Hernia (2023) 27:35–40
https://doi.org/10.1007/s10029-022-02662-2

ORIGINAL ARTICLE

Psychological disorders in patients with chronic postoperative inguinal pain

B. T. Miller[1] · J. Scheman[2] · C. C. Petro[1] · L. R. A. Beffa[1] · A. S. Prabhu[1] · M. J. Rosen[1] · D. M. Krpata[1]

Received: 13 May 2022 / Accepted: 30 July 2022 / Published online: 12 August 2022

Abstract

Purpose Chronic postoperative inguinal pain (CPIP), a complication of inguinal hernia repair, may negatively affect mental health. The rates of psychological disorders in patients with CPIP are unknown. We aimed to describe the prevalence of psychological disorders coinciding with CPIP.

Methods A retrospective chart review was performed of all patients seen at the Cleveland Clinic Center for Abdominal Core Health's inter-disciplinary Chronic Groin Pain Clinic. This clinic is unique in that all patients are evaluated by a surgeon, a sonographer and radiologist, and a behavioral medicine psychologist. Patient psychological history and treatment, Depression Anxiety and Stress Scale (DASS) scores, pain catastrophizing, and trauma or abuse history were captured.

Results From January 2018 to January 2022, 61 patients were evaluated and included in the study. Psychological treatment had been provided to 37 (61%) patients (present: 16 (27%), past: 21 (35%)). The most common psychological disorders represented were depression ($N=13$, 22%), anxiety ($N=10$, 17%), and post-traumatic stress disorder ($N=5$, 8%). DASS scores indicated that 20 (33%) patients were reporting symptoms of depression and 16 (27%) patients were reporting symptoms of anxiety. Of the 40 patients assessed for pain catastrophizing, 28 (70%) reported rumination, 9 (23%) reported magnification, and 23 (58%) reported feelings of helplessness. A childhood history of emotional or physical abuse was reported by 11 (18%) patients.

Conclusion An inter-disciplinary groin pain clinic has revealed that patients with CPIP frequently have pre-existing complex psychosocial issues. A multi-specialty approach to CPIP may improve preoperative assessments and identify patients who may benefit from further psychological evaluation and treatment.

Keywords Inguinal hernia repair · Chronic postoperative inguinal pain · Psychological disorders · Pain catastrophizing

Introduction

Chronic postoperative inguinal pain (CPIP) is defined as new or different (compared to preoperative) groin pain lasting for more than 3 months after inguinal hernia repair [1]. The incidence of moderate to severe CPIP is estimated to be 5–10% [2]. Its etiology is poorly understood but is likely multifactorial. Nerve injury, mesh-related problems, inflammation, and hernia recurrence have all been implicated in the development of CPIP [3]. Psychosocial issues may also contribute to the pathophysiology of CPIP [4].

Chronic pain has been linked to worse mental health. Psychological and behavioral disturbances, such as depression, anxiety, and substance misuse, are more prevalent in patients with chronic pain than in the general population [5], although the direction of the causality has remained elusive. A collaborative approach to treating chronic pain, including psychological evaluation and treatment, has been found to be more successful in improving pain symptoms and mental health than treatment-as-usual by a primary care provider [6]. To optimize treatment of patients with CPIP, an inter-disciplinary chronic groin pain clinic, which includes a comprehensive psychological evaluation, was developed at the Cleveland Clinic Center for Abdominal Core Health (CCCACH).

✉ B. T. Miller
millerb35@ccf.org

[1] Cleveland Clinic Center for Abdominal Core Health, Department of General Surgery, Cleveland Clinic Foundation, Cleveland, OH, USA

[2] Digestive Disease and Surgery Institute, Cleveland Clinic Foundation, Cleveland, OH, USA

Although psychological disturbances, like depressed mood and poor emotional health, have been associated with CPIP [7], the prevalence of these diagnoses in this population is unknown. A better understanding of the prevalence of psychological disorders in patients with CPIP may enable surgeons to optimize patient assessments and treatment approaches. Using the data from our groin pain clinic, we aimed to describe the prevalence of psychological distress, pre-existing psychological disorders, and other psychosocial issues in a group of patients with CPIP.

