Published in final edited form as:
Obstet Gynecol. 2014 April ; 123(4): 822–827. doi:10.1097/AOG.0000000000000186.

Urinary Incontinence, Depression, and Economic Outcomes in a Cohort of Women Between the Ages of 54 and 65

Kristin J. Hung, MD[1,*], **Christopher S. Awtrey, MD**[1,2], and **Alexander C. Tsai, MD, PhD**[2,3,4]

[1]Department of Obstetrics and Gynecology, Beth Israel Deaconess Medical Center, Boston, Mass

[2]Harvard Medical School, Boston, Mass

[3]Chester M. Pierce, MD Division of Global Psychiatry, Department of Psychiatry, Massachusetts General Hospital, Boston, Mass

[4]Center for Global Health, Massachusetts General Hospital, Boston, Mass

Abstract

Objective—To estimate the association between urinary incontinence and probable depression, work disability, and workforce exit.

Methods—The analytic sample consisted of 4,511 women enrolled in the population-based Health and Retirement Study cohort. The analysis baseline was 1996, the year that questions about urinary incontinence were added to the survey instrument, and at which time study participants were 54–65 years of age. Women were followed with biennial interviews until 2010–2011. Outcomes of interest were onset of probable depression, work disability, and workforce exit. Urinary incontinence was specified in different ways based on questions about experience and frequency of urine loss. We fit Cox proportional hazards regression models to the data, adjusting the estimates for baseline socio-demographic and health status variables previously found to confound the association between urinary incontinence and the outcomes of interest.

Results—At baseline, 727 participants (survey-weighted prevalence, 16.6 percent; 95% confidence interval [CI], 15.4–18.0) reported any urinary incontinence, of which 212 (survey-weighted prevalence, 29.2 percent; 95% CI, 25.4–33.3) reported urine loss on more than 15 days in the past month; and 1,052 participants were categorized as having probable depression (survey-weighted prevalence, 21.6 percent; 95% CI, 19.8–23.6). Urinary incontinence was associated with increased risks for probable depression (adjusted hazard ratio [AHR], 1.43; 95% CI, 1.27–1.62) and work disability (AHR, 1.21; 95% CI, 1.01–1.45) but not workforce exit (AHR, 1.06; 95% CI, 0.93–1.21).

Conclusions—In a population-based cohort of women between the ages of 54 and 65, urinary incontinence was associated with increased risks for probable depression and work disability.

[*]Corresponding author: Kristin J. Hung, MD, Department of Obstetrics and Gynecology, Beth Israel Deaconess Medical Center, 330 Brookline Avenue, East Campus, Kirstein 317, Boston, MA 02215; khung@bidmc.harvard.edu.

Financial Disclosure

The other authors did not report any potential conflicts of interest.

Improved diagnosis and management of urinary incontinence may yield significant economic and psychosocial benefits.

INTRODUCTION

Urinary incontinence is a common condition affecting nearly one-fifth of women in the U.S. [1]. The symptoms can be extremely bothersome [2] and may be accompanied by numerous adverse psychosocial sequelae, including social isolation [3] and depression [4]. Overall, women with urinary incontinence experience substantially reduced quality of life [5, 6]. In comparison, less is known about the economic impacts of urinary incontinence. Estimates of the volume and aggregate cost of urogynecological procedures do not account for indirect costs such as those related to lost economic productivity [6, 7]. Women with urinary incontinence adopt numerous strategies to manage symptoms at work, but their symptoms nonetheless compromise their self-confidence, concentration, and/or work performance [2, 8–11]. Women faced with these difficulties may decide to engage in limited types of work or to work fewer hours, or even exit the workforce entirely.

Understanding the indirect costs of urinary incontinence as reflected in labor force outcomes has long been highlighted as an important area for investigation [7, 8]. While the cross-sectional studies cited above suggest that urinary incontinence may have important negative impacts on economic outcomes, they are far from conclusive. To address this important gap in the literature, we conducted a secondary analysis of data from the Health and Retirement Study, an ongoing population-based cohort of middle-aged and older adults. Given their high risk not only for transitions out of the workforce but also urinary incontinence [1] and depression [12], this age group represents an important population for in-depth study of the relationships between these variables. Specifically, we sought to estimate the association between urinary incontinence and risk of depression, work disability, and workforce exit over long-term follow-up.

