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A MAPP Network Case-Control Study of Urologic Chronic Pelvic Pain Compared with Non-Urologic Pain Conditions

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Abstract

Objectives: Limited research suggests commonalities between urologic chronic pelvic pain syndromes (UCPPS) and other non-urologic chronic overlapping pain conditions (COPCs) including fibromyalgia, chronic fatigue syndrome, and irritable bowel syndrome. The goal of this case-control study was to examine similarities and differences between UCPPS and these other COPCs.

Methods: As part of the Multidisciplinary Approach to the Study of Chronic Pelvic Pain Research Network, we examined 1,039 individuals with UCPPS (n = 424), non-urologic COPCs (n = 200), and healthy controls (n = 415). Validated standardized measures were used to assess urological symptoms, non-urological pain symptoms, and psychosocial symptoms and traits.

Results: Participants with UCPPS had more urologic symptoms than non-urologic COPCs or healthy controls ($p < 0.001$); non-urological COPC group also had significantly worse urological symptoms than healthy controls ($p < 0.001$). Participants with non-urological COPCs reported more widespread pain than those with UCPPS ($p < 0.001$), yet both groups had similarly increased symptoms of anxiety, depression, negative affect, perceived stress, neuroticism, and lower levels of extraversion than healthy controls ($p < 0.001$). Participants with UCPPS with and without COPCs reported more catastrophizing than those with non-urological COPCs ($p < 0.001$).

Discussion: Findings are consistent with the hypothesis of common underlying biopsychosocial mechanisms and can guide the comprehensive assessment and treatment of these conditions

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regardless of the primary site of pain or diagnosis. Heightened catastrophizing in UCPPS should be examined to inform psychosocial interventions and improve patient care.

Keywords

Catastrophizing; Chronic Fatigue Syndrome; Fibromyalgia; Irritable Bowel Syndrome; Pelvic Pain

Introduction

Interstitial cystitis/bladder pain syndrome (IC/BPS) and chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) are defined by the hallmark symptom of chronic pain in the pelvis, urogenital floor, or external genitalia, and often accompanied by urinary symptoms such as urinary urgency or frequency (1,2). Historically, the bladder was thought to be the origin of IC/BPS, whereas the prostate was believed to be the source of CP/CPPS. However, this viewpoint has come under recent challenge, in large part from the observation that many IC/BPS and CP/CPPS patients exhibit symptoms but do not have identifiable pathology in these organs (3). Therefore, the NIDDK funded the Multidisciplinary Approach to the Study of Chronic Pelvic Pain (MAPP) Research Network to examine urological chronic pelvic pain syndrome (UCPPS) broadly to move beyond traditional bladder- and prostate-focused efforts.

Growing research suggests that UCPPS share demographic, clinical, and psychosocial features with other non-urological chronic overlapping pain conditions (COPCs), including fibromyalgia (FM), chronic fatigue syndrome (CFS), and irritable bowel syndrome (IBS) and frequently co-occur with these COPC (4). Many of the COPCs were previously thought to have organ-centric, local, or peripherally-based pathology. However, substantial research now supports prominent central nervous system contributions (i.e. central sensitization) to the pathophysiology of these conditions, prompting further exploration of common underlying pathophysiology instead of an organ-specific approach (5).

Recognizing these emerging insights and the limitations of previous basic and clinical studies, the MAPP Research Network examined urological, non-urological, and psychosocial characteristics in men and women with UCPPS compared with sex- and age-matched healthy controls (HC) as well as positive control individuals with COPCs including FM, CFS, and IBS (6). One overarching goal of the MAPP Research Network was to use these comprehensive data to investigate the potential relationship between UCPPS and non-urologic COPCs.

Despite longstanding clinical observation of the similarities between UCPPS and non-urological COPCs and the growing literature on the co-occurrence of these conditions, no studies to date have comprehensively examined the symptom-based and psychosocial similarities as well as differences between UCPPS and common COPCs. Better understanding these similarities and differences and the potential effects of co-occurrence on outcomes can help to illuminate shared pathophysiology, especially in the psychosocial domain, and have implications for testing interventions that can address potential underlying mechanisms. We used MAPP Research Network data to examine the similarities and differences in urological, non-urological, and psychosocial characteristics across individuals

with UCPPS (with and without non-urological COPCs), individuals with non-urologic COPCs (i.e., FM, CFS, IBS), and HC in a case-control study. The HC group was included in order to contextualize the findings in relation to a non-pain sample. We hypothesized that 1) participants with UCPPS would have the most urological symptoms and the HCs the least; 2) COPC participants would have more non-urological pain symptoms than the UCPPS and HC groups; and 3) across psychosocial characteristics, UCPPS participants would be more similar to COPC participants than HC participants. Given the limited literature on the potential symptom and psychosocial burden of UCPPS with co-occurring COPCs, we also conducted exploratory analyses to compare the UCPPS subgroups with and without COPCs and the COPC group on urological, non-urological, and psychosocial characteristics.