Methods

After Institutional Review Board approval, a retrospective chart review of all patients seen at the CCCACH Chronic Groin Pain Clinic between January 2018 and January 2022 was performed. Patients are referred to the CCCACH Chronic Groin Pain Clinic if they are more than six months out from their index operation and do not report a groin bulge. The CCCACH inter-disciplinary Chronic Groin Pain Clinic is comprised of a sonographer, a musculoskeletal radiologist, a surgeon who is fellowship-trained in minimally invasive surgery and abdominal wall reconstruction, and a behavioral medicine psychologist. All patients undergo a dynamic groin ultrasound, which is interpreted immediately by the musculoskeletal radiologist. The surgeon performs dermatomal pain mapping and a complete history and physical examination. Patients also receive a behavioral medicine evaluation, performed by the behavioral medicine psychologist.

An inter-disciplinary chronic groin pain clinic is resource-intensive, requiring the cooperation of several providers simultaneously, and is therefore limited by their availability. Some patients referred to the CCCACH with chronic groin pain are seen in general surgery clinic by the surgeon alone. Patient allocation to the inter-disciplinary Chronic Groin Pain Clinic versus the general surgery clinic is random. All patients included in this study were seen in the inter-disciplinary Chronic Groin Pain Clinic.

The behavioral medicine evaluation assesses pain, psychological co-morbidities and treatment history, mood, childhood history of abuse and trauma, function, pain catastrophizing, and substance abuse history. Psychological co-morbidities are defined as disorders diagnosed using the Diagnostic Statistical Manual of Mental Disorders (DSM-5) criteria [8]. Mood is assessed with an interview and the short-form Depression Anxiety and Stress Scale-21 (DASS-21). The DASS-21 is a validated, 21-item questionnaire that measures psychological distress in terms of depression, anxiety, and stress [9].

Function is assessed using the Pain Disability Index (PDI). The PDI is a validated questionnaire that measures the degree to which chronic pain disrupts activities [10]. Seven domains of function are assessed: family and home responsibilities, recreation, social activity, occupation, sex, self-care, and life-supporting activity. Each domain is scored on a scale of 0–10, with 0 representing no disability and 10 representing the worst disability. Each domain is scored on a scale of 0–10, with 0 representing no disability and 10 representing the worst disability. An overall disability score is calculated by summing the scores from the seven domains of activity (range 0–70). PDI scores ≤ 2 indicate mild disability, scores of 3–7 indicate moderate disability, and scores ≥ 8 indicate severe disability [11].

Pain catastrophizing is defined as "an exaggerated negative mental set brought to bear during actual or anticipated painful experiences" [12]. Three dimensions of thought are involved in pain catastrophizing: rumination, magnification, and helplessness. The presence or absence (yes/no) of these three factors is assessed with the validated three-item daily Pain Catastrophizing Scale [13]. Patients are asked if, during the past 24 h, "I kept thinking about how much I hurt." (Rumination), "I felt my pain overwhelmed me." (Magnification), and "I was afraid that my pain would get worse." (Helplessness).

Patient demographics, pre-operative medical co-morbidities, operative details, and the behavioral medicine evaluation results were captured during chart review. The primary study outcome was the rate of psychological co-morbidities in this cohort with CPIP. Additional outcomes included DASS-21 scores, trauma or abuse history, PDI scores, the presence of rumination, magnification, or helplessness, and substance use history.

Results

From January 2018 to January 2022, 61 patients with CPIP were evaluated and included in the study. Most patients were men ($N=53$, 87%), and the median cohort age was 56 (IQR 43;62) years. Patients with CPIP had undergone open inguinal hernia repair with mesh ($N=37$, 61%) and minimally invasive inguinal hernia repairs ($N=29$, 48%) (some patients had undergone both open and minimally invasive inguinal hernia repairs) (Table 1). Multiple inguinal hernia repairs had been performed on 12 (20%) patients. For mesh fixation in the minimally invasive repairs, Tacking devices (11 (38%) cases), suture (5 (17%) cases), and self-fixating mesh [10 (34%) cases] were used. Four (7%) patients had undergone ilioinguinal nerve manipulation or prophylactic ilioinguinal neurectomy.

