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Widespread Psychosocial Difficulties in Men and Women with Urologic Chronic Pelvic Pain Syndromes (UCPPS): Case-control findings from the MAPP Research Network

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Abstract

Objectives—To determine the extent, severity and sex differences of psychosocial deficits in men and women with urologic chronic pelvic pain syndromes (UCPPS), which in the past have been considered separate bladder (Interstitial Cystitis/Painful Bladder Syndrome) and prostate (Chronic Prostatitis/Chronic Pelvic Pain Syndrome) disorders. Evaluations of men and women separately suggest UCPPS is associated with increased anxiety and depression. However, studies directly testing deficits in broader psychosocial domains such as cognitive processes, intimate

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relationships and trauma history, or tests of sex differences in the pattern of difficulties associated with UCPPS have not been performed.

Methods—A total of 233 female and 191 male UCPPS patients and 235 female and 182 male healthy controls (HCs) were recruited from six academic medical centers in the US and evaluated with a comprehensive battery of symptom, psychosocial, and illness impact measures. Primary comparisons of interest were between UCPPS patients and HC, and between men and women with UCPPS.

Results—In addition to greater negative affect, male and female UCPPS patients show higher levels of current and lifetime stress, poorer illness coping, increased self-report of cognitive deficits and more widespread pain symptoms compared to sex and education matched HC. Similar problems were found in male and female UCPPS although female UCPPS showed increased self-report of childhood adversity and more widespread symptoms of pain and discomfort.

Conclusions—Given the significance of psychosocial variables in prognosis and treatment of chronic pain conditions, the results add substantially to our understanding of the breath of difficulties associated with UCPPS and point to important areas for clinical assessment.

Urologic chronic pelvic pain syndromes (UCPPS) include idiopathic chronic pelvic pain in both men and women and what have in the past been considered separate bladder and prostate syndromes[1]. Interstitial cystitis/bladder pain syndrome (IC/BPS)[2] has been diagnosed primarily in women while chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS)[3] is a diagnosis exclusive to men. Although historically these conditions have been studied separately, more recent views stress that male and female UCPPS share many common features including features in common with other chronic pain conditions[4, 5].

Several psychosocial deficits have been reported for specific UCPPS subpopulations, especially women with IC/BPS. These include an increased prevalence of psychiatric diagnoses, greater levels of anxiety and depressive symptoms, increased incidence of childhood trauma and higher levels of current life stress in IC/BPS patients compared to healthy controls [6-8]. Some increased psychosocial problems have also been reported for men with CP/CPPS [9] [10]. However, many important psychological and psychosocial variables have not been well examined in men with UCPPS, or compared to matched male controls. Similarly, there is little data directly comparing psychosocial variables across men and women with UCPPS. One study of psychiatric co-morbidity, based on a brief symptom questionnaire, reported similar levels of depression and anxiety in men with CP/CPPS and women with IC/BPS; both groups had increased numbers of psychiatric diagnoses compared to sex matched healthy controls but the patient levels did not appear higher than previous reports for unselected primary care samples [8]. Since the presence of psychosocial and somatic co-morbidities are significant clinical prognostic indicators as well as markers for differential treatment in UCPPS [11] and other chronic pain disorders, it is important to better characterize these variables in both men and women with UCPPS.

A primary aim of the National Institutes of Health (NIH) Multidisciplinary Approach to the Study of Chronic Pelvic Pain (MAPP) collaborative research network [1] is to characterize a large and geographically diverse sample of men and women with UCPPS across a comprehensive set of psychosocial measures and to compare these patient groups with age,

sex and location matched healthy controls (HC). This paper reports a case-control analysis addressing this aim with a focus on two primary hypotheses. First that both men and women diagnosed with UCPPS, compared to matched controls, will evidence a broad spectrum of psychosocial problems beyond heightened anxiety and depression, including decreased quality of life, health related coping and self-perceived mental capabilities, increased levels of early life and current life stress, and widespread physical symptoms. Second we hypothesized that overall men and women with UCPPS would not differ from each other on these measures but that higher UCPPS symptom severity would be significantly associated with greater psychosocial difficulties, regardless of sex.

Materials and Methods

Overview of the MAPP

This NIH-sponsored multi-center network represents a broad-based multidisciplinary longitudinal approach to the study of UCPPS. The MAPP network includes six discovery sites that conduct the research studies and two core sites that coordinate data collection, analyze tissue samples, and provide technical support. UCPPS participants in the trans-MAPP study provide comprehensive phenotyping data at baseline and then abridged assessments in-clinic at 6 months and 12 months and internet-based bi-weekly assessments for the entire 12 month study period[12]. HC participants only provide the initial baseline data. This report examined baseline data for all UCPPS and HC participants from the trans-MAPP case control study.

