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Correlates of Urinary Incontinence in Community Dwelling Older Latinos

Ariana L. Smith, MD^{*}, Pin-Chieh Wang, PhD[†], Jennifer T. Anger, MD, MPH[‡], Carol M. Mangione, MD, MSPH[§], Laura Trejo[¶], Larissa V. Rodríguez, MD[‡], and Catherine A. Sarkisian, MD, MSPH^{§, #}

^{*}Division of Urology, University of Pennsylvania School of Medicine, Philadelphia, PA

[†]Department of Epidemiology, David Geffen School of Medicine, University of California, Los Angeles, CA

[‡]Department of Urology, David Geffen School of Medicine, University of California, Los Angeles, CA

[§]Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles, CA

[¶]City of Los Angeles Department of Aging, Los Angeles, CA

[#]Veterans Administration Greater Los Angeles Healthcare System Geriatric Research Education Clinical Center (GRECC), Los Angeles, CA

Abstract

The prevalence of urinary incontinence (UI) has shown significant variability in the literature and is reflective of the definition and sampling methodologies used as well as the age group, ethnicity, and gender being studied. Our aim was to measure the prevalence and correlates of UI in a cross sectional sample of 572 older Latinos participating in *Caminemos*, a trial of a behavioral intervention to raise walking levels. Participants completed a baseline survey as well as a series of physical performance measures. UI was measured using the International Consultation on Incontinence item: “How often do you leak urine?” Potential correlates of UI were measured including: sociodemographic characteristics, body mass index, smoking history, physical activity medical comorbidity, physical performance, activities of daily living impairment, use of assistive ambulatory devices, cognitive function, physical and mental health-related quality of life (HRQoL), and depressive symptoms. The prevalence of UI in this community sample was 26.9%. Older Latinos reporting UI were more likely to be female, less physically active, have greater medical comorbidity, lower physical performance scores, greater ADL impairment, use assistive ambulatory devices, have worse cognitive function, have lower HRQoL, and have depressive symptoms. Multivariate logistic regression analysis revealed that medical comorbidity was independently associated with higher rates of UI (OR=1.66, 95% CI 1.30-2.12), while better cognitive function (OR=0.73, 95% CI 0.57-0.93) and higher weighted physical activity scores (OR=0.77, 95% CI 0.60-0.98) were independently associated with lower rates of UI. UI is highly prevalent but not ubiquitous among community-residing older Latinos, suggesting that UI is not an inevitable consequence of aging. Future studies should examine whether interventions that

Corresponding Author: Ariana L. Smith, MD University of Pennsylvania, Division of Urology 299 South 8th Street, Philadelphia, PA 19106 P: (215) 829-3409 | F: (215) 925-9749 ariana.smith@uphs.upenn.edu. Alternate Corresponding Author: Catherine A. Sarkisian MD, MSPH csarkisian@mednet.ucla.edu.

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decrease comorbidity and cognitive decline and increase physical activity among older Latinos also improve continence status.

Keywords

Urinary incontinence; epidemiology; Latinos; prevalence; aging

INTRODUCTION

The burden of urinary incontinence (UI) reaches far beyond the episodes of wetness, the odor of urine, and the inconvenience of protective garments. It encompasses adverse physical, psychological, and social effects including skin breakdown, recurrent urinary tract infections, impaired sleep, falls and fractures, social withdrawal, anxiety, depression, and a predisposition to institutionalization.¹ The economic encumbrance includes the costs of treatment, the complications of treatment, and lost productivity, which together engender a conservative price tag of nearly \$20 billion dollars annually.²

The prevalence of UI has shown significant variability in the literature and is reflective of the definition and sampling methodologies used³ as well as the age group, ethnicity and gender being studied,⁴ but it is generally agreed that prevalence rates among non-institutionalized older adults range from approximately 15% to 35% of those aged 65 years and older.^{1, 5} Much attention has focused on the social and psychosocial consequences of UI in the aging population, including substantially lower psychological well being in those with UI.⁶ Previous work suggests a higher prevalence of UI among women, older adults, nursing home residents,⁷ and among those with limited functional status⁸. To date, the vast majority of epidemiologic studies on UI have focused on non-Latino Caucasian women, with few addressing prevalence among Caucasian men and minority women. More recent work has begun to investigate the risk factors for UI among minorities, including minority men, and suggests that the risk factors for UI may vary by racial/ethnic group.^{7, 9} Heterogeneity in continence status among aging Americans has created great interest in identifying groups of older adults most likely to benefit from interventions to prevent or treat UI, by identifying sociodemographic, health, and modifiable factors that may be contributing to UI.