METHODS

The Health and Retirement Study employs a multi-stage area probability sample and at its inception in 1992 had a target population of all adults aged 51–61 years residing in households in the contiguous United States [13]. Data are collected through biennial telephone and in-person interviews. The response rate to the initial survey was 81.6 percent, and re-interview response rates have exceeded 93.1 percent at every subsequent interview cycle. The omnibus questionnaires administered to study participants reflect a broad range of analytic and policy interests related to labor force, health, and family transitions. Because of its expansive scope and sampling strategy, the Health and Retirement Study is frequently used by analysts to investigate questions of clinical relevance to the gynecologic care of middle aged and older women [3, 4, 10, 14, 15] and to middle aged and older adults in general [16–18].

Because questions about the primary exposure of interest (urinary incontinence) were not added to the surveys until 1996, we restricted our analysis to data beginning in 1996, by which time study participants were 54–65 years old. Urinary incontinence was assessed with

the question, “This might not be easy to talk about, but during the last 12 months, have you lost any amount of urine beyond your control?” Participants who responded affirmatively were then asked to estimate the frequency of episodes with the question, “On about how many days in the last month have you lost any urine?” Responses were grouped into three ordered categories (none/continent, 0–15 days, and >15 days), which allowed us to explore potential dose-dependence in the associations between urinary incontinence and the outcomes of interest.

The primary outcomes of interest were onset of probable depression, work disability, and workforce exit. Depression symptom severity was measured using a modified version of the Center for Epidemiologic Studies-Depression scale [19], shortened to eight items while retaining similar reliability [20, 21], factor structure [21], and construct validity [21–23]. Although the diagnosis of major depressive disorder is a clinical diagnosis that accounts for other pertinent information such as symptom duration, functional impairment, and exclusion of other psychiatric diagnoses, participants’ survey responses enabled us to identify probable depression with reasonable accuracy. Specifically, a score ≥3 on the Center for Epidemiologic Studies-Depression scale was used to classify study participants as having symptoms indicating probable depression. This threshold has been found to have 71 percent sensitivity and 79 percent specificity when compared to the criterion standard of major depression as determined by the short form of the World Health Organization Composite International Diagnostic Interview [21, 24].

The outcome of work disability was assessed with the question, “Do you have any impairment or health problem that limits the kind or amount of paid work you can do?” Responses are scored on a dichotomous scale, i.e., “yes” or “no.” Its construct validity is supported by prior studies correlating work disability with pain [23] and labor force participation [25]. Furthermore, little bias was observed when the responses of Health and Retirement Study participants were compared to the criterion standard of U.S. Social Security Administration disability insurance benefit decisions [26]. The outcome of workforce exit was based on the “labor force status” variable in the RAND Health and Retirement Study Data file [27], which summarizes the labor force status for each respondent at each interview into mutually exclusive categories of “working full-time,” “working part-time,” “unemployed,” “partly retired,” “retired,” “disabled,” or “not in the labor force” [28]. Workforce exit was defined as being retired, partly retired, disabled, or not in the labor force.

For each of the 3 outcomes, we fit 2 Cox proportional hazards regression models corresponding to the 2 different specifications of urinary incontinence described above. Analysis time was extended through 2010–11. Estimates were adjusted for the following socio-demographic and health status variables measured at baseline: age, race, marital status, educational attainment, household income, body mass index, parity, smoking status, alcohol use, psychiatric medication use, number of physician-diagnosed chronic conditions out of eight (hypertension, diabetes, cancer, chronic lung disease, cardiovascular disease, cerebrovascular disease, arthritis, or psychiatric disorder), and difficulties with activities of daily living. In these regression models, the sub-sample of participants initially considered “at risk” varied by outcome. For the analyses examining onset of probable depression, only

participants who had no depressive symptoms or who had subthreshold symptoms (modified depression score <3) at baseline were considered "at risk" for developing the outcome over the follow-up period. For the analyses examining onset of work disability, we limited the analytic sample to participants with no work disability at baseline. Finally, for the analyses examining workforce exit, we excluded participants who were not in the labor force at baseline (i.e., they reported being retired, partly retired, or not in the labor force).