Recruitment

UCPPS participants were recruited from clinics and local advertisements and HC from advertisements at each MAPP discovery site. Study entry criteria were broad to permit recruitment of participants with a range of symptoms and symptom severity. Inclusion and exclusion criteria are described in detail elsewhere [12] and included a clinical diagnosis of IC/BPS or CP/CPPS and pain severity of at least 1 on a 0-10 Likert pain scale. To meet IC/BPS inclusion criteria, male or female subjects were required to have an unpleasant sensation of pain, pressure, or discomfort, perceived to be related to the bladder and/or pelvic region, associated with lower urinary tract symptoms. These symptoms had to be present for the majority of the time during any 3 months in the previous 6 months, and also had to be present for the majority of the time during the most recent 3 months. To meet CP/CPPS criteria, men were required to report pain or discomfort in any of the 8 items in the pain subscale of the Genitourinary Pain Index (GUPI) [13]. These symptoms had to be present for the majority of the time during any 3 months in the previous 6 months. Thus all females fit IC/BPS criteria while males could be classified with CP/CPPS and/or IC/BPS. For this paper these sub classifications of UCPPS are not compared but further detail of MAPP urological symptoms can be found elsewhere [14]

Persons were excluded from the study if they had a history of any non-dermatologic malignancy, systemic autoimmune disorder (such as inflammatory bowel disease, systemic lupus erythematosis, multiple sclerosis, or rheumatoid arthritis), neurologic disorder affecting bladder function, major psychiatric or medical disorder that would interfere with

study participation, pregnancy, prior augmentation cystoplasty or cystectomy. Men were also excluded if they had isolated unilateral orchalgia with no additional pain symptoms, or had received selected previous prostate therapies (e.g., microwave, needle ablation, balloon dilation, laser procedure, or cryosurgery). If otherwise eligible, potential study participants could be deferred from study entry for three months if they had bacterial cystitis, other urogenital infections (epididymitis/orchitis, urethritis, vaginitis, etc.), recent prostate biopsy, or transurethral resection of the prostate.

Measures

Psychosocial and somatic symptoms—The psychosocial measures for this study were chosen to provide a comprehensive assessment of state and trait psychological functioning, degree of current and past psychosocial stress, health related quality of life, presence of bothersome non-urologic somatic symptoms, and presence of illness related cognitions. Table 1 lists the individual measures. A more detailed description and justification for each included measure has been previously published [12] .

Covariates—Age, income (as a marker for social economic status) and UCPPS symptom severity were collected for use as covariates in the analysis. The GUPI bladder symptom score was chosen as it has been validated for use in both males and females with UCPPS [13].

Analyses

Group and sex differences on demographic variables and overall UCPPS symptom severity were examined with t-tests for continuous and chi-square tests for categorical variables. The primary analysis tested for group and sex differences individually for each of the psychosocial variables using multivariable linear regression analyses. The first model for each variable tested for overall group (UCPPS vs HC) differences controlling for sex (male, female), age and income. A second model additionally included the group × sex interaction to test whether there were significant group differences for males and for females and whether the size of the group effect differed by sex. A further analysis examined the hypothesis that psychosocial differences between male and female UCPPS participants may be due to differences in UCPPS symptom severity. This hypothesis was also examined using two models. The first model included sex, age and income and examined the overall impact of sex on the psychosocial variable among UCPPS patients. A second model included the GUPI severity measure and tested both the sex difference after controlling for severity and the relationship between severity and the individual psychosocial variable (after controlling for age, income and sex). The threshold for statistical significance was set at a conservative level of $p<.01$ to minimize Type 1 error.

Results

Demographics and covariates—The sample consisted of 233 female and 191 male UCPPS patients and 235 female and 182 male HCs. Male and female recruitment was generally balanced across the six MAPP sites. Table 2 shows the demographic and GUPI total severity index data for the sample. GUPI severity did not differ between males and females with UCPPS. There was a significant age difference between UCPPS and HC ($p<$.

001; patients being older than the controls) and male/female differences in employment and income as shown in Table 2.

Psychosocial Measures—Table 3 shows the results of the primary analysis of the main effects of group (UCPPS vs HC), sex and the group × sex interaction. This analysis controls for age and income (a full table of means and standard deviations for the psychosocial measures for the two groups stratified by sex is available in a supplementary table). The Overall test in Table 3 reflects the group difference and the regression coefficient for this factor is accompanied by the 99% confidence interval for the coefficient as well as an effect size measure (ßstd) to facilitate comparison of the size of the group difference across the psychosocial measures. Similar statistical parameters are shown from the second model testing group difference in women and men separately. In addition a statistical test is shown comparing the size of the group differences across males and females. As can be seen in Table 3 almost all of the psychosocial variables showed robust differences between UCPPS and HCs; in every case UCPPS showed greater problems, distress or difficulty. Male and female UCPPS patients show greater psychological difficulty, higher levels of current and lifetime stress, poorer quality of life, poorer coping, increased self-report of cognitive deficits and more widespread pain symptoms than sex and education matched HC. Exceptions to this trend were several of the measures of core personality traits (openness, conscientiousness and agreeableness), none of which evidenced significant group differences. Examination of ßstd indicates that the largest group differences were on measures of quality of life, mood, current stress, and presence of non-urological symptoms.

Most of the psychosocial variables examined were similar in males and females. However, a few variables showed larger group effects in females including the number of painful body locations and the physical component of health related quality of life. Early life and adult traumatic events were significantly greater in women with UCPPS compared to HC but not in men (although the test for sex differences was not significant). In contrast, confidence and self-esteem in sexual relationships showed greater UCPPS related impairment in males compared to females (Table 3).

The secondary analysis (Table 4) compared male and female UCPPS participants on the same psychosocial measures before and after controlling for the effect of GUPI symptom severity in addition to age and income. The first column indicating sex differences before controlling for GUPI show similar results to those comparing the UCPPS and HCs for males and females. In these unadjusted analyses, women with UCPPS show increased reports of non-urological symptoms and early life and adult trauma, and report less control over pain and lower quality of life in terms of physical activities compared to men. In unadjusted analyses, males report greater issues with self-esteem and confidence related to sexual relationships. This pattern is not changed when GUPI symptom severity is included in the model (column 2), i.e., the variables showing significant sex effects were still significant. Table 4 also shows that after controlling for age, income, and sex, UCPPS symptom severity is significantly related to almost all of the psychosocial variables. However these effects are mostly relatively small. The strongest relationships are seen between GUPI severity and measures of bodily pain and pain impact and moderate relationships are found between GUPI severity and measures of mood.