Latinos currently represent approximately 15% of the US population and account for half of the US population growth since 2000.¹⁰ Furthermore, Latinos represent the fastest growing group of Americans over 60 years of age.¹⁰ Previous work has shown that the risk for several often-preventable or curable diseases and syndromes associated with UI, including diabetes,¹¹ the metabolic syndrome,¹² and cervical cancer,¹³ are greater among Latinos, suggesting that a greater prevalence of incontinence may be found. Given the rapidly rising numbers of older Latinos, it is imperative to understand the prevalence as well as the correlates of UI among older Latinos in order to design and implement appropriate interventions aimed at ameliorating the impact of UI.

With the overarching goal of understanding the prevalence and associated characteristics of UI among community-residing older Latinos, this study analyzed cross-sectional baseline data from an ongoing trial of a behavioral intervention to increase walking levels among older Latinos recruited from 27 community-based senior centers in the greater Los Angeles area. The specific aims were: 1) to estimate UI prevalence; and 2) to identify sociodemographic, behavioral, medical, physical, psychological and quality of life (QoL) correlates of UI in this sample.

METHODS

Sample

To measure the prevalence of UI in this convenience sample, baseline data was analyzed from a randomized trial of a behavioral intervention to raise walking levels among sedentary older Latinos (*Caminemos!*, Clinicaltrials.gov Identifier: NCT00183014). Participants were recruited from 27 community-based senior centers between August 2005 and August 2007. To be eligible for the study, potential participants had to be aged 60 years or older, self-identify as Latino, be able to communicate verbally in English or Spanish, pass the six item cognitive screening with four of six items correct,¹⁴ and exercise less than 20 minutes 3 times per week. Of 1,217 potential participants screened, 572 (47%) met eligibility criteria, completed informed consent, and enrolled in the study. Each participant completed a baseline in-person survey (offered in English or Spanish) that included measures of physical activity level, general health, physical function, and QoL. Each participant also completed a brief physical exam and a series of performance measures (see below) administered by bilingual staff. This study was approved by the University of California, Los Angeles Institutional Review Board.

Measures

Incontinence—UI was measured using an item modified from the International Consultation on Incontinence Questionnaire: “How often do you leak urine?”^{15, 16} There were six possible responses: (1) never (2) less than one time per week, (3) two to three times per week, (4) once per day, (5) several times per day, or (6) all the time. Participants who responded anything other than “never” were classified as having UI. Five categories of characteristics were selected based on the existing UI literature and were hypothesized to be associated with UI in this sample: sociodemographic, behavioral, medical, physical, and psychological/quality of life characteristics.

Sociodemographic Characteristics—Age, gender, marital status, level of education, and income were measured using standard previously tested measures. Acculturation was assessed with the Marin Short-Acculturation Scale, which ranges from 1 (no evidence of acculturation) to 5 (most acculturation).¹⁷ Because 46% of the sample scored the lowest possible score on this measure (1), acculturation was dichotomized into any (scores >1) versus none (score=1).

Behavioral Characteristics—Body Mass Index (BMI) - Though BMI is not a behavioral characteristic in itself, because obesity is a construct that is amenable to behavioral change, BMI was categorized with other behavioral constructs. Height and weight were collected on each patient following a standardized protocol and were used to calculate BMI (kg/m²). BMI was divided into four categories: 18.5 kg/m² (underweight), 18.6-24.9 kg/m² (normal weight), 25-29.9 kg/m² (overweight) and >30 kg/m² (obese) according to the BMI classification defined by World Health organization (WHO).¹⁸ Inter-rater reliability on a random 10% of participants was 1.00 (p<0.001) for height and weight.