Materials and Methods

Participants and Procedures

UCPPS, non-urologic COPCs, and HC participants were recruited by advertisement and from clinic attendees at 7 MAPP sites (Los Angeles, CA; Chicago, IL; St. Louis, MO; Iowa City, IA, Seattle, WA, Ann Arbor, MI, and Stanford) and 2 additional sites (Miami, FL; Birmingham, AL) provided support. Recruitment took place from 2/14/2009 through 12/14/2012 and required sample sizes for each group were established a priori based on power analyses. Participants were 18 years of age or older and could provide self-report data in English. All UCPPS participants met criteria for IC/BPS or CP/CPPS, with urologic symptoms present a majority of the time during any 3 of the past 6 months (CP/CPPS) or the most recent 3 months (IC/BPS), and a response of at least 1 on a pain, pressure or discomfort scale (0–10 scale). Participants who met the established diagnostic criteria for FM, CFS, or IBS were recruited as positive controls (7–9). Potential UCPPS participants were referred to the study on the basis of bladder/urinary symptoms and/or chronic pelvic pain but were assessed for COPCs during screening, whereas potential non-urological COPC potential participants were referred on the basis of a COPC diagnosis but were also assessed for pelvic pain and urinary symptoms. Potential participants were evaluated according to the criteria for the group for which they were referred to the study and were enrolled into that group irrespective of criteria for the other study groups.

Exclusion criteria for all participants included: symptomatic urethral stricture, neurological disease affecting bladder function, fistula, cystitis caused by tuberculosis, radiation therapy, or cytoxan/cyclophosphamide therapy, augmentation cystoplasty, cystectomy, Crohn’s disease, ulcerative colitis, systemic lupus erythematosis, rheumatoid arthritis, multiple sclerosis, human immunodeficiency virus infection, major psychiatric disorder (e.g., bipolar disorder or schizophrenia), or severe cardiac, pulmonary, renal, or hepatic disease that in the study physician’s judgment would preclude participation. Males only were excluded for a history of isolated, unilateral orchalgia, transurethral microwave thermotherapy, transurethral needle ablation or balloon dilation of the prostate, prostate cryosurgery, or laser prostate procedure. HC participants were subject to the same exclusion criteria as UCPPS and non-urological COPCs and were additionally excluded if they reported any pain in the pelvic or bladder region or if they reported chronic pain in more than one non-urological body region.

Potential participants were initially screened by phone or in-person for general interest and eligibility. If eligible, participants then completed the baseline questionnaire battery during an in-person visit, using a computerized testing procedure where responses were collected by the central MAPP Network Data Coordinating Core at University of Pennsylvania. Recruitment was monitored centrally by the Data Coordinating Core where the sex and age balance of the UCPPS and HC groups were monitored at the site level in a 2×3 cross classified table; sites were encouraged to recruit into a particular cell if it was lacking. Study procedures were approved by each site's Institutional Review Board and participants provided written informed consent at their respective study sites.

Measures

Sociodemographic characteristics included age, gender, race/ethnicity, employment and education collected by self-report. The extensive self-report assessment battery focused on the 3 domains of urological symptoms, non-urological pain symptoms, and psychosocial symptoms and traits as described in detail elsewhere (6). Measures are briefly described below. These baseline data were collected in-office.

Urological measures were selected purposefully to assess symptoms historically related to CP/CPPS and IC/PBS, including: a) Symptom and Health Care Utilization Questionnaire, a 12 item measure developed for this study to ask about pain, urgency, and frequency among other symptoms; b) Genitourinary Pain Index, a 9-item instrument applicable to men and women to assess pain symptoms, urinary symptoms, and quality of life as separate sub-scales, and overall as a total score (10); c) Interstitial Cystitis Symptom Index and Problem Index, two 4-item questionnaires on urinary and pain symptoms and degree of bother associated with these symptoms in patients with IC/BPS (11); and d) American Urological Association Symptom Index, a 7-item questionnaire that assesses voiding symptoms in both men and women (12). Across all participants, the correlation coefficients within this domain ranged from .72 to 0.90 (all p's $p < .0001$).