Discussion

This paper reports the largest and most comprehensive direct comparison of male and female patients with UCPPS on measures of psychosocial functioning, life stress and non-urological symptoms. Prior individual studies of women with IC/BPS have indicated increased levels of anxiety and depression, catastrophizing, and childhood trauma compared to healthy controls [6, 7] [8, 15, 16]. It has been hypothesized that men with CP/CPPS may have similar difficulties but the case-control literature is very small [9] [10]. The current results provide a much expanded and clinically important description of the psychosocial status of men and women with UCPPS. In addition to increased anxiety and depression and decreased quality of life, the UCPPS patients in the current study compared to age and sex matched controls show greater difficulties in sleep, functioning in sexual relationships, higher levels of general stress, greater exposure to adult and childhood trauma, poorer coping with pain and illness, increased self-report of deficits in cognitive abilities (such as in memory and concentration) and more widespread pain symptoms. As shown in Table 3, variables related to quality of life, mood, catastrophizing, and presence of widespread somatic symptoms showed large effect sizes while the trauma history, relationship difficulty and perceived mental capabilities variables showed small to medium effect sizes. A unique aspect of the current study is the ability to directly compare psychosocial variables between women and men with UCPPS. The initial hypothesis that the psychosocial profiles of these two groups would be similar was generally confirmed. Across most of the diverse set of measures used in this study men with UCPPS showed the same pattern of psychosocial disturbance as that for women. Contrary to this overall pattern, women with UCPPS did show greater deficits in physical aspects of quality of life, as well as reporting increased childhood adversity and more non-urological symptoms including pain. These differences were not due to differences in UCPPS symptom severity or age. Increased co-morbid pain symptoms have also been reported for women with IBS compared to men despite similar IBS severity and level of psychological symptoms [17, 18]. A recent study also found women with UCPPS are more likely to report bothersome non-urologic symptoms across multiple organ systems than men with UCPPS.[19] It has been hypothesized that altered somatic sensitivity may be a sex biased consequence of chronic stress with women showing increased hypersensitivity and men greater autonomic dysfunction [18]. A similar mechanism may underlie the current results. Level of childhood and adult adversity was another variable showing sex differences. Females with UCPPS reported significantly greater childhood and adult trauma compared to female controls while UCPPS males did not. A recent review and meta-analysis of the literature concludes that both childhood and adult trauma is significantly associated with several pain conditions that are related to UCPPS [20] and the current data suggest this may be more so for women than men with UCPPS. In the current study, the only measures showing greater self-reported problems in males with UCPPS compared to females were the two SEAR sexual functioning scales related to self-esteem and confidence in intimate relationships. Although this could reflect measurement bias - the instrument was originally designed and validated for use in men with erectile dysfunction - it may also reflect the greater psychological impact of UCPPS symptoms on relationship variables such as sexual performance that are seen as more

important to males as compared to variables (such as sexual desire) of more concern to females.

Another notable finding from this study was the variation in group differences across the 'big five' personality traits (Extraversion, Negative Emotionality, Openness to Experience, Conscientiousness, and Agreeableness). Patients with UCPPS evidenced higher scores on Negative Emotionality and lower scores on Extraversion compared to HC. Negative Emotionality (formerly referred to as Neuroticism) reflects a general propensity to increased stress responses and has been associated with development of IBS [21], CFS [22] and other pain problems [23, 24]. A pattern of high negative emotionality and low extroversion has recently been found in a longitudinal study to be the personality pattern most associated with long term poor health [25] and low resilience. The other personality factors, Openness, Conscientiousness, and Agreeableness did not differ between the groups and these traits have also not been consistently associated with other medical or psychological disorders and are those most associated with positive psychological functioning. Since personality traits are thought to reflect life-long individual characteristics, these data are consistent with a model of development of psychosocial problems that hypothesizes some personality traits, especially negative emotionality and to a lesser extent low extraversion (indicating an inhibited personality), may be important mediators of who will develop significant chronic symptoms in the face of physical or environmental stressors, and who may be less resilient to recovery from these stressors. It is also possible that common physiological mechanisms may underlie both trait psychological characteristics and a vulnerability to chronic pain or inflammation [22, 26]. Furthermore, early adversity is known to profoundly alter biologic mechanisms related to later health vulnerabilities and outcomes [27]. Further longitudinal studies are clearly needed to fully test these hypotheses.