Smoking History – Smoking history was assessed using the Behavioral Risk Factor Surveillance System Survey Questionnaire (BRFSS). ADD REFERENCE

Physical Activity: Each participant completed the Yale Physical Activity Survey, a previously-tested and widely-used survey that measures physical activity among older adults.¹⁹ It has two sections: in the first section, seniors are provided with a detailed list of specific physical activities and asked to report the time spent in each during a typical week in the previous month. In the second section, seniors are asked to report the time spent in each of 5 specific activity “dimensions” (vigorous activity, leisurely walking, moving,

standing and sitting). The first section is used to calculate both a Total Time Summary Index (total time spent in any of the listed activities) and an Energy Expenditure Summary Index (total time in each activity multiplied by a kcal intensity code and summed over all activities). A third summary index - the Activity Dimensions Summary (ADS) Score - is derived from Section 2 of the Yale Survey by multiplying the time spent in each activity "dimension" by a weight (ranging from 5 for vigorous activities to 1 for sitting) and summing up the weighted total for all 5 activity dimensions..^{20, 21}

Medical Characteristics

Medical Comorbidity: The modified Charlson comorbidity index²² was used to quantify the number of self-reported specific comorbid conditions: hypertension (HTN); myocardial infarction (MI); congestive heart failure (CHF); stroke or transient ischemic attack (TIA); diabetes mellitus; arthritis; hip fracture; wrist, arm or spine fracture; asthma, emphysema, chronic obstructive pulmonary disease (COPD) or chronic bronchitis (CB); cirrhosis or liver disease; cancer (other than skin); Parkinson's disease; lower extremity bypass; Alzheimer's disease or dementia; depression; and anxiety.

Physical Function Characteristics

Physical Performance Measures: A series of physical performance measures from Guralnik's National Institute of Aging performance test battery²³ were performed following a standardized protocol. Balance, gait, strength, and endurance were evaluated by examining ability to stand with the feet together in the side-by-side, semi-tandem, and tandem positions, time to walk eight feet, and time to rise from a chair and return to the seated position five times. A physical performance summary score was calculated by summing categorical rankings of performance on each test. A random 10% of participants had each of these measured twice; inter-rater reliability was 1.00 ($p < 0.001$).

Self Reported Physical Function: The activities of daily living (ADL) summary scale²⁴ was used to assess difficulty performing sixteen basic tasks, including walking, bathing, dressing, using the toilet, transferring, feeding, grooming, using the telephone, shopping, preparing meals, housekeeping, doing laundry, driving, taking medications, and handling finances. A summary score with a maximum value of 16 was given to each patient.

Use of Assistive Devices: Frequency of use of assistive devices (cane, walker and/or wheelchair) was assessed using the Behavioral Risk Factor Surveillance System Survey Questionnaire (BRFSS).²⁵

Psychological/ Quality of Life Characteristics

Cognitive Function: Global cognitive function was measured using the Modified Mini Mental State Exam (3MS).²⁶ The 3MS is an expanded version of the Mini-Mental State Examination²⁷, with additional items assessing verbal fluency, delayed recall, and abstract reasoning.

Health Related Quality of Life: All participants completed the Medical Outcomes Study 12-item Short Form Survey (SF-12).²⁸ Responses were used to compute a Physical Component Summary (PCS-12) and a Mental Component Summary (MCS-12) using standardized weights based on the distribution of scores in the U.S population with a mean of 50 and a standard deviation of 10.

Depressive symptoms: All participants completed the 5-Item Geriatric Depression Scale (GDS) achieving scores between zero and five; higher scores indicated greater symptoms of

depression.²⁹ GDS was dichotomized with score less than two and score greater than or equal to two because this cutpoint has a sensitivity of 97% and a specificity of 85% for detecting clinical depression.²⁹

Statistical Analysis

Bivariate associations between UI and potential correlates were tested using Pearson's chi square for categorical variables and Student's t-test for continuous variables. Significance was set at p value = 0.05.