For each multivariable regression model, the link test proposed by Pregibon [29, 30] was employed to assess adequacy in specification of the linear predictor. Namely, after estimation of the regression coefficients, the linear predictor and its square were included in a second version of the regression model. A non-statistically significant estimated regression coefficient on the square of the prediction was taken to be evidence that the proportional hazards assumption was not violated. No violations were noted. All analyses were conducted with the use of the Stata statistical software (version 13.0, StataCorp LP, College Station, Tex.) and employed the survey weights to adjust standard errors for the complex survey sampling design. Due to survey weighting, some prevalence estimates may not correspond exactly to the ratio of the subpopulation to the sample size and are explicitly labeled below.

Study participants provided written informed consent. Health and Retirement Study procedures were approved by the relevant committees at the University of Michigan and the U.S. National Institute of Aging. The data have been made publicly available for download at http://hrsonline.isr.umich.edu/ as unrestricted datasets, which are purged of secondary identifying information such that they pose no significant threat to respondent anonymity. The specific analysis presented in this paper was reviewed by the Partners Human Research Committee and determined not to meet the definition of human subjects research because it was based on anonymous, public-use data with no identifiable information on study participants.

RESULTS

Summary statistics for the sample are described in Table 1. The analytic sample consisted of 4,511 women. The mean age was 59.4 years. The sample consisted largely of Caucasian women, only a minority of whom did not complete high school. Most women reported having three or more children.

Among all study participants, 727 (survey-weighted prevalence, 16.6 percent; 95% confidence interval [CI], 15.4–18.0) reported any urinary incontinence at baseline. Of these, 212 participants (survey-weighted prevalence, 29.2 percent; 95% CI, 25.4–33.3) reported losing urine on more than 15 days out of the past month. A total of 1,052 participants were categorized as having probable depression (survey-weighted prevalence, 21.6 percent; 95% CI, 19.8–23.6) and 1,276 participants had a work disability (survey-weighted prevalence, 27.1 percent; 95% CI, 25.4–28.9), while 1,921 participants were working for pay, either full time or part-time (survey-weighted prevalence, 43.0 percent; 95% CI, 41.4–44.5); these participants were excluded from the survival analyses depending on the model specification (described below).

Analytically, women were followed from November 15, 1995 to May 15, 2011. Among the 3,300 women with absent or subthreshold symptoms of depression at baseline, 1,628 developed probable depression (49.3%). Presence of urinary incontinence was associated with an increased risk of probable depression (adjusted hazard ratio [AHR], 1.43; 95% CI, 1.27–1.62) (Table 2). Increasing frequency of incontinence (in terms of days with urine loss) was associated with greater risk.

Among the 3,075 women with no work disability at baseline, 1,398 developed a new work disability (45.5%). Presence of urinary incontinence was associated with an increased risk of work disability (AHR=1.21; 95% CI, 1.01–1.45), with increasing frequency of incontinence similarly associated with greater risk. Among the 1,848 women working full time or part time at baseline, 1,621 left the workforce (87.7%). Regardless of how the exposure was defined, urinary incontinence did not have a statistically significant association with workforce exit.

DISCUSSION

In this national cohort of women between the ages of 54 and 65 in the U.S. followed over 14 years, we found that urinary incontinence was associated with increased risks for probable depression and work disability but not workforce exit. The estimated associations were statistically significant, large in magnitude, increasing in severity of the exposure, consistent with related strands of research, and robust to the inclusion of confounders previously found to be related to both the exposures and outcomes. Our findings have important implications for both research and clinical practice in this area.

The potential association between depression and either urinary incontinence or the severity of incontinence has been well-studied. Most analyses in this literature have been cross-sectional in nature [4, 31–33], but two longitudinal studies have shown null findings [15, 34]. Thom et al. [34] measured urinary incontinence using chart diagnoses, but it is well known that fewer than one-half of women with urine leakage actually seek care for their symptoms [35]. The analysis by Melville et al. [15] was based on the same underlying dataset as ours, but we believe there are four potential explanations for the conflicting findings. First, in estimating the association between urinary incontinence measured in 1996 and probable depression measured during 1998–2004, Melville et al. [15] did not account for attrition from the study during the eight-year period. Second, our use of repeated-measures, time-updated data on urinary incontinence minimized the potential for misclassification of exposure status (that would have occurred had a study participant's exposure status changed after the baseline interview). Third, in our analysis, the participants were followed for a longer duration of time. The Cox proportional hazards regression models likely provided greater statistical power than the logistic regression model of Melville et al. [15], as study participants contributed data until they experienced the outcome of interest or exited the study. Fourth, Melville et al. [15] employed a different threshold on the depression scale (i.e., with ≥6 indicating probable depression). Any of these analytic modifications, either alone or in combination with the others, could have explained the discrepant results.