The current analysis used a cross section case-control design with the goal to show the pattern of responses for the groups across a range of psychosocial measures. Group and sex comparisons were conducted for measures individually, as it was beyond the scope of this paper to examine relationships among the various psychosocial measures. Another limitation was due to recruitment from clinics and community advertising vs a representative population sample. Despite these limitations, the data from this study, the largest and most comprehensive of its kind to date in UCPPS, reveal several clear and clinically important findings regarding these common conditions. First the psychosocial impact from having UCPPS is both broad and deep. Clinical assessment of UCPPS patients should therefore be expansive in examining not just negative affect but also cognitive and social variables that may play an important role in outcomes. Second, clinicians should be aware that similar to other chronic pain conditions, women with UCPPS tend to show a greater degree of widespread pain and other non-urologic somatic symptoms compared to their male counterparts but that both men and women have similar difficulties in affect and cognition, and patterns of behavior associated with chronic stress. Third, while UCPPS symptom severity is significantly related to the broad range of psychosocial variables studied, the effect sizes were not very large; suggesting that many patients with only moderate chronic symptoms may have significant illness impact that should be addressed in treatment. In addition the data suggest that further study is needed to examine alternative hypotheses of mediators between UCPPS and illness impact beyond just symptom severity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Clemens JQ, et al. The MAPP research network: a novel study of urologic chronic pelvic pain syndromes. BMC Urol. 2014; 14:57. [PubMed: 25085007]
2. Hanno PM, et al. AUA guideline for the diagnosis and treatment of interstitial cystitis/bladder pain syndrome. J Urol. 2011; 185(6):2162–70. [PubMed: 21497847]
3. Krieger JN, Nyberg L Jr. Nickel JC. NIH consensus definition and classification of prostatitis. Jama. 1999; 282(3):236–7. [PubMed: 10422990]
4. Potts JM, Payne CK. Urologic chronic pelvic pain. Pain. 2012; 153(4):755–8. [PubMed: 22153018]
5. Rodriguez MA, Afari N, Buchwald DS. Evidence for overlap between urological and nonurological unexplained clinical conditions. J Urol. 2009; 182(5):2123–31. [PubMed: 19758633]
6. Nickel JC, et al. Psychosocial phenotyping in women with interstitial cystitis/painful bladder syndrome: a case control study. J Urol. 2010; 183(1):167–72. [PubMed: 19913812]
7. Rothrock NE, et al. Depressive symptoms and quality of life in patients with interstitial cystitis. J Urol. 2002; 167(4):1763–7. [PubMed: 11912405]
8. Clemens JQ, Brown SO, Calhoun EA. Mental health diagnoses in patients with interstitial cystitis/painful bladder syndrome and chronic prostatitis/chronic pelvic pain syndrome: a case/control study. J Urol. 2008; 180(4):1378–82. [PubMed: 18707716]
9. Nickel JC, et al. Psychosocial variables affect the quality of life of men diagnosed with chronic prostatitis/chronic pelvic pain syndrome. BJU Int. 2008; 101(1):59–64. [PubMed: 17924985]
10. Shoskes DA, et al. Clinical phenotyping of patients with chronic prostatitis/chronic pelvic pain syndrome and correlation with symptom severity. Urology. 2009; 73(3):538–42. discussion 542-3. [PubMed: 19118880]
11. Nickel JC, et al. Phenotype-directed management of interstitial cystitis/bladder pain syndrome. Urology. 2014; 84(1):175–9. [PubMed: 24813068]
12. Landis JR, et al. The MAPP research network: design, patient characterization and operations. BMC Urol. 2014; 14(1):58. [PubMed: 25085119]
13. Clemens JQ, et al. Validation of a modified National Institutes of Health chronic prostatitis symptom index to assess genitourinary pain in both men and women. Urology. 2009; 74(5):983–7. quiz 987 e1-3. [PubMed: 19800663]
14. Clemens JQ, et al. Comparison Of Baseline Urologic Symptoms In Men And Women In The Multidisciplinary Approach To The Study Of Chronic Pelvic Pain (Mapp) Research Cohort. The Journal of Urology. (0).
15. Pontari MA, et al. A case-control study of risk factors in men with chronic pelvic pain syndrome. BJU Int. 2005; 96(4):559–65. [PubMed: 16104910]
16. Nickel JC, et al. Childhood sexual trauma in women with interstitial cystitis/bladder pain syndrome: a case control study. Can Urol Assoc J. 2011; 5(6):410–5. [PubMed: 22154637]
17. Tang YR, et al. Sex differences in the symptoms and psychological factors that influence quality of life in patients with irritable bowel syndrome. Eur J Gastroenterol Hepatol. 2012; 24(6):702–7. [PubMed: 22382707]
18. Mayer EA, et al. Sex-based differences in gastrointestinal pain. Eur J Pain. 2004; 8(5):451–63. [PubMed: 15324776]

19. Lai HH, et al. Polysymptomatic, polysyndromic presentation of patients with urological chronic pelvic pain syndrome. J Urol. 2012; 187(6):2106–12. [PubMed: 22503014]
20. Afari N, et al. Psychological trauma and functional somatic syndromes: a systematic review and meta-analysis. Psychosom Med. 2014; 76(1):2–11. [PubMed: 24336429]
21. Talley NJ, Boyce PM, Jones M. Is the association between irritable bowel syndrome and abuse explained by neuroticism? A population based study. Gut. 1998; 42(1):47–53. [PubMed: 9505885]
22. Poeschla B, et al. Chronic fatigue and personality: a twin study of causal pathways and shared liabilities. Ann Behav Med. 2013; 45(3):289–98. [PubMed: 23361410]
23. Malin K, Littlejohn GO. Neuroticism in young women with fibromyalgia links to key clinical features. Pain Res Treat. 2012; 2012:730741. [PubMed: 22454770]
24. Aaseth K, et al. Personality traits and psychological distress in persons with chronic tension-type headache. The Akershus study of chronic headache. Acta Neurol Scand. 2011; 124(6):375–82. [PubMed: 22017633]
25. Kinnunen ML, et al. Personality profiles and health: longitudinal evidence among Finnish adults. Scand J Psychol. 2012; 53(6):512–22. [PubMed: 22913837]
26. Kato K, et al. Premorbid predictors of chronic fatigue. Arch Gen Psychiatry. 2006; 63(11):1267–72. [PubMed: 17088507]
27. Miller GE, et al. Low early-life social class leaves a biological residue manifested by decreased glucocorticoid and increased proinflammatory signaling. Proc Natl Acad Sci U S A. 2009; 106(34):14716–21. [PubMed: 19617551]