A series of hierarchical multivariate logistic regression models were constructed to estimate odds ratios (OR) and 95% confidence intervals (CI) for UI using SAS 9.1 software (SAS Institute, Inc., Cary, NC). All multivariate models adjusted for Spanish language of the survey and for clustering by senior center site.

RESULTS

The mean patient age for this study was 73.1 years (range 60-93 years). Seventy-seven percent of the participants were female and 22.9% were male; 15.2% of participants had been hospitalized in the past 6 months. The overall prevalence of UI in this older Latino population was 26.9%, with 29.5% of women and 18.3% of men ($p < 0.01$ for difference between groups) reporting UI. Severity of incontinence was reported as less than one time per week (7.2%), two to three times per week (3.5%), daily (4.7%), greater than one time per day (9.4%), or constant (2.1%). Characteristics of the study population broken down by the presence and absence of UI are shown in **Table 1**. Female gender was the strongest sociodemographic correlate of UI. Age, in this participant cohort, was not associated with an increased prevalence of UI.

In bivariate analyses, HTN, CHF, arthritis, depression, and anxiety were associated with higher prevalence of UI. A linear correlation between prevalence of UI and the number of comorbid conditions was found (correlation coefficient, $r = 0.98$ (ARE YOU SURE – THIS SOUNDS WAY TOO HIGH?!?!)) and is shown in **Figure 1**. With one comorbid condition the associated unadjusted risk of UI in this study was 12.6%, with two conditions this rose to 17.1%, with three conditions 18.9%, and with four conditions the unadjusted associated risk of UI was 22.6%.

A series of multivariate regression analyses were constructed using five hierarchical models based on the five categories of potential UI correlates described above (sociodemographic, behavioral, medical, physical, and psychological/QoL). **Table 2** shows the results of the five models in which each model added one of the five categories of potential UI correlates. The fully adjusted model revealed that medical comorbidity was associated with higher rates of UI (OR=1.66, 95% CI 1.30-2.12), while better cognitive function (OR=0.73, 95% CI 0.57-0.93) was independently associated with lower rates of UI. Additionally, one summary index of the Yale Physical Activity Survey, the ADS Score, was associated with lower rates of UI (OR=0.77, 95% CI 0.60-0.98). To explore possible reasons why only 1 of the 3 physical activity measures correlated with UI, we re-ran the models using modified versions of the ADS Score: eliminating the weights from the ADS Score resulted in a stronger association with UI (AOR 0.72, 95% CI 0.56-0.91) and dropping the “standing” and “sitting” dimensions from the ADS Score resulted in an AOR virtually identical to the original model (0.76, 95% CI 0.6-0.97). Acculturation showed borderline independent association with higher rates of UI (OR=1.24, 95% CI 1.00-1.55). Several important bivariate correlates of UI including gender, ADL impairment, use of assistive devices, and QoL were not significant in the fully adjusted multivariate model.

DISCUSSION

UI is a highly prevalent condition among lower income older urban Latinos attending community senior centers in the greater Los Angeles region. The overall prevalence of UI in this 60 year-old and above cohort was 26.9%, with 29.5% of Latino women and 18.3% of Latino men reporting UI. This was at the high end of the range of previously reported epidemiologic studies in women,^{4, 7, 30, 31, 32} men,^{7, 9} and Latinos.³³ In a multivariate model adjusting for sociodemographic, behavioral, medical, physical, psychological and QoL characteristics, it was found that medical comorbidity was independently associated with higher rates of UI, while better cognitive function and greater weighted physical activity summary scores were independently associated with lower rates of UI.

