	1 (0.3)
Multiracial	14 (1)	8 (0.8)	7 (1)	6 (2)
Missing	13 (1)	15 (2)	9 (2)	6 (2)
Self-reported Hispanic or Latino, n (%)	17 (2)	18 (2)	12 (2)	10 (3)
Health Metrics and Behaviors				
Smoking Pack-years, n (%)				
None	461 (41)	391 (42)	245 (40)	135 (40)
<20	323 (29)	302 (32)	197 (32)	91 (27)
20–39.9	189 (17)	133 (14)	88 (14)	53 (16)
≥40	156 (14)	117 (12)	82 (13)	59 (18)
Alcohol Consumption, n (%)				
None	376 (33)	344 (37)	197 (32)	126 (37)
≤6.9 drinks/week	446 (40)	338 (36)	233 (38)	126 (37)
7–13.9 drinks/week	157 (14)	152 (16)	113 (19)	55 (16)
≥14 drinks/week	149 (13)	106 (11)	69 (11)	32 (9)
PASE score, mean (SD)	147 (66)	143 (67)	137 (66)	128 (64)
BMI, kg/m^2, mean (SD)	27.1 (3.7)	26.9 (3.6)	27.3 (3.6)	27.4 (4.1)
Comorbidities and Medication Use, n (%)				
Myocardial Infarction or Angina	204 (18)	174 (18)	113 (19)	82 (24)
Heart Failure	54 (5)	56 (6)	30 (5)	22 (7)
Stroke or Parkinson's Disease	61 (5)	67 (7)	43 (7)	24 (7)
Hypertension	560 (50)	509 (54)	342 (56)	197 (58)
Diabetes Mellitus	134 (12)	120 (13)	99 (16)	61 (18)
Chronic Obstructive Pulmonary Disease	86 (8)	89 (9)	76 (12)	52 (15)

Variable	Urinary Bother Categories			
	0–1	2	3	4–6
Depressive Symptoms *	23 (2)	35 (4)	46 (8)	30 (9)
Diuretic Medication Use	305 (27)	247 (26)	176 (29)	96 (28)
Multimorbidity †				
0 chronic conditions	537 (48)	356 (38)	211 (35)	109 (32)
1 chronic condition	324 (29)	349 (37)	214 (35)	107 (32)
2 chronic conditions	189 (17)	151 (16)	125 (20)	69 (20)
≥3 chronic conditions	80 (7)	88 (9)	62 (10)	54 (16)
Frailty Phenotype‡, n (%)				
Robust (0 criteria met)	517 (46)	396 (42)	235 (39)	101 (30)
Intermediate (1–2 criteria met)	528 (47)	461 (49)	318 (52)	173 (51)
Frail (≥3 criteria met)	85 (8)	87 (9)	58 (10)	65 (19)
Cognitive function, mean (SD)				
Teng 3MS	93.1 (6)	93.4 (6)	93.1 (5)	92.4 (5)
Trails B	114 (56)	116 (58)	118 (56)	124 (63)
LUTS Treatments, n (%)				
α-Antagonist	135 (12)	215 (23)	206 (34)	135 (40)
5α-Reductase inhibitor	51 (5)	92 (10)	75 (12)	47 (14)
Urinary antispasmodic	10 (1)	24 (3)	27 (4)	25 (7)
Self-reported BPH Surgery	130 (12)	113 (12)	70 (11)	53 (16)

AUASI American Urological Association Symptom Index; n sample size; SD standard deviation; LUTS lower urinary tract symptoms; BMI body mass index

*Geriatric Depression Scale >5

†Cumulative number of the following chronic medical conditions: stroke, Parkinson's disease, myocardial infarction, angina, chronic obstructive pulmonary disease, heart failure, diabetes mellitus, osteoporosis, osteoarthritis, hyperthyroidism, or hypothyroidism.

‡Frailty phenotype status based on cumulative number of criteria met: low lean mass, weakness, exhaustion, slowness, and low physical activity.

Table 2.

Association of urinary bother and lower urinary tract symptom (LUTS) severity with incident life-space mobility restriction among older men.

