

Mental Health, Sleep, and Physical Function in Treatment-Seeking Women With Urinary Incontinence

Nazema Y. Siddiqui, MD, MHS; Jonathan B. Wiseman, MS; David Cella, PhD; Catherine S. Bradley, MD, MSCE; H. Henry Lai, MD; Margaret E. Helmuth, MA; Abigail R. Smith, PhD; James W. Griffith, PhD; Cindy L. Amundsen, MD; Kimberly S. Kenton, MD, MS; J. Quentin Clemens, MD, FACS, MSCI; Karl J. Kreder, MD, MBA; Robert M. Merion, MD, FACS; Ziya Kirkali, MD; John W. Kusek, PhD; and Anne P. Cameron, MD for the Symptoms of Lower Urinary Tract Dysfunction Research Network (LURN)

SUPPLEMENTARY MATERIALS

Supplementary Table 1: Multivariable Linear Regression Models of Mental Health, Sleep, and Physical Function Measures (with UI vs. without UI)*

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
Sleep disturbance	Intercept	57.35	2.16	<0.001	<0.001
	With UI vs. without UI	0.84	1.03	0.42	0.52
	Age	-0.09	0.03	0.002	0.01
	Education (ref = High School or Less)			0.001	0.002
	Some college/tech school - no degree	-1.80	1.35	0.18	0.26
	Associates degree	-2.99	1.58	0.06	0.09
	Bachelor's degree	-4.60	1.33	0.001	0.002
	Graduate degree	-5.24	1.40	<0.001	0.001
	BMI category (ref = Normal)			0.52	0.61
	Overweight	0.54	1.07	0.62	0.66
	Obese	0.66	1.14	0.56	0.64
	Morbidly obese	-0.83	1.16	0.48	0.57
	Functional Comorbidity Index	1.11	0.22	<0.001	<0.001
	Sleep Apnea	2.66	1.11	0.02	0.03
	Traumatic sexual experience prior to age 17	2.19	0.92	0.02	0.03
	Diabetic	-3.72	1.19	0.002	0.004
Depression	Intercept	50.78	1.62	<0.001	<0.001
	With UI vs. without UI	0.06	0.98	0.95	0.95
	Education (ref = High School or Less)			<0.001	<0.001
	Some college/tech school - no degree	-2.79	1.31	0.03	0.05
	Associates degree	-4.91	1.53	0.001	0.003
	Bachelor's degree	-6.09	1.30	<0.001	<0.001
	Graduate degree	-5.51	1.36	<0.001	<0.001
	BMI category (ref = Normal)			0.72	0.76
	Overweight	-0.21	1.01	0.83	0.85
	Obese	0.91	1.09	0.40	0.51
	Morbidly obese	0.59	1.10	0.59	0.65
	Functional Comorbidity Index	1.40	0.20	<0.001	<0.001
	Sleep Apnea	3.27	1.04	0.002	0.004
	Hysterectomy	-2.41	0.81	0.003	0.01
	Diabetic	-4.50	1.12	<0.001	<0.001
	Anxiety	Intercept	53.03	2.11	<0.001
With UI vs. without UI		0.74	1.02	0.47	0.57
Age		-0.12	0.04	0.005	0.01