A second important finding is that urinary incontinence predicted the development of a work disability. Given that previous work has shown depression to be one of the most important causes of work absenteeism [36, 37], the analysis presented here extends previously published findings that only indirectly suggest the potential adverse labor force impacts of urinary incontinence [2, 8–11]. The mechanisms explaining the association between urinary incontinence and work disability are likely varied and may be due to symptom-related bother [8, 9], avoidance and limiting behaviors [2], or restricted physical activities in general [10, 11]. Importantly, there was no statistically significant association between urinary incontinence and workforce exit. It may be that the threshold for exiting the workforce due to incontinence-related bother may be higher than the threshold for engaging in different types of work or cutting back on the amount of work.

If these estimated associations are causal, the findings presented in this analysis suggest that early diagnosis and management of urinary incontinence may have important psychosocial and economic benefits for women. Given that depression is a treatable condition, obstetricians and urogynecologists should be attentive to its signs and/or symptoms among their patients presenting with urinary incontinence. With regard to the study's economic implications, some observers may ask how many more years of economic productivity the women in this study have to contribute. However, if effective management of urinary incontinence prevents the loss of only one -- and potentially up to 11 -- years of economic productivity (i.e., prior to Medicare eligibility), this could still have important economic consequences for individual women. At the level of population health, the macroeconomic implications for the U.S. would depend on the aggregate number of women with urinary incontinence for whom effective intervention delayed or prevented their reliance on public insurance programs like Medicare and/or Social Security Disability Insurance. Certainly the analyses presented here cannot establish causality. It may be that urinary incontinence is simply a marker for frailty heralding subsequent functional decline [38], but this would not undermine the economic benefits of early diagnosis and management.

Interpretation of our findings is subject to several limitations. First, the analytic sample consisted of a relatively homogeneous group of women with an age range of 54–65 years at baseline. On average they may have fewer economically productive years compared to younger women, so it is likely that the potential economic impacts identified in our study are minimized. Urinary incontinence is likely to exert even more powerful labor force effects at younger ages and among women of lower socioeconomic status, but this possibility would need to be explored with a different dataset. Second, all of the variables were self-reported. Notably, labor force participation was not verified with employer surveys or access to employment records. However, it is also important to note that the outcome measures were generic rather than condition-specific. To the extent that outcome measures based on condition-specific questions (e.g., "Does fear of odor or smell restrict your activities?" [39]) would have been more closely correlated with urinary incontinence [31, 40], our estimates are likely biased towards the null. Third, this analysis did not distinguish between different types of incontinence. To the extent that urge urinary incontinence has greater adverse effects on quality of life compared to stress urinary incontinence [41–43], the estimates presented here may be biased towards the null. Finally, although the outcome of probable depression (as determined by responses to a screening instrument) is accepted in the field

and is frequently used in large-scale epidemiologic studies [4, 15], it does not equate to a clinical diagnosis of major depressive disorder or dysthymia consistent with the *Diagnostic and Statistical Manual of Mental Disorders* To explore the sensitivity of our findings to alternative definitions of probable depression, we used a threshold of ≥4 on the Center for Epidemiologic Studies-Depression scale, which is the threshold estimated by Steffick [44] to correspond to the conventionally adopted threshold of ≥16 on the full 20-item scale [19, 45]. This procedure actually yielded point estimates of increased magnitude and statistical significance, so we chose to report the more conservative estimates in this article.

These caveats notwithstanding, our analysis of population-based, longitudinal data shows that urinary incontinence among women between the ages of 54 and 65 is associated with increased risks for onset of probable depression and work disability. These findings are unlikely to be explained entirely by unobserved confounding and, if anything, are stronger and of greater magnitude than the estimates presented here. Therefore, improved diagnosis and management of urinary incontinence may yield significant economic and psychosocial benefits.