The association between UI and medical comorbidity has been recognized in several previous studies;^{31, 33} however, significant variability exists in the presence and strength of that association. In our study, HTN, CHF, arthritis, depression, and anxiety were associated with a higher prevalence of UI. Too few patients with Parkinson's, Alzheimer's or other dementia were included to make meaningful conclusions regarding the associations in this population. Other studies have shown asthma,⁹ stroke,³⁴ diabetes,³⁵ and smoking³² are independently associated with UI. A positive linear association was seen in our study between the number of comorbid conditions and the prevalence of UI. This finding suggests that the elevated prevalence of UI may be associated with the cumulative effect of multiple diseases (multi-comorbidity) rather than with particular individual diseases. Multi-comorbidity presents a challenging management dilemma that is especially prevalent in the geriatric patient populations.³⁶ With each medical condition come guidelines for care, usually involving medications. The cumulative effect of each set of guidelines may not be appropriate therapy due to drug interactions, adverse drug events, or simply too many medications, producing an unsustainable treatment burden.³⁷ As a result, prioritization of care is imperative with identification of the most dangerous as well as the most bothersome conditions. Given the strong association seen between UI, comorbidity and health-related quality of life, it is important that providers screen for UI in their patients with multi-comorbidity, search for reversible causes of UI, and treat selectively with a goal of improving overall quality of life.

An association between cognitive function and UI was appreciated in our analysis with the most cognitively impaired seniors being more likely to experience UI than the least impaired seniors. Impaired cognitive function is a well recognized risk factor for UI among nursing home residents³⁸ and those admitted for hip fracture;⁸ but, because the current study includes only older Latinos who were able to pass the cognitive screening and complete informed consent, this current study extends this work by suggesting that even mild cognitive impairment may contribute to UI.

Though neither total time exercising nor energy expenditure was associated with UI, it is interesting that the ADS summary score was strongly associated with lower rates of UI. The sensitivity analyses suggest that it is the moderate and vigorous exercise dimensions of the ADS Score that are contributing the most to the association; dimensions that make up a much smaller component of the time and energy indices. This suggests that either UI is preventing older adults from participating in moderate or vigorous exercise, or that moderate-vigorous physical activity might prevent UI. The latter hypothesis is supported by innovative work showing that an exercise intervention in a physically inactive, incontinent nursing home cohort can decrease UI as well as improve mobility and strength.³⁹ Significant improvements in mobility, strength, and continence were seen. Further research in this area should help determine whether the effects on UI could be secondary to exercise, mobility, weight loss or other factors.

A pitfall of this and other cross sectional studies is that the direction of causation cannot be determined. Does UI predispose patients to medical comorbidity, cognitive dysfunction and physical inactivity, or are those who are sicker, less active, and experiencing mild cognitive impairment more prone to UI? A longitudinal population-based study of elder Mexican Americans across five south-western states attempted to shed light on this association; it showed that incident UI was associated with global functional impairment.⁸ The authors concluded that UI may be an early marker signaling the onset of frailty among the elderly. The concept of frailty in the elderly represents vulnerability and captures elements of physical function, cognitive function and general health. Previous studies have addressed the association between UI and frailty⁸ and our results further support this link. While the directional and temporal association of these conditions cannot be determined by this cross-sectional analysis, one could speculate that improving cognitive function, physical function, and general health could improve continence. Aggressive preventative health measures to maintain cognitive function, prevent multi-comorbidity, and promote physical activity among older adults may have multifactorial health benefits including improved continence and quality of life. Further studies evaluating these associations and adjusting for the role of medications and baseline fitness level in a longitudinal study are warranted.

In this analysis a higher prevalence of UI was seen among the more acculturated Latinos, an association that approached statistical significance in the fully adjusted model. Whether this reflects a true difference or measurement error is unclear: one possible explanation for this finding is that because UI can be a difficult topic to discuss, older Latinos who are more acculturated may have been more likely to report it. Latino seniors who are more acculturated and use English more often may be less likely to be influenced by the phenomenon of social desirability when answering a question about this potentially embarrassing problem. If so, this would suggest that the rates of UI are probably higher than reported here. Further study is needed.

A few important bivariate correlates did not maintain significance in the multivariate model. Female gender has been found in many previous studies to be associated with a greater risk of UI.^{7, 9} In our study the addition of acculturation to the multivariate model may have created the drop out of UI due to the unequal gender distribution for acculturation. Additionally, ADL impairment, use of assistive devices, and HRQoL did not maintain significance in the multivariate model suggesting these associations are captured by other correlates added to the model, such as medical comorbidity.