Non-urological pain measures included established and standardized instruments used commonly in COPC and chronic pain research: a) Brief Pain Inventory (BPI), a 15-item measure that results in scores for pain severity and pain interference (13); b) a detailed body map used in epidemiological studies to better identify widespread pain by body regions (14); and c) Complex Multi-Symptom Inventory (CMSI) containing a 41-item symptom checklist of past year illnesses specific to COPCs such as FM, CFS, IBS. The CMSI was the tool used to determine presence of COPCs in study participants (15). Across all participants, the correlation coefficients within this domain ranged from .52 (# of body map sites and BPI pain severity) to .81 (BPI pain severity and pain interference) (all p's $p < .0001$).

Psychosocial measures included a comprehensive battery of validated measures of state and trait indicators of mood, perceived stress, catastrophizing, and personality: a) Hospital Anxiety and Depression Scale, a 14-item instrument assessing depressive and anxiety symptoms in non-psychiatric settings (16); b) Positive and Negative Affect Schedule, a 20-item measure of both positive and negative affect states (17); c) Perceived Stress Scale, a 10-item measure of the degree to which situations are perceived as being unpredictable, uncontrollable and overwhelming (18); d) Catastrophizing sub-scale from the Coping

Strategies Questionnaire, a 6-item measure of the perception that pain is overwhelmingly awful and the worst imaginable burden that one can endure (19); and e) International Personality Item Pool short form, a public-domain, 120-item instrument developed to reflect the 5 personality domains of extraversion, neuroticism, agreeableness, conscientiousness, and openness to experience (20). Across all participants, the correlation coefficients within this domain ranged from −.37 (extraversion and catastrophizing) to .81 (negative affect and anxiety symptoms) (all p's $p < .0001$).

Analyses

Age was summarized by means and standard deviations and binary comparisons between groups were evaluated by Student's t-test. Categorical demographic variables were summarized by frequencies and percentages and compared among groups by Chi-square tests. Groups were compared by multivariable linear regression models, adjusted for those demographic factors (age, gender, race, and employment status) that differed significantly for any two groups at the .05 level. An overall test was conducted using a 3-level dummy variable for group, and subsequent pairwise tests were conducted for variables that differed significantly across all 3 groups. To reduce the likelihood of false positives, overall group differences were declared significant at the .01 level and pairwise tests among groups were conducted at the .003 level of significance. Further, Cohen's effect sizes (d) for adjusted group differences were calculated as an indicator of practical or clinical difference between groups. To explore the role of comorbidity on urological symptoms, non-urological pain, and psychosocial symptoms and traits, post hoc analyses explored differences between the UCPPS subgroups with and without COPCs and the COPC group.

Role of the Funding source

The MAPP Research Network was funded by NIDDK through a series of research project cooperative agreements (U01) to conduct a multi-center epidemiology/phenotyping study. The study was designed with input from all centers as well as NIDDK program officers and was approved by an external advisory board of experts in UCPPS and COPCs.

Results

Demographics and Prevalence of COPCs

The final comparison groups included 424 UCPPS (233 female and 191 male), 200 non-urologic COPC control (156 female and 44 male) and 415 HC (233 female and 182 male) participants. Demographic characteristics of the three participant groups are described in Table 1. Participants had a mean age in the 40s and were predominantly female, white, of non-Hispanic ethnicity, employed, and with college or graduate education. The UCPPS participants were, on average, older than HCs and were more likely to be white than the other 2 groups. The percentage of women in the COPC group was higher than in the other 2 groups. Participants in both UCPPS and COPC groups were less likely to be employed than HC participants. There were no other group differences among demographic characteristics.

Based on the CMSI follow-up assessment modules, 162 (38.2%) of 424 UCPPS participants met criteria for at least one additional COPC, including 15 (4%) with FM; 13 (3%) with

CFS; 93 (22%) with IBS; and 41(10%) with multiple COPCs. Of the 200 participants in the COPC group, 13 (6.5%) had FM alone, 12 (6.0%) had CFS alone, 95 (47.5%) had IBS alone, and 80 (40.0%) met criteria for multiple conditions.

Group Comparisons

The 3-level overall tests of group differences were significant for each of the examined variables; Table 2 provides information on the pair-wise comparison of the 3 groups for urological, non-urological pain, and psychosocial symptoms and traits. Individuals with UCPPS and those with non-urological COPCs had more urinary symptoms across all measures ($p < .001$) than HCs, yielding large Cohen's effect size values (UCPPS vs. HC $d = 1.92$ to $d = 3.85$; COPC vs HC $d = .67$ to $d = 1.19$), indicating both statistical and clinical differences. Individuals with UCPPS also had more urinary symptoms across all measures ($p < .001$) than those with COPCs, with large effect sizes ($d = 1.07$ to $d = 2.22$).