Prior to their evaluation in our groin pain clinic, behavioral health treatment had been provided to 37 (61%) patients [present: 16 (26%), past: 21 (34%)]. Twenty-two (36%) patients had been diagnosed with a psychological disorder [1

Table 1 Patient and operative characteristics

	N = 61
Age (years)	56 (43,62)
Gender (male)	53 (87%)
Hypertension	17 (28%)
Diabetes	5 (8%)
COPD	3 (5%)
Congestive heart failure	3 (5%)
MIS inguinal hernia repair[a]	17 (28%)
MIS bilateral inguinal hernia repair[a]	12 (20%)
Mesh fixation	
Tacking device	11 (18%)
Suture	5 (8%)
Self-fixating mesh	10 (16%)
Open inguinal hernia repair[a]	31 (51%)
Lichtenstein repair	13 (21%)
Bilayer mesh	2 (3%)
Tissue repair	2 (3%)
Plug & patch	10 (16%)
Open bilateral inguinal hernia repair[a]	8 (13%)
Patients with multiple inguinal hernia repairs	12 (20%)
Inguinal nerve manipulation	2 (3%)
Prophylactic ilioinguinal neurectomy	2 (3%)

Data presented as *N* (%) or median (IQR), where appropriate

CHF congestive heart failure, *COPD* chronic obstructive pulmonary disease, *MIS* minimally invasive surgery

[a]Some patients had undergone both open and MIS inguinal hernia repairs

disorder: *N* = 11 (18%), 2 or more disorders: *N* = 11 (18%)]. The most common diagnoses represented were depression (*N* = 13, 21%), anxiety (*N* = 10, 16%), and post-traumatic stress disorder (PTSD) (*N* = 5, 8%) (Table 2). A childhood history of emotional or physical abuse was reported by 11 (18%) patients.

When asked during the interview about feeling depressed, anxious, frustrated or irritable, 28 (47%) patients reported feelings of depression, 34 (57%) reported feelings of anxiety, 56 (92%) reported frustration, and 45 (74%) reported irritability. DASS-21 questionnaire results revealed that 20 (33%) patients were reporting symptoms of depression and 16 (27%) patients were reporting symptoms of anxiety (Table 3). Of the 40 patients assessed for pain catastrophizing, 33 (83%) expressed at least one element of pain catastrophizing. There were 28 (70%) patients who ruminated on their pain, 9 (23%) who magnified their pain, and 23 (58%) had feelings of helplessness.

Patients with CPIP also reported impairment in activities. The median overall PDI score was 30 [IQR 19;42]. Median PDI scores for the 7 functional domains assessed were 5 [IQR 3;6] (family and home responsibilities), 6 [IQR 4;8] (recreation), 4 [IQR 2;6] (social activity), 5 [IQR 2.75;8] (occupation), 6 [IQR 3;8] (sex), 3 [IQR 3;8] (self-care), and 4 [IQR 2;5] (life-supporting activities). Pain caused 8 (13%) patients to be housebound and 1 (2%) patient to be bed-bound.

Substance use was reported among the cohort. Twenty-five (42%) patients reported that they had at least one alcoholic drink per week, 10 (17%) patients reported that they used nicotine, and 7 (12%) patients reported that they used marijuana. Opioid use was reported by 6 (10%) patients, but opioid misuse was denied by all opioid users. All patients denied illicit drug use. A previous personal concern about substance use was reported by 20 (33%) patients, and 12 (20%) patients had a family member who had raised concerns about their substance use. Seven (12%) patients had received treatment for substance use.

Table 2 Cohort psychological conditions

	N = 61
Current psychological treatment	16 (26%)
Anxiety	7 (11%)
Depression	8 (13%)
Bipolar disorder	3 (5%)
Intermittent explosive disorder	1 (2%)
Post-traumatic stress disorder	4 (7%)
History of psychological treatment	21 (34%)
Anxiety	3 (5%)
Depression	5 (8%)
Post-traumatic stress disorder	1 (2%)
Attention deficit hyperactivity disorder	1 (2%)
Schizophrenia	1 (2%)

Data presented as *N* (%)