Limitations of our study include selection bias and possible measurement error. This was a convenience sample from a study whose primary aim was not to measure rates of UI; prevalence rates from this sample cannot be extrapolated to the entire Latino community. Since participants were recruited from community centers, active seniors may be overrepresented while those less active or sicker may be at home or in nursing facilities, causing an underestimation of the prevalence of UI. Despite being a senior center sample, however, it is important to keep in mind that this was not an exclusively healthy sample, as evidenced by 15% recent hospitalization rate. These data are based on self-reported instruments which are subject to recall and social desirability bias. Participants who had been previously diagnosed and/or successfully treated for UI may not have been captured by our measure of UI and as a result effective treatment may have led to underestimation of prevalence or downgrading of severity of UI in this sample. In addition it is important to point out that some of the constructs measured had not been previously tested in an older Latino population. Though all instruments were front and back-translated into Spanish and all analyses adjusted for the language of survey administered (English or Spanish), it is still possible that subtle differences between the versions of the instruments may have contributed to the observed findings.

CONCLUSION

UI is a highly prevalent condition among older urban Latinos with 29.5% of women and 18.3% of men reporting incontinence in this sample. Impairments in cognitive and physical function coexist with UI; and, together, these factors can have a significant impact on QoL. Our results suggest that UI is not an inevitable consequence of aging and though not always curable, should not be attributed to normal aging. Multivariate regression analysis revealed that greater medical comorbidity and cognitive impairment, regardless of age, were independently associated with higher rates of UI among older Latinos. Additionally, a weighted physical activity summary score was independently associated with lower rates of UI. Since existing comorbid disease and cognitive dysfunction are difficult to modify, preventive measures to decrease the number of comorbid conditions and maintain adequate cognitive function, as well as increase participation in moderate and vigorous physical activity may play an important role in preventing UI. An excellent opportunity to improve UI may exist with initiation of an exercise program. Furthermore, it is important that providers screen for UI in their patients with multi-comorbidity and impaired cognition, not only to search for reversible causes of UI, but also because UI appears to be an indicator of declining health and function. Prioritizing care aimed at interventions to decrease the risk of UI may save healthcare dollars, decrease patient morbidity, and improve QoL.

Acknowledgments

Conflict of Interest Checklist

Elements of Financial/ Personal Conflicts	ALS		PCW		JTA		LVR		CMM		LT		CAS	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		X		X		X		X		X		X		X
Grants/Funds		X		X		X		X		X		X		X
Honoraria		X		X		X		X		X		X		X
Speaker Forum		X		X		X		X		X		X		X
Consultant		X		X		X		X		X		X		X
Stocks		X		X		X		X		X		X		X
Royalties		X		X		X		X		X		X		X
Expert Testimony		X		X		X		X		X		X		X
Board Member		X		X		X		X		X		X		X
Patents		X		X		X		X		X		X		X
Personal Relationship		X		X		X		X		X		X		X

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Figure 1.
A linear association between the number of comorbid medical conditions and risk for urinary incontinence was seen.