Table 1

Psychosocial and Symptom Measures

MEASURE	Description	Range	Abbreviation
Quality of Life			
GUPI QOL impact	Urological symptoms impact on daily life (1 week)	0-12	GUPI-Impact
SF12 physical health composite	Quality of life regarding physical functioning (4 weeks)	0-100	SF12-PH
SF12 mental health composite	Quality of life regarding mental functioning (4 weeks)	0-100	SF12-MH
BPI pain interference	Impact of pain on daily activities (past week)	0-10	BPI-Interference
SEAR: Sexual Relationship	Quality of sexual relationships (4 weeks)	0-100	SEAR-Sex
SEAR: Confidence	Confidence in relationships (4 weeks)	0-100	SEAR-Conf
SEAR: Overall Score	Overall relationship score (4 weeks)	0-100	SEAR-Total
SEAR: Self_Esteem	Self-esteem in relationships (4 weeks)	0-100	SEAR-Esteem
SEAR: Overall Relationship	Satisfaction with relationships (4 weeks)	0-100	SEAR-Relation
Mood			
SYM-Q: Mood	Overall mood rating (2 weeks)	0-10	SYMQ-mood
HADS-Anxiety	Anxiety symptoms (2 weeks)	0-21	HADS-A
HADS-Depression	Depression symptoms (2 weeks)	0-21	HADS-D
PANAS positive affect	Degree of positive affect (1 week)	5-50	PANAS-Pos
PANAS negative affect	Degree of negative affect (1 week)	5-50	PANAS-Neg
Life stress			
CTES: prior to age 17	Severity of traumatic events before age 17	0-84	CTES-Age17
CTES: within last 3 years	Severity of traumatic events in last three years	0-84	CTES-3yrs
Perceived stress scale	Self-rated level of stress (1 month)	0-40	PSS
Coping Skills			
CSQ: Catastrophizing	Pain Catastrophizing (no time specified)	0-36	CSQ-Catas
CSQ: ability to decrease pain	Perceived ability to decrease pain (no time specified)	0-6	CSQ-Decrease
CSQ: ability to control pain	Perceived ability to control pain (no time specified)	0-6	CSQ-Control
BPCQ: Internal Locus of Pain	Self-efficacy for pain (no	5-30	BPCQ-Int

MEASURE	Description	Range	Abbreviation
Control	time specified)		
BPCQ: External locus - Powerful Doctors	Importance of doctors in pain control (no time specified)	4-24	BQCQ-PD
BPCQ: External locus – Chance happenings	Importance of chance in pain control (no time specified)	4-24	BQCQ-Chance
Personality Traits			
IPIP:Negative Emotionality (Neuroticism)	Emotional stability (as you are now)	24-120	IPIP-N
IPIP:Extraversion	Outgoingness, sociability (as you are now)	24-120	IPIP-E
IPIP:Openness	Intellectual curiosity (as you are now)	24-120	IPIP-O
IPIP:Agreeableness	Friendlness, compassion (as you are now)	24-120	IPIP-A
IPIP:Conscientiousness	Self-discipline (as you are now)	24-120	IPIP-C
Wide spread symptoms			
BPI pain severity sore	Severity of pain (1 week)	0-10	BPI-severity
BPI: Body map -total # of sites	Number of painful body sites (1 week)	0-45	BPI-sites
CMSI: sum of symptoms for at least 3 month in past year	Number of physical symptoms persistent for at least 3 months in past year	0-39	CMSI-yr
CMSI: sum of symptoms for at least 3 month in lifetime	Number of physical symptoms persistent for at least 3 months in lifetime	0-39	CMSI-lifetime
Cognitive Skills			
MASQ: Language	Self-reported language problems (no time specified)	8-40	MASQ-Langage
MASQ:Visual Perceptual Ability	Self-reported visual problems (no time specified)	6-30	MASQ-Visual
MASQ: Verbal Memory	Self-reported verbal memory problems (no time specified)	8-40	MASQ-Verbal
MASQ: Visual Spatial Memory	Self-reported visual memory problems (no time specified)	8-40	MASQ-VS
MASQ: Attention Concentration	Self-reported concentration problems (no time specified)	8-40	MASQ-Attent