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
	BMI category (ref = Normal)			0.62	0.66
	Overweight	-0.23	1.05	0.83	0.85
	Obese	0.82	1.12	0.46	0.57
	Morbidly obese	-0.63	1.12	0.58	0.64
	Post-menopausal status (ref = Not post-menopausal)			0.03	0.05
	Post-menopausal (not using hormones)	-0.43	1.25	0.73	0.77
	Post-menopausal (using hormones)	-3.64	1.61	0.02	0.04
	Functional Comorbidity Index	1.80	0.21	<0.001	<0.001
	Diabetic	-4.29	1.19	<0.001	0.001
Perceived stress	Intercept	18.88	1.79	<0.001	<0.001
	With UI vs. without UI	0.71	0.81	0.38	0.48
	Age	-0.12	0.03	<0.001	<0.001
	Education (ref = High School or Less)			<0.001	<0.001
	Some college/tech school - no degree	-2.16	1.08	0.05	0.07
	Associates degree	-4.42	1.26	0.001	0.002
	Bachelor's degree	-5.26	1.07	<0.001	<0.001
	Graduate degree	-3.42	1.12	0.002	0.01
	Employment (ref = Employed Full-Time)			0.01	0.01
	Employed part-time	1.56	0.93	0.09	0.14
	Unemployed (looking for work)	6.86	2.09	0.001	0.003
	Not employed (not looking for work)	0.93	0.76	0.23	0.31
	BMI category (ref = Normal)			0.58	0.64
	Overweight	-0.84	0.85	0.32	0.42
	Obese	-0.59	0.93	0.53	0.61
	Morbidly obese	-1.23	0.93	0.18	0.26
	Functional Comorbidity Index	0.52	0.19	0.01	0.01
	Sleep Apnea	2.87	0.88	0.001	0.003
	Psychiatric Diagnosis	3.86	0.68	<0.001	<0.001
	Diabetic	-2.85	0.95	0.003	0.01
Physical function	Intercept	61.08	1.91	<0.001	<0.001
	With UI vs. without UI	-1.39	0.89	0.12	0.17
	Age	-0.11	0.03	<0.001	<0.001
	Education (ref = High School or Less)			0.001	0.003
	Some college/tech school - no degree	1.89	1.18	0.11	0.16
	Associates degree	3.68	1.38	0.01	0.01

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
	Bachelor's degree	4.18	1.16	<0.001	0.001
	Graduate degree	4.27	1.22	0.001	0.002
	Employment (ref = Employed Full-Time)			<0.001	0.001
	Employed part-time	-1.19	1.02	0.24	0.33
	Unemployed (looking for work)	-3.37	2.12	0.11	0.16
	Not employed (not looking for work)	-3.69	0.84	<0.001	<0.001
	BMI category (ref = Normal)			<0.001	<0.001
	Overweight	-2.35	0.92	0.01	0.02
	Obese	-3.88	1.00	<0.001	<0.001
	Morbidly obese	-7.45	1.01	<0.001	<0.001
	Functional Comorbidity Index	-1.32	0.18	<0.001	<0.001
	Sleep Apnea	-4.36	0.98	<0.001	<0.001
	Brain or spinal surgery	-4.02	1.33	0.003	0.01

*Candidate covariates for model selection included all variables from Table 1 for all outcomes with one notable exception: history of psychiatric disease was not included as a covariate for models of PROMIS Depression and Anxiety outcomes.

Supplementary Table 2: Logistic Regression Model of IPAQ categorical scale (with UI vs. without UI)

<i>Dependent</i>	<i>Variable</i>	<i>Odds ratio estimate</i>	<i>Lower 95% confidence limit</i>	<i>Upper 95% confidence limit</i>	<i>p-value</i>	<i>FDR p-value</i>
IPAQ (odds of being active)	With UI vs. without UI	1.038	0.63365	1.70033	0.88	0.89
	BMI category (ref = Normal)				<0.001	<0.001
	Overweight	0.667	0.40643	1.09452	0.28	0.37
	Obese	0.482	0.28613	0.81049	0.37	0.48
	Morbidly obese	0.308	0.18236	0.51920	<0.001	0.001

Supplementary Table 3: Multivariable Linear Regression Models of Mental Health, Sleep, and Physical Function Measures (UI subtypes)*