	# Incident Life-Space Mobility Restriction / Total (%)	Age and site-Adjusted	Multivariable[§] Adjusted		Mutually Adjusted[§]	
		Risk Ratio[‡] (95% CI)	Risk Ratio[‡] (95% CI)	P value	Risk Ratio[‡] (95% CI)	P value
Urinary Bother Categories [*]						
0–1	81/1130 (7.2)	Ref.	Ref.		Ref.	
2	91/944 (9.6)	1.29 (0.97, 1.71)	1.18 (0.90, 1.57)	0.24	1.25 (0.94, 1.67)	0.12
3	63/612 (10.3)	1.34 (0.98, 1.83)	1.23 (0.91, 1.67)	0.17	1.36 (0.98, 1.90)	0.06
4–6	63/339 (18.6)	2.28 (1.69, 3.07)	1.87 (1.38, 2.53)	<0.01	2.20 (1.51, 3.19)	<0.01
Clinical LUTS Categories [†]						
None/Mild (0–7)	143/1611 (8.9)	Ref.	Ref.		Ref.	
Moderate (8–19)	120/1203 (10.0)	1.10 (0.88, 1.38)	0.98 (0.79, 1.23)	0.90	0.81 (0.63, 1.04)	0.10
Severe (20–35)	35/212 (16.5)	1.57 (1.14, 2.16)	1.36 (0.98, 1.89)	0.07	0.94 (0.64, 1.39)	0.76

[*] Urinary bother based on the AUASI bother question with a range of 0 to 6. Higher urinary bother scores indicate more severe bother and ≥4 represents clinically significant urinary bother.

[†] American Urological Association Symptom Index (AUASI) score range is 0 to 35 and is categorized using validated thresholds for none/mild (0–7), moderate (8–19), and severe (20–35) LUTS. Higher AUASI score indicates more frequent symptoms.

[‡] Life-space mobility restriction defined as a life-space mobility score ≤60. Risk ratios and 95% confidence intervals calculated using Poisson regression. *P* values calculated using the Wald test.

[§] Multivariable model adjusted for age, study site, body mass index, alcohol consumption, smoking pack-years, physical activity, chronic obstructive pulmonary disease, diabetes, and stroke or Parkinson's disease. Mutually adjusted model further adjusted for LUTS severity and/or urinary bother.

Table 3.

Association of urinary bother and lower urinary tract symptom (LUTS) severity with change in mean life-space mobility score among older men without baseline life-space mobility restriction.

	Age and site-Adjusted	Multivariable[§] Adjusted		Mutually Adjusted[§]	
	β (95% CI)[‡]	β (95% CI)[‡]	P value	β (95% CI)[‡]	P value
Urinary Bother Categories[*]					
0–1	Ref.	Ref.		Ref.	
2	−0.20 (−1.99, 1.58)	−0.04 (−1.83, 1.76)	0.97	−0.34 (−2.24, 1.56)	0.72
3	−1.05 (−3.08, 0.98)	−0.76 (−2.81, 1.28)	0.47	−1.35 (−3.73, 1.02)	0.26
4–6	−2.90 (−5.40, −0.40)	−2.17 (−4.69, 0.36)	0.09	−3.05 (−6.16, 0.05)	0.05
Clinical LUTS Categories[†]					
None/Mild (0–7)	Ref.	Ref.		Ref.	
Moderate (8–19)	−0.12 (−1.66, 1.42)	0.25 (−1.30, 1.80)	0.76	1.01 (−0.78, 2.80)	0.27
Severe (20–35)	−2.93 (−5.89, 0.02)	−2.35 (−5.35, 0.64)	0.12	−1.02 (4.42, 2.37)	0.55

[*] Urinary bother based on the AUASI bother question with a range of 0 to 6. Higher urinary bother scores indicate more severe bother and ≥4 represents clinically significant urinary bother.

[†] American Urological Association Symptom Index (AUASI) score range is 0 to 35 and is categorized using validated thresholds for none/mild (0–7), moderate (8–19), and severe (20–35) LUTS. Higher AUASI score indicates more frequent symptoms.

[‡] Beta coefficients, 95% confidence intervals, and *P* values calculated using linear regression.

[§] Multivariable model adjusted for age, study site, body mass index, alcohol consumption, smoking pack-years, physical activity, chronic obstructive pulmonary disease, diabetes, and stroke or Parkinson's disease. Mutually adjusted model further adjusted for LUTS severity and/or urinary bother.