Table 2

Baseline Characteristics of UCPPS and Healthy Controls by Sex

		UCPPS (n=424)			Healthy Controls (n=417)			
		Male	Female	p value	Male	Female	p value	p value (UCPPS vs HC)
Number of Participants	N (%)	191 (45%)	233 (55%)		182 (44%)	235 (56%)		
Age (years)	Mean (Range)	46.8 (19 - 82)	40.5 (19 - 78)	<.001	43.7 (19 - 83)	38.1 (19 - 67)	<.001	0.005
Race/Ethnicity	White	170 (89.0%)	204 (87.6%)	0.645	148 (81.3%)	170 (72.3%)	0.033	<.001
	Non-white	21 (11.0%)	29 (12.4%)		34 (18.7%)	65 (27.7%)		
Employment	Employed	134 (70.2%)	144 (61.8%)	<.001	122 (67.0%)	173 (73.6%)	<.001	<.001
	Unemployed	19 (9.9%)	39 (16.7%)		37 (20.3%)	49 (20.9%)		
	Retired	30 (15.7%)	13 (5.6%)		21 (11.5%)	6 (2.6%)		
	Full-time homemaker	12 (5.2%)			1 (0.5%)	7 (3.0%)		
	Disabled	8 (4.2%)	24 (10.3%)					
	Missing	1 (0.4%)			1 (0.5%)			
Income	$10,000 or less	9 (4.7%)	31 (13.3%)	<.001	15 (8.2%)	29 (12.3%)	0.528	<.001
	$10,001 to $25,000	12 (6.3%)	22 (9.4%)		25 (13.7%)	31 (13.2%)		
	$25,001 to $50,000	26 (13.6%)	43 (18.5%)		44 (24.2%)	69 (29.4%)		
	$50,001 to $100,000	61 (31.9%)	61 (26.2%)		57 (31.3%)	64 (27.2%)		
	More than $100,000	68 (35.6%)	52 (22.3%)		24 (13.2%)	29 (12.3%)		
	Prefer not to Answer	14 (7.3%)	23 (9.9%)		17 (9.3%)	13 (5.5%)		
	Missing	1 (0.5%)	1 (0.4%)					
Duration of Symptoms (years)	Mean (Range)	7.8 (0 - 54)	9.1 (0 - 47)	0.216	.	.	.	.
Baseline GUPI total score (0-45)	Mean (Range)	24.6 (6 - 44)	26.4 (0 - 43)	0.026	1.8 (0 - 14)	1.5 (0 - 12)	0.137	<.001

Table 3

Regression analysis for group and sex effects on the psychosocial measures

	Overall Test (M1)	Female group Effect (M2)	Male group Effect (M2)	Diff of M&F
	ß(99% CI), $ß_{std}$	ß(99% CI), $ß_{std}$	ß2+ß3(99% CI), $ß_{std}$	p value for ß3
Quality of Life				
GUPI-Impact	7.34*(6.93- 7.74), 1.74	7.49*(6.96- 8.02), 1.78	7.14*(6.54- 7.74), 1.69	0.251
SF12-PH	−9.97*(−11.4- −8.53), −1.07	−11.9*(−13.8- −10.1), −1.29	−7.45*(−9.57- −5.33), −0.80	0.000*
SF12-MH	−10.7*(−12.3- −9.08), −1.05	−10.8*(−13.0- −8.68), −1.06	−10.6*(−13.0- −8.14), −1.03	0.830
BPI-Interference	3.57*(3.19- 3.95), 1.33	4.03*(3.53- 4.53), 1.50	3.00*(2.44- 3.55), 1.11	0.000*
SEAR-Sex	−19.3*(−23.8- −14.9), −0.74	−21.1*(−27.0- −15.1), −0.81	−17.3*(−23.7- −10.8), −0.66	0.253
SEAR-Conf	−10.5*(−13.7- −7.27), −0.60	−6.91*(−11.2- −2.57), −0.39	−14.7*(−19.3- −10.0), −0.84	0.001*
SEAR-Total	−15.9*(−19.4- −12.3), −0.76	−15.6*(−20.4- −10.8), −0.75	−16.2*(−21.4- −11.0), −0.78	0.816
SEAR-Esteem	−13.2*(−16.5- −9.94), −0.57	−8.11*(−12.4- −3.81), −0.35	−19.6*(−24.4- −14.8), −0.84	0.000*
SEAR-Relation	−9.48*(−14.8- −4.19), −0.35	−5.37(−12.4- 1.65), −0.20	−14.5*(−22.3- −6.75), −0.53	0.023
Mood				
SYMQ-mood	2.29*(1.92- 2.65), 1.00	2.34*(1.86- 2.81), 1.02	2.22*(1.69- 2.76), 0.97	0.683
HADS-A	4.21*(3.51- 4.92), 0.96	4.05*(3.12- 4.99), 0.92	4.42*(3.37- 5.47), 1.00	0.494
HADS-D	3.78*(3.16- 4.40), 0.98	3.86*(3.04- 4.69), 1.00	3.67*(2.75- 4.59), 0.95	0.672
PANAS-Pos	−6.88*(−8.23- −5.53), −0.86	−7.14*(−8.93- −5.36), −0.89	−6.55*(−8.56- −4.55), −0.81	0.565
PANAS-Neg	7.37*(.20- 8.54), 1.00	7.75*(6.21- 9.30), 1.05	6.89*(5.16- 8.63), 0.93	0.331
Life Stress				
CTES-Age17	0.43*(0.19- 0.68), 0.32	0.64*(0.33- 0.96), 0.48	0.17(−0.19- 0.52), 0.12	0.009*
CTES-3yrs	0.35*(0.13- 0.57), 0.29	0.45*(0.16- 0.74), 0.37	0.23(−0.10- 0.55), 0.19	0.179
PSS	6.50*(5.20- 7.79), 0.84	7.15*(5.45- 8.86), 0.92	5.66*(3.75- 7.58), 0.73	0.128
Coping Skills				
CSQ-Catas	10.58*(9.31- 11.86), 1.22	11.53*(9.86- 13.20), 1.33	9.37*(7.49- 11.26), 1.08	0.025