Across non-urological pain symptoms, UCPPS and COPC groups reported more non-urologic pain symptoms than the HC group (all p values $< .001$) with large Cohen's effect sizes (UCPPS vs HC $d = .87$ to $d = 2.28$; COPC vs HC $d = 1.42$ to $d = 1.74$). Differences between the UCPPS and COPC groups were significant but smaller in magnitude, with the UCPPS group showing slightly higher ratings across pain severity ($p < .001$; $d = .52$) and interference ($p = .004$; $d = .36$), and the COPC group reporting more widespread pain on the body map with a large Cohen's effect size ($p < .001$; $d = .63$). The UCPPS and COPC groups reported greater levels of multiple symptoms on the CMSI than the HC group but did not differ from each other ($p = .225$; $d = .11$).

On psychosocial symptoms and traits, UCPPS and COPC participants reported higher levels of anxiety, depression, negative affect, perceived stress, and catastrophizing symptoms, and lower levels of positive affect compared to the HC group (all p values $< .001$; UCPPS vs HC $d = .85$ to $d = 1.46$; COPC vs HC $d = .81$ to $d = 1.07$). UCPPS and COPC participants also reported higher neuroticism and lower extraversion than HC individuals, with medium effects sizes (all p values $< .001$; $d = .41$ to $d = .71$). With the exception of pain catastrophizing symptoms, where the UCPPS group had higher scores than the COPC group ($p < .001$; $d = .51$), both groups had similarly worse scores on all other measures than HC that were not significantly different from each other.

Subgroup Analyses

To assess the potential effects of comorbidity on outcomes, exploratory analyses compared UCPPS individuals with and without COPCs to the COPC control group (Table 3). As expected, the UCPPS with COPCs subgroup reported worse urological, non-urological pain, and psychosocial symptoms and traits than the UCPPS without COPCs subgroup across measures. More importantly, individuals with UCPPS and COPCs also reported worse non-urological pain severity and interference, greater level of multiple symptoms, more negative affect, and increased catastrophizing compared to those with non-urologic COPCs (all p values $< .001$; $d = .45$ to $d = .68$). UCPPS participants without COPCs also had a higher catastrophizing score than the non-urological COPC group ($p < .001$; $d = .43$).

Discussion

To better understand the pathophysiology of UCPPS, we evaluated similarities and differences between UCPPS individuals and controls across the urological, pain, and psychological domains. Three participant groups (UCPPS, non-urologic COPCs, HC) were compared across comprehensive measures targeting urological symptoms, non-urological pain, and psychological traits and symptoms. Our data support the hypothesis that UCPPS participants had the most urological symptoms and the HC group the least, but also found that those with non-urologic COPCs also had significantly elevated urological symptoms compared to HC. Our data also provide partial support for the hypothesis that both the UCPPS and COPC groups showed higher levels of non-urological pain symptoms compared to HC. However, differences between the UCPPS and non-urological COPC groups were less pronounced for pain severity and interference. Results across psychological symptoms and traits also supported the hypothesis that UCPPS and non-urological COPC participants had similarly elevated psychosocial symptoms than HC. Exploratory subgroup analyses found a higher burden of non-urological pain and negative affect in UCPPS plus COPCs, but both UCPPS with and without COPC participants had higher catastrophizing compared to COPCs alone.

To our knowledge this is the first large scale study to examine the similarities and differences between UCPPS and non-urologic COPCs (FM, CFS, and IBS). Regardless of their clinical diagnosis or the anatomical site of primary symptoms, individuals with UCPPS and those with COPCs reported elevated levels of urological, non-urological, and psychosocial symptoms and traits; although as expected those with UCPPS had more urological symptoms than those with non-urologic COPCs. Thus, our results suggest that these conditions share many characteristics across multiple physical and psychosocial domains. Additionally, we found substantial co-occurrence of these conditions (i.e., UCPPS, FM, CFS, or IBS) even though participants were recruited based on meeting criteria for a primary set of symptoms. The next step in this line of research is to conduct latent class or other cluster analyses to empirically establish groups with similar characteristics and to examine those groups in relation to clinical and other outcomes.

The link between UCPPS and COPCs may be complex and multifactorial. Although this study did not examine mechanisms underlying the shared characteristics, the findings are supportive of the hypothesis that UCPPS and COPCs may be linked through partially shared mechanisms or pathophysiology. For example, recent studies suggest that genetic factors may underlie the relationship between urological and somatic syndromes as well as within chronic pain conditions (21,22). Central nervous system-mediated hypersensitivity or central sensitization might partially account for the similarities between UCPPS and COPCs. Central sensitization has been implicated in FM, CFS, IBS, and a number of other COPCs (5,23,24). There is also growing evidence that central sensitization plays a role in chronic pelvic pain and urological conditions (25,26). Alternately, a recent study from the MAPP Research Network found brain white matter abnormalities unique to UCPPS in comparison to IBS (27), suggesting that other mechanisms may also be important in the pathophysiology of UCPPS. Additionally, the similar presentations in UCPPS and COPCs could be a consequence of experiencing any sort of chronic pain condition. Future studies should

examine these and other shared and unique mechanisms and pathophysiology to guide treatments that may more comprehensively address these conditions.