Acknowledgments

Alexander C. Tsai receives salary support from NIH K23MH096620 and the Robert Wood Johnson Foundation Health and Society Scholars Program.

REFERENCES

1. Nygaard I, Barber MD, Burgio KL, Kenton K, Meikle S, Schaffer J, et al. Prevalence of symptomatic pelvic floor disorders in US women. JAMA. 2008 Sep 17.300:1311–1316. [PubMed: 18799443]
2. Fultz NH, Burgio K, Diokno AC, Kinchen KS, Obenchain R, Bump RC. Burden of stress urinary incontinence for community-dwelling women. Am J Obstet Gynecol. 2003 Nov.189:1275–1282. [PubMed: 14634553]
3. 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 Feb.208:146, e1–e7. [PubMed: 23159696]
4. Nygaard I, Turvey C, Burns TL, Crischilles E, Wallace R. Urinary incontinence and depression in middle-aged United States women. Obstet Gynecol. 2003 Jan.101:149–156. [PubMed: 12517660]
5. Temml C, Haidinger G, Schmidbauer J, Schatzl G, Madersbacher S. Urinary incontinence in both sexes: prevalence rates and impact on quality of life and sexual life. Neurourol Urodyn. 2000; 19:259–271. [PubMed: 10797583]
6. Subak LL, Brown JS, Kraus SR, Brubaker L, Lin F, Richter HE, et al. The "costs" of urinary incontinence for women. Obstet Gynecol. 2006 Apr.107:908–916. [PubMed: 16582131]
7. Wyman JF. The 'costs' of urinary incontinence. Eur Urol. 1997; 32(Suppl 2):13–19. [PubMed: 9248807]
8. Fultz N, Girts T, Kinchen K, Nygaard I, Pohl G, Sternfeld B. Prevalence, management and impact of urinary incontinence in the workplace. Occup Med (Lond). 2005 Oct.55:552–557. [PubMed: 16251372]
9. Margalith I, Gillon G, Gordon D. Urinary incontinence in women under 65: quality of life, stress related to incontinence and patterns of seeking health care. Qual Life Res. 2004 Oct.13:1381–1390. [PubMed: 15503833]
10. Fultz NH, Fisher GG, Jenkins KR. Does urinary incontinence affect middle-aged and older women's time use and activity patterns? Obstet Gynecol. 2004 Dec.104:1327–1334. [PubMed: 15572498]