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
Sleep disturbance	Intercept	58.08	2.29	<0.001	<0.001
	UI subtype (ref = Stress incontinence)			0.83	0.85
	Urge incontinence	-0.66	1.36	0.63	0.67
	Mixed incontinence	-0.06	1.19	0.96	0.96
	Age	-0.11	0.03	0.001	0.004
	Education (ref = High School or Less)			0.02	0.05
	Some college/tech school - no degree	-1.72	1.48	0.25	0.35
	Associates degree	-2.47	1.72	0.15	0.23
	Bachelor's degree	-3.75	1.46	0.01	0.02
	Graduate degree	-4.76	1.57	0.003	0.01
	BMI category (ref = Normal)			0.42	0.51
	Overweight	1.61	1.25	0.20	0.29
	Obese	2.01	1.28	0.12	0.19
	Morbidly obese	1.21	1.27	0.34	0.43
	Functional Comorbidity Index	1.20	0.23	<0.001	<0.001
	Traumatic sexual experience prior to age 17	2.68	1.01	0.01	0.02
	Diabetic	-4.46	1.34	0.001	0.003
Depression	Intercept	48.72	1.74	<0.001	<0.001
	UI subtype (ref = Stress incontinence)			0.28	0.38
	Urge incontinence	1.44	1.33	0.28	0.38
	Mixed incontinence	1.86	1.16	0.11	0.18
	Education (ref = High School or Less)			0.002	0.01
	Some college/tech school - no degree	-2.05	1.42	0.15	0.23
	Associates degree	-4.28	1.68	0.01	0.02
	Bachelor's degree	-5.45	1.43	<0.001	0.001
	Graduate degree	-3.38	1.52	0.03	0.05
	BMI category (ref = Normal)			0.37	0.45
	Overweight	-1.39	1.20	0.25	0.35
	Obese	0.71	1.25	0.57	0.63
	Morbidly obese	0.14	1.26	0.91	0.92
	Post-menopausal status (ref = Not post-menopausal)			0.04	0.08
	Post-menopausal (not using hormones)	-1.75	0.94	0.06	0.11
	Post-menopausal (using hormones)	-3.36	1.47	0.02	0.05
	Functional Comorbidity Index	1.37	0.22	<0.001	<0.001
Sleep Apnea	4.28	1.16	<0.001	0.001	
Current or former smoker	1.90	0.89	0.03	0.06	
Diabetic	-4.87	1.28	<0.001	0.001	

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
Anxiety	Intercept	52.24	2.04	<0.001	<0.001
	UI subtype (ref = Stress incontinence)			0.01	0.02
	Urge incontinence	0.90	1.40	0.52	0.59
	Mixed incontinence	3.22	1.21	0.01	0.02
	Age	-0.13	0.03	<0.001	<0.001
	BMI category (ref = Normal)			0.57	0.63
	Overweight	-0.93	1.25	0.46	0.55
	Obese	0.64	1.29	0.62	0.67
	Morbidly obese	-0.77	1.27	0.54	0.61
	Functional Comorbidity Index	1.80	0.23	<0.001	<0.001
	Diabetic	-4.63	1.36	0.001	0.003
Stress scale	Intercept	17.51	1.95	<0.001	<0.001
	UI subtype (ref = Stress incontinence)			0.31	0.41
	Urge incontinence	0.78	1.08	0.47	0.55
	Mixed incontinence	1.41	0.94	0.13	0.21
	Age	-0.10	0.03	0.001	0.004
	Education (ref = High School or Less)			<0.001	<0.001
	Some college/tech school - no degree	-2.06	1.18	0.08	0.14
	Associates degree	-4.72	1.38	0.001	0.003
	Bachelor's degree	-5.50	1.18	<0.001	<0.001
	Graduate degree	-3.03	1.25	0.02	0.03
	Employment (ref = Employed Full-Time)			0.01	0.03
	Employed part-time	1.50	1.02	0.14	0.22
	Unemployed (looking for work)	6.46	2.10	0.002	0.01
	Not employed (not looking for work)	0.20	0.86	0.81	0.85
	BMI category (ref = Normal)			0.83	0.85
	Overweight	-0.63	0.98	0.52	0.59
	Obese	-0.36	1.05	0.73	0.77
	Morbidly obese	-0.90	1.04	0.39	0.47
	Functional Comorbidity Index	0.63	0.21	0.003	0.01
	Sleep Apnea	3.11	0.98	0.002	0.005
	Psychiatric Diagnosis	3.70	0.78	<0.001	<0.001
Diabetic	-3.80	1.08	<0.001	0.002	
Physical function	Intercept	64.62	1.81	<0.001	<0.001
	UI subtype (ref = Stress incontinence)			0.09	0.15
	Urge incontinence	-1.25	1.22	0.31	0.41
	Mixed incontinence	-2.26	1.05	0.03	0.06
	Age	-0.09	0.03	0.004	0.01
	Employment (ref = Employed Full-Time)			<0.001	0.001