Individuals with COPCs reported significantly greater urological symptoms than HC participants across multiple measures. These findings are striking in that the mean American Urological Association Symptom Index score in this group, as an indicator of lower urinary tract symptoms, was higher than what has been reported in the general population, and even higher than groups in which urological disorders are common (e.g., men and women in their 70's) (28). Our findings are consistent with a small but growing literature suggesting comorbidity between UCPPS and various COPCs (4), and extends those findings by suggesting that the overlap is not limited to pain but may include urinary symptoms as well (29). We also found that individuals with UCPPS reported similar, if not higher, levels of non-urological pain than those with COPCs, suggesting that the experience of UCPPS may also extend beyond pain associated with urinary symptoms. Individuals with UCPPS and non-urological COPCs typically present to different clinics and specialists. Our findings indicate that patients with any of these conditions may benefit from a comprehensive and multi-dimensional assessment regardless of treating clinic and specialist. These findings also support previous recommendations to evaluate pain and urinary symptoms separately in UCPPS (30).

The subgroup analyses validate previous findings from the same sample that individuals with UCPPS and COPCs have more symptoms and morbidity than those with UCPPS alone (31). Here, we extend those findings by comparing UCPPS with and without COPCs with the non-urological COPC group. Individuals with UCPPS with and without COPCs reported similarly elevated distress and other psychological symptoms and traits compared to individuals with non-urological COPCs on nearly all measures. Catastrophizing (i.e., negative cognitive-affective perceptions or appraisal of the pain experience) was a notable exception suggesting that UCPPS regardless of comorbid COPCs appears to lead to significantly worse catastrophizing than COPCs. Several previous studies have shown that individuals with UCPPS exhibit more catastrophizing than healthy controls (32–34), but ours is the first to document that catastrophizing in UCPPS is even worse than in others with chronic pain conditions. One potential reason for increased catastrophizing in UCPPS is the greater burden of urological and non-urological pain in those with UCPPS. Future studies can examine the interaction of pain and pain catastrophizing to better understand the experience of pain in UCPPS and inform treatments.

Longitudinal studies also can help shed light on the potential role of catastrophizing as a dispositional or outcome factor in relation to urological and other symptoms in UCPPS. Increased catastrophizing has been associated with poorer quality of life and appears to mediate the relationship between pain and quality of life in at least some UCPPS conditions (35,36). Findings from the MAPP Research Network also indicate that greater pain catastrophizing is associated with poorer pain outcomes over a one-year period (37). As with COPCs and chronic pain in general, pharmacotherapy with noradrenergic antidepressants and behavioral treatments such as cognitive behavioral therapy, acceptance and commitment therapy, or mindfulness-based interventions might improve functioning and quality of life in UCPPS (24,38–40). There is some evidence that high levels of catastrophizing may limit the

benefits of antidepressants in pain (41). Psychosocial interventions, on the other hand, are well suited for addressing cognitive distortions such as catastrophizing. Intervention research should focus on large-scale clinical trials that specifically focus on reducing catastrophizing in UCPPS.

This is the largest and most comprehensive comparison of UCPPS with COPCs. We used a cross-sectional case-control design to examine urological, non-urological, and psychosocial characteristics across individuals with UCPPS, non-urologic COPCs, and HCs. Nonetheless, this study has limitations. The predominantly white sample was recruited from clinics and community advertising, not from a representative population sample. Enrollment did not target specific COPC such that separate COPC comparisons are limited by sparsity. The composition of the non-urologic COPC group did not allow us to examine comparisons across gender. The sex and age matching was specific to the UCPPS and HC groups and did not include COPCs. We chose to include a non-pain HC groups so it is possible that differences with the HC group are larger than would be expected in the general population. However, one would argue that since pain is part of the definition for UCPPS and COPCs, this difference is not a bias and rather a manifestation of the conditions being compared to HC. Further, we did not evaluate the COPC group for UCPPS diagnoses and relied on symptom-based urinary measures and did not evaluate the UCPPS group for COPC diagnoses and relied on the CMSI. Despite these limitations, our findings make an important contribution to understanding the similarities and differences between UCPPS and non-urologic COPCs.