	Overall Test (M1)	Female group Effect (M2)	Male group Effect (M2)	Diff of M&F
	ß(99% CI), $ß_{std}$	ß(99% CI), $ß_{std}$	ß2+ß3(99% CI), $ß_{std}$	p value for ß3
CSQ-Decrease	−1.56*(−1.86- −1.25), −0.88	−1.58*(−1.98- −1.18), −0.89	−1.53*(−1.98- −1.08), −0.87	0.840
CSQ-Control	−0.55*(−0.92- −0.18), −0.29	−0.36*(−0.84- 0.13), −0.19	−0.79*(−1.34- −0.25), −0.42	0.118
BPCQ-Int	−4.14*(−5.03- −3.26), −0.80	−4.72*(−5.89- −3.56), −0.91	−3.41*(−4.72- −2.10), −0.66	0.049
BQCQ-PD	2.48*(1.72- 3.24), 0.59	2.47*(1.46- 3.47), 0.59	2.50*(1.37- 3.63), 0.60	0.952
BQCQ-Chance	2.11*(1.36- 2.86), 0.51	2.32*(1.33- 3.32), 0.56	1.85*(0.74- 2.96), 0.45	0.406
Personality Traits				
IPIP-N	11.82*(8.60- 15.04), 0.69	12.21*(7.99- 16.42), 0.71	11.31*(6.52- 16.10), 0.66	0.712
IPIP-E	−7.18*(−9.85- −4.51), −0.51	−8.46*(−11.9- −4.96), −0.61	−5.48*(−9.49- −1.47) −0.39	0.143
IPIP-O	−1.26(−3.67- 1.15), −0.10	−0.78(−3.95- 2.40), −0.06	−1.88(−5.48- 1.71), −0.15	0.546
IPIP-A	−1.66(−3.51- 0.20), −0.17	−1.33(−3.78- 1.12), −0.13	−2.07(−4.82- 0.67), −0.21	0.597
IPIP-C	−2.49(−4.98- 0.01), −0.19	−2.30(−5.56- 0.95), −0.18	−2.73(−6.49- 1.04), −0.21	0.823
Widespread Symptoms				
BPI-severity	3.70*(3.41- 3.99), 1.55	3.86*(3.48- 4.24), 1.62	3.49*(3.06- 3.92), 1.46	0.088
BPI-sites	4.75*(3.88- 5.63), 0.89	5.90*(4.75- 7.05), 1.11	3.30*(2.01- 4.59), 0.62	0.000*
CMSI-yr	9.86*(8.82- 10.91), 1.30	11.92*(10.57- 13.27), 1.57	7.25*(5.74- 8.77), 0.95	0.000*
CMSI-lifetime	3.88*(2.01- 5.75), 0.38	4.40*(1.94- 6.87), 0.43	3.21*(0.44- 5.98), 0.31	0.399
Cognitive Skills				
MASQ-Language	2.51*(1.78- 3.23), 0.61	2.67*(1.71- 3.63), 0.65	2.30*(1.22- 3.38), 0.56	0.508
MASQ-Visual	1.48*(0.85- 2.10), 0.42	1.75*(0.93- 2.56), 0.50	1.13*(0.20- 2.05), 0.32	0.190
MASQ-Verbal	2.22*(1.36- 3.08), 0.47	2.64*(1.50- 3.78), 0.55	1.68*(0.40- 2.96), 0.35	0.142
MASQ-VS	1.49*(0.78- 2.20), 0.38	1.64*(0.71- 2.58), 0.42	1.30*(0.24- 2.36), 0.33	0.522
MASQ-Attent	2.87*(2.05- 3.68), 0.62	2.61(1.54- 3.68), 0.57	3.20(1.99- 4.40), 0.69	0.339

Regression results for models testing group and sex effects. M1: Psychosocial Measure=ß0 + ß1(sex=Male) + ß2(Cohort=UCPPS) + ß4 age + ß5 Income. M2: Psychosocial Measure=ß0 + ß1(sex=Male) + ß2(Cohort=UCPPS)+ß3(Male * UCPPS) + ß4 age + ß5 Income.

CI=confidence interval. A CI that does not include 0 indicates a significant beta. $\mathbf{ß_{std}}$ = **ß** divided by the variable's standard deviation, an effect size measure showing relative strength of the relationship.

* =p<.01.