11. Nygaard I, Girts T, Fultz NH, Kinchen K, Pohl G, Sternfeld B. Is urinary incontinence a barrier to exercise in women? Obstet Gynecol. 2005 Aug.106:307–314. [PubMed: 16055580]
12. Blazer DG. Depression in late life: review and commentary. J Gerontol A Biol Sci Med Sci. 2003 Mar.58:249–265. [PubMed: 12634292]
13. Juster FT, Suzman R. An overview of the Health and Retirement Study. J Hum Resources. 1995; 30:S7–S56.
14. Lindau ST, Drum ML, Gaumer E, Surawska H, Jordan JA. Prevalence of high-risk human papillomavirus among older women. Obstet Gynecol. 2008 Nov.112:979–989. [PubMed: 18978096]
15. Melville JL, Fan MY, Rau H, Nygaard IE, Katon WJ. Major depression and urinary incontinence in women: temporal associations in an epidemiologic sample. Am J Obstet Gynecol. 2009 Nov. 201:490, e1–e7. [PubMed: 19716547]
16. Baker DW, Sudano JJ, Albert JM, Borawski EA, Dor A. Lack of health insurance and decline in overall health in late middle age. N Engl J Med. 2001 Oct 11.345:1106–1112. [PubMed: 11596591]
17. McWilliams JM, Meara E, Zaslavsky AM, Ayanian JZ. Health of previously uninsured adults after acquiring Medicare coverage. JAMA. 2007 Dec 26.298:2886–2894. [PubMed: 18159058]
18. Hurd MD, Martorell P, Delavande A, Mullen KJ, Langa KM. Monetary costs of dementia in the United States. N Engl J Med. 2013 Apr 4.368:1326–1334. [PubMed: 23550670]
19. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas. 1977; 1:385–401.
20. Kohout FJ, Berkman LF, Evans DA, Cornoni-Huntley J. Two shorter forms of the CES-D (Center for Epidemiological Studies Depression) depression symptoms index. J Aging Health. 1993 May. 5:179–193. [PubMed: 10125443]
21. Turvey CL, Wallace RB, Herzog R. A revised CES-D measure of depressive symptoms and a DSM-based measure of major depressive episodes in the elderly. Int Psychogeriatr. 1999 Jun. 11:139–148. [PubMed: 11475428]
22. Han B. Depressive symptoms and self-rated health in community-dwelling older adults: a longitudinal study. J Am Geriatr Soc. 2002 Sep.50:1549–1556. [PubMed: 12383153]
23. Emptage NP, Sturm R, Robinson RL. Depression and comorbid pain as predictors of disability, employment, insurance status, and health care costs. Psychiatr Serv. 2005 Apr.56:468–474. [PubMed: 15812099]
24. Kessler RC, Andrews G, Mroczek DK, Ustun B, Wittchen HU. The World Health Organization Composite International Diagnostic Interview short-form (CIDI-SF). Int J Meth Psych Res. 1998; 7:171–185.
25. Webber DA, Bjelland MJ. The impact of work-limiting disability on labor force participation. Health Econ. 2014 Dec 5. in press. Epub ahead of print 2013 Dec 5 ADD DIGITAL OBJECT IDENTIFIER.
26. Benítez-Silva H, Buchinsky M, Chan HM, Cheidvasser S, Rust J. How large is the bias in self-reported disability? J Appl Econometrics. 2004; 19:649–670.
27. St. Clair, P.; Bugliari, D.; Campbell, N.; Chien, S.; Hayden, O.; Hurd, M., et al. RAND HRS data documentation, version L. Santa Monica: Labor & Population Program, RAND Center for the Study of Aging; 2011.
28. Doshi JA, Cen L, Polsky D. Depression and retirement in late middle-aged U.S. workers. Health Serv Res. 2008 Apr.43:693–713. [PubMed: 18370974]
29. Pregibon D. Goodness of link tests for generalized linear models. Appl Statist. 1980; 29:15–24.
30. Pregibon D. Logistic regression diagnostics. Ann Statist. 1981; 9:705–724.
31. Fultz NH, Herzog AR. Self-reported social and emotional impact of urinary incontinence. J Am Geriatr Soc. 2001 Jul.49:892–899. [PubMed: 11527480]
32. Melville JL, Delaney K, Newton K, Katon W. Incontinence severity and major depression in incontinent women. Obstet Gynecol. 2005 Sep.106:585–592. [PubMed: 16135592]

33. Sung VW, West DS, Hernandez AL, Wheeler TL 2nd, Myers DL, Subak LL, et al. Association between urinary incontinence and depressive symptoms in overweight and obese women. Am J Obstet Gynecol. 2009 May.200:557, e1–e5. [PubMed: 19236869]
34. Thom DH, Haan MN, Van Den Eeden SK. Medically recognized urinary incontinence and risks of hospitalization, nursing home admission and mortality. Age Ageing. 1997 Sep.26:367–374. [PubMed: 9351481]
35. Harris SS, Link CL, Tennstedt SL, Kusek JW, McKinlay JB. Care seeking and treatment for urinary incontinence in a diverse population. J Urol. 2007 Feb.177:680–684. [PubMed: 17222656]
36. Kessler RC, Greenberg PE, Mickelson KD, Meneades LM, Wang PS. The effects of chronic medical conditions on work loss and work cutback. J Occup Environ Med. 2001 Mar.43:218–225. [PubMed: 11285869]
37. Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. J Occup Environ Med. 2004 Apr.46:398–412. [PubMed: 15076658]
38. Holroyd-Leduc JM, Mehta KM, Covinsky KE. Urinary incontinence and its association with death, nursing home admission, and functional decline. J Am Geriatr Soc. 2004 May.52:712–718. [PubMed: 15086650]
39. Norton C. The effects of urinary incontinence in women. Int Rehabil Med. 1982; 4:9–14. [PubMed: 7201456]
40. Fultz NH, Herzog AR. Epidemiology of urinary symptoms in the geriatric population. Urol Clin North Am. 1996 Feb.23:1–10. [PubMed: 8677528]
41. Coyne KS, Zhou Z, Thompson C, Versi E. The impact on health-related quality of life of stress, urge and mixed urinary incontinence. BJU Int. 2003 Nov.92:731–735. [PubMed: 14616456]
42. Monz B, Chartier-Kastler E, Hampel C, Samsioe G, Hunskaar S, Espuna-Pons M, et al. Patient characteristics associated with quality of life in European women seeking treatment for urinary incontinence: results from PURE. Eur Urol. 2007 Apr.51:1073–1081. discussion 81–2. [PubMed: 17081676]
43. Coyne KS, Kvasz M, Ireland AM, Milsom I, Kopp ZS, Chapple CR. Urinary incontinence and its relationship to mental health and health-related quality of life in men and women in Sweden, the United Kingdom, and the United States. Eur Urol. 2012 Jan.61:88–95. [PubMed: 21831517]
44. Steffick, DE. Documentation of affective functioning measures in the Health and Retirement Study. Ann Arbor: Survey Research Center, University of Michigan; 2000.
45. Comstock GW, Helsing KJ. Symptoms of depression in two communities. Psychol Med. 1976 Nov.6:551–563. [PubMed: 1005571]