In conclusion, this study provides evidence that UCPPS and non-urologic COPCs are similar across multiple measures of non-urinary pain symptoms and psychological symptoms and traits, supporting the potential for common underlying biopsychosocial mechanisms. Regardless of primary diagnosis, individuals with UCPPS and COPCs exhibit a variety of urological, non-urological, and psychosocial symptoms. Thus, the clinical assessment of these conditions should be comprehensive and multi-dimensional. Finally, individuals with UCPPS appear to have worse catastrophizing than those with non-urologic COPCs. The heightened role of catastrophizing in UCPPS should be examined further to inform future psychosocial clinical trials and improve patient care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Acronyms:

CFS	chronic fatigue syndrome
COPCs	chronic overlapping pain conditions
CP/CPPS	chronic prostatitis/chronic pelvic pain syndrome
CMSI	Complex Multi-Symptom Inventory
FM	fibromyalgia
HC	healthy control
IC/BPS	interstitial cystitis/bladder pain syndrome
IBS	irritable bowel syndrome
MAPP	Multidisciplinary Approach to Chronic Pelvic Pain
NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
UCPPS	urological chronic pelvic pain syndrome

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Table 1.

Demographic characteristics of participants with urologic chronic pelvic pain syndrome (UCPPS), healthy controls (HC), and non-urological chronic overlapping pain conditions (COPC).

		UCPPS (n=424) n (%)	HC (n=415) n (%)	COPC (n=200) n (%)	p UCPPS vs HC	p UCPPS vs COPC	p COPC vs HC
Age in years, mean (SD)		43.4 (15.1)	40.5 (14.1)	41.7 (13.7)	.005	.192	.31
Gender	Male	191 (45.0%)	182 (43.9%)	44 (22.0%)	.73	<.001	<.001
	Female	233 (55.0%)	233 (56.1%)	156 (78.0%)			
Race	White	374 (88.2%)	316 (76.1%)	150 (75.0%)	<.001	<.001	.83
	Black	16 (3.8%)	48 (11.6%)	22 (11.0%)			
	Other	34 (8.0%)	51 (12.3%)	28 (14.0%)			
Ethnicity	Hispanic	28 (6.6%)	35 (8.4%)	13 (6.5%)	.32	.97	.41
	Non-Hispanic	395 (93.2%)	380 (91.6%)	186 (93.0%)			
	Unknown	1 (0.2%)	0 (0%)	1 (0.5%)			
Employment*	Employed	278 (65.6%)	294 (70.8%)	116 (58.0%)	<.01	<.01	<0.01
	Unemployed	58 (13.7%)	86 (20.7%)	42 (21.0%)			
	Retired	43 (10.1%)	27 (6.5%)	8 (4.0%)			
	Homemaker	12 (2.8%)	7 (1.7%)	7 (3.5%)			
	Disabled	32 (7.5%)	0 (0%)	25 (12.5%)			
Education	< High School	0 (0%)	2 (0.5%)	1 (0.5%)	.97	.54	.65
	High School or GED	31 (7.3%)	27 (6.5%)	9 (4.5%)			
	Some College	118 (27.8%)	115 (27.7%)	66 (33.0%)			
	College Graduate	163 (38.4%)	154 (37.1%)	72 (36.0%)			
	Professional or Graduate degree	112 (26.4%)	117 (28.2%)	52 (26.0%)			

*Employment data were missing for 4 individuals: 1 UCPPS, 1 HC, and 2 COPC.

Table 2.

Comparison of participants with urologic chronic pelvic pain syndrome (UCPPS), healthy controls (HC), and non-urological chronic overlapping pain conditions (COPC) on urological, non-urological pain, and psychological symptoms and traits.