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
	Employed part-time	-1.10	1.14	0.34	0.43
	Unemployed (looking for work)	-3.65	2.16	0.09	0.16
	Not employed (not looking for work)	-4.16	0.97	<0.001	<0.001
	BMI category (ref = Normal)			<0.001	<0.001
	Overweight	-3.19	1.07	0.003	0.01
	Obese	-5.55	1.11	<0.001	<0.001
	Morbidly obese	-8.57	1.12	<0.001	<0.001
	Functional Comorbidity Index	-1.44	0.20	<0.001	<0.001
	Sleep Apnea	-3.43	1.09	0.002	0.01
	Brain or spinal surgery	-3.28	1.44	0.02	0.05

*Candidate covariates for model selection included all variables from Table 1 for all outcomes with one notable exception: history of psychiatric disease was not included as a covariate for models of PROMIS Depression and Anxiety outcomes.

Supplementary Table 4: Logistic Regression Model of IPAQ categorical scale (UI subtypes)

<i>Dependent</i>	<i>Variable</i>	<i>Odds ratio estimate</i>	<i>Lower 95% confidence limit</i>	<i>Upper 95% confidence limit</i>	<i>p-value</i>	<i>FDR p-value</i>
IPAQ (odds of being active)	UI subtype (ref = Stress incontinence)				0.31	0.41
	Urge incontinence	0.863	0.43521	1.71172	0.33	0.42
	Mixed incontinence	1.282	0.71466	2.30102	0.16	0.23
	BMI category (ref = Normal)				<0.001	<0.001
	Overweight	0.499	0.27541	0.90420	0.48	0.56
	Obese	0.332	0.18174	0.60797	0.15	0.22
	Morbidly obese	0.221	0.12066	0.40552	<0.001	0.001

Supplementary Table 5: Multivariable Linear Regression Models of Mental Health, Sleep, and Physical Function Measures (UI severity)*

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
Sleep disturbance	Intercept	56.65	2.13	<0.001	<0.001
	UI Severity	0.31	0.18	0.09	0.12
	Age	-0.09	0.03	0.003	0.01
	Education (ref = High School or Less)			0.002	0.004
	Some college/tech school - no degree	-1.57	1.35	0.25	0.32
	Associates degree	-2.79	1.58	0.08	0.11
	Bachelor's degree	-4.27	1.34	0.002	0.004
	Graduate degree	-4.89	1.42	0.001	0.002
	BMI category (ref = Normal)			0.55	0.61
	Overweight	0.39	1.06	0.71	0.76
	Obese	0.41	1.15	0.72	0.76
	Morbidly obese	-0.99	1.16	0.40	0.46
	Functional Comorbidity Index	1.10	0.22	<0.001	<0.001
	Sleep Apnea	2.51	1.11	0.02	0.04
	Traumatic sexual experience prior to age 17	2.15	0.91	0.02	0.03
Diabetic	-3.74	1.18	0.002	0.004	
Depression	Intercept	48.71	1.55	<0.001	<0.001
	UI Severity	0.50	0.17	0.004	0.01
	Education (ref = High School or Less)			<0.001	0.001
	Some college/tech school - no degree	-2.41	1.30	0.06	0.10
	Associates degree	-4.56	1.52	0.003	0.01
	Bachelor's degree	-5.48	1.30	<0.001	<0.001
	Graduate degree	-4.80	1.36	<0.001	0.001
	BMI category (ref = Normal)			0.87	0.87
	Overweight	-0.33	1.00	0.74	0.77
	Obese	0.54	1.09	0.62	0.68
	Morbidly obese	0.25	1.10	0.82	0.84
	Functional Comorbidity Index	1.37	0.20	<0.001	<0.001
	Sleep Apnea	3.08	1.04	0.003	0.01
	Hysterectomy	-2.48	0.81	0.002	0.005
	Diabetic	-4.42	1.11	<0.001	<0.001
Anxiety	Intercept	46.78	1.02	<0.001	<0.001
	UI Severity	0.63	0.18	0.001	0.002
	BMI category (ref = Normal)			0.69	0.75
	Overweight	-0.69	1.05	0.51	0.58
	Obese	0.23	1.14	0.84	0.86
	Morbidly obese	-0.89	1.12	0.43	0.50