Table 1

Summary Statistics (N=4,511)

	Mean (Range) or Percentage (95% Confidence Interval)
Age (y)	59.4 (54–65)
Race	
White/Caucasian	85.7% (84.0–87.3)
Black/African-American	10.7% (9.5–11.9)
Other	3.6% (2.9–4.6)
Married	68.1% (66.4–69.7)
Educational Attainment	
Did Not Complete High School	28.0% (25.4–30.9)
High School Graduate	37.2% (35.6–38.9)
Some College	20.0% (18.6–21.5)
College Graduate or More	14.7% (13.1–16.5)
Household Income	
Quintile 1 (Poorest)	6778 (0–12440)
Quintile 2	18789 (12444–25000)
Quintile 3	32357 (25024–40492)
Quintile 4	51853 (40500–65940)
Quintile 5 (Richest)	130054 (66000–1116086)
Body Mass Index	
<18.5 kg/m^2	17.3 (13.7–18.4)
18.5–24.9 kg/m^2	22.5 (18.5–24.9)
25–29.9 kg/m^2	27.2 (25–29.9)
≥30 kg/m^2	34.6 (30–63.5)
Parity	
Nulliparous	8.4% (7.7–9.2)
One Child	8.9% (7.9–9.9)
Two Children	24.7% (23.1–26.3)
Three Children or More	58.1% (56.2–60.0)
Currently Smokes	19.8% (18.4–21.2)
Currently Uses Any Alcohol	47.0% (44.2–49.7)
Number of Chronic Conditions	
None or One	61.1% (59.2–63.1)
Two or More	38.9% (36.9–40.8)
Difficulty with Any Activities of Daily Living	11.4% (10.3–12.5)
Use of Any Psychiatric Medication	8.0% (7.1–9.0)

Table 2

Adjusted Associations between Urinary Incontinence and Time to Probable Depression, Work Disability, and Workforce Exit

	Adjusted Hazard Ratio (95% Confidence Interval)		
	Probable Depression (n=3,300)	**Work Disability (n=3,075)**	**Workforce Exit (n=1,848)**
Urinary Incontinence			
No	Ref	Ref	Ref
Yes	1.43 (1.27–1.62) ‡	1.21 (1.01–1.45) *	1.06 (0.93–1.21)
Number of Days of Urine Loss			
Continent	Ref	Ref	Ref
≤15 Days	1.24 (1.07–1.43) †	1.38 (1.20–1.59) ‡	1.03 (0.88–1.21)
>15 Days	1.89 (1.60–2.22) ‡	2.01 (1.58–2.56) ‡	1.14 (0.93–1.40)

This table represents the output of 2 regression models for each of the 3 outcomes, specifying the different urinary incontinence variables as the explanatory variable of interest while adjusting for baseline age, race, marital status, educational attainment, household income, body mass index, parity, current smoking status, current alcohol use, number of chronic conditions, difficulties with activities of daily living, and current use of psychiatric medications.

* Statistical significance at the level of $P<.05$

† Statistical significance at the level of $P<.01$

‡ Statistical significance at the level of $P<.001$