	UCPPS (n=424)	HC (n=415)	COPC (n=200)	UCPPS vs HC*		UCPPS vs COPC*		COPC vs HC*	
	Mean (SD)	Mean (SD)	Mean (SD)	p	d	p	d	p	d
Urological Symptoms **									
SYM-Q Pain (0–10)	5.1 (2.2)	0.0 (0.1)	1.4 (2.2)	<.001	3.28	<.001	1.86	<.001	−1.02
SYM-Q Urgency (0–10)	5.1 (2.6)	0.9 (1.4)	2.3 (2.5)	<.001	1.98	<.001	1.22	<.001	−0.67
SYM-Q Frequency (0–10)	4.9 (2.6)	0.7 (1.5)	2.3 (2.8)	<.001	1.94	<.001	1.07	<.001	−0.76
GUPI Pain (0–23)	12.6 (4.5)	0.2 (1.0)	3.3 (4.5)	<.001	3.85	<.001	2.22	<.001	−1.03
GUPI Urinary (0–10)	5.3 (3.0)	0.9 (1.2)	2.4 (2.5)	<.001	1.92	<.001	1.14	<.001	−0.82
GUPI Quality of Life Impact (0–12)	7.7 (2.9)	0.5 (1.1)	3.0 (3.2)	<.001	3.32	<.001	1.77	<.001	−1.12
GUPI Total Score (0–45)	25.6 (8.6)	1.6 (2.5)	8.7 (8.9)	<.001	3.80	<.001	2.12	<.001	−1.19
ICINDEX Symptom (0–20)	9.7 (4.7)	2.1 (2.1)	4.4 (4.0)	<.001	2.06	<.001	1.36	<.001	−0.69
ICINDEX Problem (0–16)	8.5 (4.4)	0.8 (1.7)	3.3 (4.0)	<.001	2.29	<.001	1.41	<.001	−0.83
AUA Symptom Index (0–35)	15.5 (8.5)	2.6 (2.9)	6.8 (7.2)	<.001	1.95	<.001	1.21	<.001	−0.79
Non-urologic Pain Symptoms **									
BPI Pain Severity (0–10)	4.0 (2.0)	0.4 (1.0)	3.3 (2.3)	<.001	2.28	<.001	0.52	<.001	−1.74
BPI Pain Interference (0–10)	3.8 (2.7)	0.3 (0.9)	3.3 (2.7)	<.001	1.69	<.001	0.36	<.001	−1.63
Body Map # of sites checked (0–45)	5.8 (6.5)	1.3 (2.1)	11.8 (11.1)	<.001	0.87	<.001	−0.63	<.001	−1.42
CMSI Sum of Symptoms (0–39)	11.3 (7.4)	1.8 (3.1)	11.7 (9.2)	<.001	1.62	.23	0.11	<.001	−1.56
Psychological Symptoms & Traits **									
HADS Anxiety (0–21)	7.7 (4.5)	3.6 (3.1)	7.6 (4.9)	<.001	1.06	.57	0.05	<.001	−0.95
HADS Depression (0–21)	5.4 (4.2)	1.8 (2.3)	5.5 (4.6)	<.001	1.01	.58	0.05	<.001	−0.96
PANAS Positive Affect (5–50)	29.8 (7.7)	36.4 (7.0)	29.0 (8.6)	<.001	−0.86	.84	−0.02	<.001	0.81
PANAS Negative Affect (5–50)	21.2 (8.1)	14.2 (4.5)	20.0 (7.9)	<.001	1.08	.013	0.23	<.001	−0.92
PSS (0–40)	16.4 (7.9)	10.4 (6.3)	17.3 (8.0)	<.001	0.85	.95	0.01	<.001	−0.87
CSQ Catastrophizing (0–36)	12.6 (8.8)	2.6 (4.6)	9.5 (7.7)	<.001	1.46	<.001	0.51	<.001	−1.07
IPIP Neuroticism (24–120)	62.8 (16.8)	52.4 (15.3)	64.9 (17.1)	<.001	0.67	.48	−0.06	<.001	−0.71

	UCPPS (n=424)	HC (n=415)	COPC (n=200)	UCPPS vs HC*		UCPPS vs COPC*		COPC vs HC*	
	Mean (SD)	Mean (SD)	Mean (SD)	p	d	p	d	p	d
IPIP Extraversion (24–120)	80.4 (13.8)	86.6 (13.1)	78.4 (14.8)	<.001	−0.41	.29	0.10	<.001	0.51

*Analyses adjusted for age, sex, race, and employment status.

**Numbers in parentheses refer to the range of possible scores.

SYM-Q = Symptom and Health Care Utilization Questionnaire; GUPI = Genitourinary Pain Index; ICINDEX = Interstitial Cystitis Symptom Index and Problem Index; AUA = American Urological Association; BPI = Brief Pain Inventory; CMSI = Complex Multi-Symptom Inventory; HADS = Hospital Anxiety and Depression Scale; PANAS = Positive and Negative Affect Schedule; PSS =Perceived Stress Scale; CSQ = Coping Strategies Questionnaire; IPIP = International Personality Item Pool.

Table 3.

Comparison of participants with urologic chronic pelvic pain syndrome (UCPPS) with and without non-urological chronic overlapping pain conditions (COPC) with the COPC control group on urological, non-urological pain, and psychological symptoms and traits.