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
	Post-menopausal status (ref = Not post-menopausal)			<0.001	<0.001
	Post-menopausal (not using hormones)	-2.72	0.88	0.002	0.01
	Post-menopausal (using hormones)	-6.02	1.36	<0.001	<0.001
	Functional Comorbidity Index	1.65	0.21	<0.001	<0.001
	Diabetic	-4.61	1.18	<0.001	<0.001
Perceived stress	Intercept	17.80	1.76	<0.001	<0.001
	UI Severity	0.38	0.15	0.01	0.01
	Age	-0.11	0.03	<0.001	<0.001
	Education (ref = High School or Less)			<0.001	<0.001
	Some college/tech school - no degree	-1.91	1.08	0.08	0.11
	Associates degree	-4.18	1.26	0.001	0.002
	Bachelor's degree	-4.83	1.07	<0.001	<0.001
	Graduate degree	-2.99	1.13	0.01	0.01
	Employment (ref = Employed Full-Time)			0.02	0.03
	Employed part-time	1.49	0.92	0.11	0.15
	Unemployed (looking for work)	6.15	2.09	0.004	0.01
	Not employed (not looking for work)	0.86	0.76	0.25	0.32
	BMI category (ref = Normal)			0.45	0.51
	Overweight	-1.00	0.84	0.24	0.31
	Obese	-0.88	0.93	0.34	0.41
	Morbidly obese	-1.44	0.92	0.12	0.16
	Functional Comorbidity Index	0.51	0.19	0.01	0.01
	Sleep Apnea	2.75	0.88	0.002	0.004
	Psychiatric Diagnosis	3.78	0.68	<0.001	<0.001
	Diabetic	-2.85	0.94	0.003	0.01
Physical function	Intercept	60.52	1.90	<0.001	<0.001
	UI Severity	-0.14	0.16	0.40	0.46
	Age	-0.11	0.03	<0.001	<0.001
	Education (ref = High School or Less)			0.002	0.004
	Some college/tech school - no degree	1.80	1.19	0.13	0.17
	Associates degree	3.60	1.39	0.01	0.02
	Bachelor's degree	4.10	1.17	0.001	0.002
	Graduate degree	4.19	1.24	0.001	0.002
	Employment (ref = Employed Full-Time)			<0.001	0.001
	Employed part-time	-1.14	1.02	0.27	0.33
	Unemployed (looking for work)	-3.29	2.14	0.12	0.17
	Not employed (not looking for work)	-3.57	0.84	<0.001	<0.001
	BMI category (ref = Normal)			<0.001	<0.001

<i>Dependent</i>	<i>Variable</i>	<i>Parameter estimate</i>	<i>Standard error</i>	<i>p-value</i>	<i>FDR p-value</i>
	Overweight	-2.22	0.93	0.02	0.03
	Obese	-3.77	1.01	<0.001	0.001
	Morbidly obese	-7.42	1.02	<0.001	<0.001
	Functional Comorbidity Index	-1.33	0.18	<0.001	<0.001
	Sleep Apnea	-4.33	0.98	<0.001	<0.001
	Brain or spinal surgery	-4.02	1.33	0.003	0.01

*Candidate covariates for model selection included all variables from Table 1 for all outcomes with one notable exception: history of psychiatric disease was not included as a covariate for models of PROMIS Depression and Anxiety outcomes.

Supplementary Table 6: Logistic Regression Model of IPAQ categorical scale (UI severity)

<i>Dependent</i>	<i>Variable</i>	<i>Odds ratio estimate</i>	<i>Lower 95% confidence limit</i>	<i>Upper 95% confidence limit</i>	<i>p-value</i>	<i>FDR p-value</i>
IPAQ (odds of being active)	UI Severity	1.045	0.95730	1.14016	0.33	0.39
	BMI category (ref = Normal)				<0.001	<0.001
	Overweight	0.651	0.39600	1.07171	0.25	0.32
	Obese	0.457	0.26838	0.77822	0.31	0.38
	Morbidly obese	0.292	0.17145	0.49811	<0.001	0.001