Table 1

Characteristics of Participants With and Without Urinary Incontinence, *n*=572

	All		No UI		UI	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
All	572	100.0%	418	73.1%	154	26.9%
Age (years)						
60 - 64	63	11.0%	48	11.5%	15	9.7%
65 - 69	120	21.0%	94	22.5%	26	16.9%
70 - 74	144	25.2%	105	25.1%	39	25.3%
75 - 79	138	24.1%	89	21.3%	49	31.8%
80 - 84	82	14.3%	63	15.1%	19	12.3%
85	25	4.4%	19	4.5%	6	3.9%
Gender						
Female	441	77.1%	311	74.4%	130	84.4%
Male	131	22.9%	107	25.6%	24	15.6%
Education						
No Schooling	83	14.5%	54	12.9%	29	18.8%
8th Grade	256	44.8%	186	44.5%	70	45.5%
High School	233	40.7%	178	42.6%	55	35.6%
Marital Status						
Never married	72	12.6%	50	12.0%	22	14.5%
Married	164	28.8%	125	29.9%	39	25.7%
Divorced or Separated	128	22.5%	96	23.0%	32	21.1%
Widowed	206	36.1%	147	35.2%	59	38.8%
Income*						
Unknown	50	8.7%	37	8.8%	13	8.4%
< \$5,000	89	15.6%	61	14.6%	28	18.2%
\$5,000 - \$10,000	169	29.5%	124	29.7%	45	29.2%
\$10,000 - \$20,000	174	30.4%	122	29.2%	52	33.8%
\$20,000 - \$30,000	61	10.7%	53	12.7%	8	5.2%
> \$30,000	29	5.1%	21	5.0%	8	5.2%

	All		No UI		UI	
	n	%	n	%	n	%
Body Mass Index (kg/m2)						
Underweight (< 18.5)	2	0.4%	2	0.5%	0	0.0%
Healthy (18.6-24.9)	91	16.0%	70	16.8%	21	13.7%
Overweight (25-29.9)	213	37.4%	158	38.0%	55	35.9%
Obese (≥ 30.0)	263	46.2%	186	44.7%	77	50.3%
Smoking (in lifetime)						
<100 cigarettes	364	63.6%	263	62.9%	101	65.6%
>100 cigarettes	208	36.4%	155	37.1%	53	34.4%
Recent Hospitalization						
No	485	84.8%	359	85.9%	126	81.8%
Yes	87	15.2%	59	14.1%	28	18.2%
Depressive Symptoms						
<2	413	72.3%	322	77.2%	91	59.1%
≥ 2	158	26.7%	95	22.8%	63	40.9%
	Mean	SD	Mean	SD	Mean	SD
Cognitive Function	82.2	11.1	83.3	10.6	79.1	12.1
Acculturation	2.1	1.3	2.0	1.3	2.3	1.5

* Total annual household income before taxes.

Table II

Odds Ratio (OR) and 95% Confidence Interval (CI) for Urinary Incontinence with Bivariate and Multivariate Regression Analyses[‡]