	UCPPS+COPC (n=162)	UCPPS Only (n=262)	COPC (n=200)	UCPPS+COPC vs UCPPS Only*		UCPPS+COPC vs COPC*		UCPPS Only vs COPC*	
	Mean (SD)	Mean (SD)	Mean (SD)	p	d	p	d	p	d
Urological Symptoms **									
SYM-Q Pain (0–10)	5.6 (2.2)	4.7 (2.1)	1.4 (2.2)	.002	0.32	<.001	2.05	<.001	1.75
SYM-Q Urgency (0–10)	5.4 (2.6)	4.8 (2.5)	2.3 (2.5)	.1	0.16	<.001	1.30	<.001	1.18
SYM-Q Frequency (0–10)	5.5 (2.6)	4.6 (2.6)	2.3 (2.8)	.003	0.31	<.001	1.21	<.001	0.95
GUPI Pain (0–23)	13.9 (4.6)	11.7 (4.1)	3.3 (4.5)	<.001	0.42	<.001	2.41	<.001	2.14
GUPI Urinary (0–10)	6.0 (3.1)	4.9 (2.8)	2.4 (2.5)	.002	0.32	<.001	1.34	<.001	1.04
GUPI quality of Life Impact (0–12)	8.3 (2.8)	7.4 (2.9)	3.0 (3.2)	.02	0.25	<.001	1.87	<.001	1.69
GUPI Total (0–45)	28.2 (8.8)	24.0 (8.1)	8.7 (8.9)	<.001	0.41	<.001	2.31	<.001	2.01
ICINDEX Symptom (0–20)	11.0 (4.6)	9.0 (4.6)	4.4 (4.0)	.003	0.32	<.001	1.64	<.001	1.23
ICINDEX Problem (0–16)	9.6 (4.2)	7.9 (4.4)	3.3 (4.0)	.004	0.31	<.001	1.64	<.001	1.27
AUA Symptom Index (0–35)	17.8 (9.1)	14.0 (7.8)	6.8 (7.2)	<.001	0.36	<.001	1.44	<.001	1.12
Non-urologic Pain Symptoms **									
BPI Pain Severity (0–10)	4.6 (2.0)	3.7 (1.9)	3.3 (2.3)	<.001	0.36	<.001	0.68	<.001	0.42
BPI Pain Interference (0–10)	4.7 (2.9)	3.2 (2.5)	3.3 (2.7)	<.001	0.40	<.001	0.59	.07	0.19
Body Map # of sites checked (0–45)	9.0 (8.6)	3.8 (3.5)	11.8 (11.1)	<.001	0.73	.04	−0.23	<.001	−0.91
CMSI Sum of Symptoms (0–39)	15.9 (8.4)	8.4 (4.9)	11.7 (9.2)	<.001	1.06	<.001	0.57	.005	−0.29
Psychological Symptoms & Traits **									
HADS Anxiety (0–21)	8.9 (4.7)	6.9 (4.3)	7.6 (4.9)	<.001	0.42	.02	0.26	.23	−0.12
HADS Depression (0–21)	6.6 (4.6)	4.6 (3.7)	5.5 (4.6)	<.001	0.40	.02	0.27	.27	−0.11
PANAS Positive Affect (5–50)	28.1 (7.7)	30.9 (7.4)	29.0 (8.6)	.009	−0.27	.13	−0.17	.48	0.07
PANAS Negative Affect (5–50)	23.6 (8.8)	19.6 (7.2)	20.0 (7.9)	<.001	0.42	<.001	0.45	.72	0.04
PSS (0–40)	19.0 (8.4)	14.9 (7.2)	17.3 (8.0)	<.001	0.43	.03	0.25	.07	−0.19
CSQ Catastrophizing (0–36)	14.4 (9.2)	11.4 (8.4)	9.5 (7.7)	.04	0.22	<.001	0.62	<.001	0.43

	UCPPS+COPC (n=162)	UCPPS Only (n=262)	COPC (n=200)	UCPPS+COPC vs UCPPS Only*		UCPPS+COPC vs COPC*		UCPPS Only vs COPC*	
	Mean (SD)	Mean (SD)	Mean (SD)	p	d	p	d	p	d
IPIP Neuroticism (24–120)	67.1 (17.8)	60.1 (15.6)	64.9 (17.1)	<.001	0.36	.38	0.10	.06	−0.19
IPIP Extraversion (24–120)	78.7 (13.6)	81.4 (13.9)	78.4 (14.8)	.18	−0.14	.84	0.02	.25	0.12

*Analyses adjusted for age, sex, race, and employment status.

**Numbers in parentheses refer to the range of possible scores.

SYM-Q = Symptom and Health Care Utilization Questionnaire; GUPI = Genitourinary Pain Index; ICINDEX = Interstitial Cystitis Symptom Index and Problem Index; AUA = American Urological Association; BPI = Brief Pain Inventory; CMSI = Complex Multi-Symptom Inventory; HADS = Hospital Anxiety and Depression Scale; PANAS = Positive and Negative Affect Schedule; PSS =Perceived Stress Scale; CSQ = Coping Strategies Questionnaire; IPIP = International Personality Item Pool.