Table 4

Sex differences with and without controlling for UCPPS severity

	Sex Effect-M1: ß(99% CI), $ß_{std}$	Sex Effect–M2: ß(99% CI), $ß_{std}$	GUPI-M2: ß(99% CI), $ß_{std}$
Quality of Life			
GUPI-Impact	0.14(−0.60- 0.88), 0.05	0.34(−0.07- 0.75), 0.14	0.28*(0.25- 0.30), 0.10
SF12-PH	4.43*(1.79- 7.07), 0.43	4.19*(1.75- 6.64), 0.39	−0.46*(−0.60- −0.32), 0.05
SF12-MH	−1.25(−3.89- 1.38), 0.12	−1.52(−3.99- 0.95), 0.15	−0.42*(−0.56- −0.28), 0.44
BPI-Interference	−0.60(−1.30- 0.09), 0.22	−0.43(−0.94- 0.08), 0.14	0.21*(0.19- 0.24), 0.09
SEAR-Sex	17.29*(10.55- 24.04), 0.66	17.38*(10.88- 23.87), 0.65	−0.80*(−1.17- −0.43), 0.04
SEAR-Conf	0.29(−4.68- 5.27), 0.02	0.34(−4.57- 5.24), 0.01	−0.42*(−0.70- −0.14), 0.03
SEAR-Total	10.49*(5.08- 15.90), .051	10.59*(5.38- 15.79), 0.50	−0.66*(−0.95- −0.36), 0.04
SEAR-Esteem	21.62*(16.32- 26.92), 0.93	21.32*(16.15- 26.48), 0.92	−0.56*(−0.86- −0.26), 0.03
SEAR-Relation	−3.76*(−11.4- 3.92), 0.14	−3.52(−11.1- 4.11), 0.13	−0.44*(−0.88- −0.00), 0.02
Mood			
SYMQ-mood	0.19(−0.38- 0.76), 0.08	0.25(−0.28- 0.79), 0.12	0.10*(0.07- 0.13), 0.05
HADS-A	0.21(−0.94- 1.36), 0.05	0.26(−0.86- 1.38), 0.06	0.13*(0.06- 0.19), 0.03
HADS-D	0.61(−0.47- 1.69), 0.15	0.72(−0.28- 1.71), 0.18	0.20*(0.14- 0.26), 0.05
PANAS-Pos	0.22(−1.72- 2.17), 0.03	0.10(−1.77- 1.97), 0.00	−0.26*(−0.37- −0.15), 0.04
PANAS-Neg	0.44(−1.57- 2.45), 0.05	0.64(−1.25- 2.53), 0.09	0.33*(0.22- 0.44), 0.05
Life Stress			
CTES-Age17	−0.54*(−0.91- −0.18), 0.39	−0.55*(−0.92- −0.19), 0.39	0.01(−0.01- 0.03), 0.01
CTES-3yrs	−0.35*(−0.66- −0.04), 0.29	−0.36*(−0.67- −0.05), 0.29	−0.00(−0.02- 0.02), 0.00
PSS	−0.65(−2.62- 1.32), 0.08	−0.52(−2.45- 1.42), 0.06	0.20*(0.08- 0.31), 0.02
Coping Skills			
CSQ-Catas	−2.14(−4.34- 0.06), 0.24	−1.91(−3.96- 0.15), 0.21	0.38*(0.26- 0.49), 0.08
CSQ-Decrease	−0.53*(−0.89- −0.17), 0.38	−0.54*(−0.90- −0.18), 0.39	−0.02*(−0.04- −0.00), 0.02
CSQ-Control	−0.41*(−0.78- −0.04), 0.29	−0.42*(−0.79- −0.05), 0.30	−0.02*(−0.04- −0.00), 0.02
BPCQ-Int	1.41*(0.06- 2.75), 0.28	1.42*(0.08- 2.75), 0.27	−0.07(−0.15- 0.00), 0.02
BQCQ-PD	0.63(−0.49- 1.76), 0.15	0.68(−0.44- 1.81), 0.17	0.06(−0.01- 0.12), 0.01
BQCQ-Chance	0.64(−0.46- 1.73), 0.16	0.63(−0.47- 1.73), 0.15	0.03(−0.03- 0.09), 0.00
Personality Traits			
IPIP-N	0.23(−4.47- 4.93), 0.01	0.33(−4.34- 4.99), 0.02	0.31*(0.04- 0.57), 0.02
IPIP-E	−1.08(−4.96- 2.81), 0.08	−1.48(−5.33- 2.38), 0.11	−0.28*(−0.50- −0.05), 0.02

	Sex Effect-M1: ß(99% CI), $ß_{std}$	Sex Effect–M2: ß(99% CI), $ß_{std}$	GUPI-M2: ß(99% CI), $ß_{std}$
IPIP-O	−1.86(−5.40- 1.68), 0.15	−2.13(−5.64- 1.37), 0.18	−0.25*(−0.45- −0.05), 0.03
IPIP-A	−7.05*(−9.68- −4.42), 0.70	−7.12*(−9.77- −4.47), 0.70	−0.04(−0.19- 0.11), 0.00
IPIP-C	−3.90*(−7.52- −0.29), 0.29	−3.88*(−7.50- −0.26), 0.29	−0.08(−0.29- 0.12), 0.00
Widespread Symptoms			
BPI-severity	−0.26(−0.76- 0.24), 0.13	−0.16(−0.52- 0.20), 0.05	0.16*(0.14- 0.18), 0.10
BPI-sites	−2.23*(−3.87- −0.59), 0.34	−2.11*(−3.74- −0.48), 0.32	0.13*(0.03- 0.22), 0.03
CMSI-yr	−4.08*(−5.97- −2.19), 0.54	−3.94*(−5.73- −2.15), 0.50	0.28*(0.18- 0.39), 0.05
CMSI-lifetime	−0.45(−2.88- 1.99), 0.05	−0.49(−2.92- 1.93), 0.05	0.06(−0.08- 0.20), 0.01
Cognitive Skills			
MASQ-Language	−0.22(−1.39- 0.96), 0.05	−0.16(−1.33- 1.01), 0.03	0.07*(0.01- 0.14), 0.02
MASQ-Visual	−1.43*(−2.40- −0.46), 0.36	−1.40*(−2.36- −0.43), 0.38	0.07*(0.01- 0.12), 0.02
MASQ-Verbal	−0.52(−1.85- 0.81), 0.10	−0.46(−1.78- 0.86), 0.08	0.10*(0.03- 0.18), 0.03
MASQ-VS	−0.39(−1.42- 0.64), 0.10	−0.37(−1.39- 0.66), 0.09	0.07*(0.01- 0.13), 0.02
MASQ-Attent	0.30(−0.93- 1.54), 0.06	0.33(−0.90- 1.56), 0.07	0.08*(0.01- 0.15), 0.02

Regression results for models testing sex effects with and without controlling for GUPI severity. M1: Psychosocial Measure=ß0 + ß1(sex=Male) + ß2 age + ß3 Income. M2: Psychosocial Measure=ß0 + ß1(sex=Male) + ß2 age + ß3 Income + ß4 GUPI severity.

CI=confidence interval. A CI that does not include 0 indicates a significant beta. $ß_{std}$ = **ß** divided by the variable's standard deviation, an effect size measure showing relative strength of the relationship.

*=p<.01.