Variables	Bivariate model		Model 1 (n=572)		Model 2 (n=567)		Model 3 (n=567)		Model 4 (n=564)		Model 5 (n=563)	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Age												
60-64		Reference		Reference		Reference		Reference		Reference		Reference
65-69	0.89	(0.43, 1.83)	0.90	(0.43, 1.87)	0.88	(0.42, 1.85)	1.02	(0.47, 2.21)	1.11	(0.50, 2.43)	1.19	(0.54, 2.66)
70-74	1.19	(0.60, 2.36)	1.24	(0.62, 2.48)	1.15	(0.56, 2.33)	1.37	(0.65, 2.87)	1.48	(0.70, 3.14)	1.54	(0.71, 3.32)
75-79	1.76	(0.90, 3.47)	1.68	(0.84, 3.34)	1.51	(0.75, 3.06)	1.79	(0.86, 3.74)	1.89	(0.89, 3.99)	1.99	(0.91, 4.34)
80-84	0.97	(0.45, 2.09)	0.97	(0.44, 2.13)	0.83	(0.37, 1.85)	1.00	(0.43, 2.33)	1.08	(0.46, 2.57)	1.07	(0.44, 2.60)
85 and above	1.01	(0.34, 2.99)	0.92	(0.31, 2.75)	0.83	(0.27, 2.56)	0.76	(0.23, 2.51)	0.74	(0.22, 2.46)	0.73	(0.21, 2.50)
Gender												
Male		Reference		Reference		Reference		Reference		Reference		Reference
Female	1.8	(1.14, 3.04)*	1.88	(1.15, 3.09)*	1.60	(0.95, 2.72)	1.55	(0.90, 2.68)	1.50	(0.86, 2.60)	1.42	(0.81, 2.48)
Education												
No schooling completed		Reference		Reference		Reference		Reference		Reference		Reference
8th grade or lower	0.70	(0.41, 1.19)	0.78	(0.45, 1.35)	0.87	(0.50, 1.52)	1.04	(0.58, 1.86)	1.03	(0.57, 1.87)	1.43	(0.74, 2.76)
Some HS or more/other	0.58	(0.33, 0.99)*	0.49	(0.28, 0.87)*	0.58	(0.32, 1.04)	0.77	(0.42, 1.44)	0.83	(0.44, 1.55)	1.37	(0.66, 2.83)
Acculturation	1.22	(1.02, 1.46)*	1.29	(1.06, 1.58)*	1.27	(1.04, 1.56)*	1.30	(1.06, 1.61)*	1.26	(1.01, 1.57)*	1.24	(1.00, 1.55)*
Body Mass Index												
Normal or underweight		Reference		Reference		Reference		Reference		Reference		Reference
Overweight	0.71	(0.41, 1.23)			0.88	(0.49, 1.58)	1.12	(0.60, 2.07)	1.17	(0.63, 2.19)	1.19	(0.63, 2.25)
Obese	0.84	(0.56, 1.26)			0.91	(0.59, 1.40)	1.24	(0.78, 1.98)	1.28	(0.79, 2.05)	1.25	(0.77, 2.04)
Yale Physical Activity Survey [‡]												
Total Time Summary Index	0.84	(0.69, 1.04)			1.19	(0.52, 2.73)	1.04	(0.45, 2.37)	1.21	(0.54, 2.72)	1.40	(0.61, 3.20)
Energy Expenditure Index	0.80	(0.63, 1.01)			0.77	(0.32, 1.89)	0.95	(0.40, 2.28)	0.89	(0.39, 2.03)	0.82	(0.35, 1.90)
Activity Dimensions Summary Score	0.66	(0.54, 0.82)*			0.72	(0.57, 0.90)*	0.74	(0.59, 0.94)*	0.75	(0.59, 0.96)*	0.77	(0.60, 0.98)*
Medical Comorbidity	1.91	(1.57, 2.32)*					1.89	(1.52, 2.34)*	1.73	(1.38, 2.17)*	1.66	(1.30, 2.12)*
Physical Performance Score [‡]	0.72	(0.60, 0.87)*							0.93	(0.73, 1.18)	1.00	(0.78, 1.27)

Variables	Bivariate model		Model 1 (n=572)		Model 2 (n=567)		Model 3 (n=567)		Model 4 (n=564)		Model 5 (n=563)	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
ADL Impairment												
Never have		Reference									Reference	
Ever have	2.59	(1.76, 3.79)*							1.49	(0.95, 2.34)	1.25	(0.76, 2.07)
Use of Assistive Devices												
Never have		Reference									Reference	
Ever have	2.39	(1.59, 3.58)*							1.36	(0.81, 2.28)	1.20	(0.70, 2.06)
Cognitive Function [†]	0.70	(0.58, 0.83)*									0.73	(0.57, 0.93)*
Physical HRQoL [‡]	0.63	(0.52, 0.76)*									0.80	(0.62, 1.04)
Mental HRQoL [‡]	0.69	(0.58, 0.83)*									0.97	(0.77, 1.24)
5-item GDS												
Less than 2		Reference									Reference	
Greater than or equal to 2	2.35	(1.58, 3.48)*									1.33	(0.81, 2.21)

Model 1: Logistic regression analyses included independent variables of age, gender, education, and acculturation score.

Model 2: Model 1 plus Body Mass Index and Yale Physical Activity Index.

Model 3: Model 2 plus Medical comorbidity.

Model 4: Model 3 plus physical performance, ADL impairment, and use assistive devices.

Model 5: Model 4 plus cognitive, HRQoL, and depression.

UI, Urinary Incontinence; HS, high school; HRQoL, health related quality of life; ADL, activities of daily living; GDS, geriatric depression scale

* Indicates p <0.05

[†] Bivariate model: logistic regression analyses included one variable at a time.

[‡] Point estimates based on continuous scores, standardized using weights with a mean of zero and a standard deviation of one.