Table 3 Cohort Depression Anxiety and Stress Scale (DASS) scores

	N = 60
DASS depression score	
Mild	10 (17%)
Moderate	5 (8%)
Severe	1 (2%)
Extremely severe	4 (7%)
Total	20 (33%)
DASS anxiety score	
Mild	4 (7%)
Moderate	3 (5%)
Severe	4 (7%)
Extremely severe	5 (8%)
Total	16 (27%)

Data presented as *N* (%)

Discussion

This retrospective study of psychosocial issues among patients with CPIP found that nearly two-thirds of them had received behavioral health treatment and that more than one-third had been diagnosed with a psychological disorder. The most common psychological disorders represented were depression, anxiety, and PTSD. Nearly one-fifth of patients in the cohort had a history of childhood abuse. Patients with CPIP often catastrophized their pain experience, and they were likely to report some degree of disability due to their pain.

Behavioral health treatment rates were higher in this group of patients with CPIP than in the general population. At the time of psychological assessment, behavioral health treatment was being provided to 26% of patients in this study. Because 87% of the patients studied were men, and roughly 13% of U.S. men received mental health treatment in 2019 [14], this cohort with CPIP received mental health treatment at about twice the expected rate. The prevalence of depression among patients in this study was also higher than the depression rate among U.S. men (13 vs 6%, respectively) [15]. However, the prevalence of anxiety was not higher in the patients studied than in the population at large. The prevalence of anxiety disorders in U.S. men is about 14% [16], while the rate of anxiety disorders in the cohort studied was 11%. The rates of depression and anxiety in the cohort with CPIP must be interpreted cautiously, though, because the prevalence of psychological disorders may be underestimated. Patients may have symptoms of depression and anxiety but fail to meet DSM-5 criteria for a diagnosis of a psychological disorder. Using tools like the DASS-21 questionnaire can provide additional insight into symptoms of depression and anxiety that patients may be experiencing.

DASS-21 scores from this study found higher rates of depression symptoms among patients with CPIP than in U.S. men. Mild, moderate, and severe depression symptoms were seen in 17, 8, and 9% of patients with CPIP, respectively. Villaroel et al. found mild, moderate, and severe depression symptoms affected 10, 3, and 2% of U.S. men, respectively [17]. Regarding anxiety, mild and moderate anxiety symptoms were similar between patients with CPIP (7 and 5%, respectively) and U.S. men (8 and 2%, respectively) [18]. However, severe anxiety symptoms affected 9% of patients in this study compared to 2% of U.S. men [18]. Our results show that rates of depression and severe anxiety symptoms may be higher in patients with CPIP than in the general population. But we do not know if CPIP leads to worse depression and severe anxiety symptoms, or if patients with depression and severe anxiety symptoms are at risk for developing CPIP. Prospective studies are needed to better understand the relationship between CPIP and psychological disorders.

PTSD and chronic pain are often comorbid conditions [19]. The prevalence of PTSD in this study was 7%. This is higher than the 2% prevalence of PTSD among U.S. men [20], but similar to the 9–10% prevalence of PTSD in other populations with chronic pain [21]. Prior studies have shown that PTSD responds positively to psychotherapy, and that integrated PTSD-chronic pain treatment approaches successfully treat both conditions [19]. For patients with comorbid PTSD and CPIP, PTSD treatment should be considered in addition to evaluation of their groin pain.

Childhood abuse has been linked to later development of chronic pain syndromes, including fibromyalgia and chronic abdominal, pelvic, and back pain [22]. The prevalence of childhood abuse reported by patients with CPIP in this study was 18%, which is slightly higher than the 12.5% lifetime childhood abuse prevalence in the U.S. [23]. As childhood maltreatment has been associated with other chronic pain syndromes, it follows that it may play a role in the development of CPIP. Further studies are needed to assess the relationship between CPIP and childhood abuse or other traumatic experiences.

Pain catastrophizing, or the tendency to forecast future pain events negatively, has been linked to chronic pain [12]. People who catastrophize have heightened pain experiences, greater emotional distress, more disability, and worse treatment outcomes compared to non-catastrophizers [12, 24, 25]. The causes of pain catastrophizing are poorly understood, but catastrophizers magnify their expected pain even before experiencing a painful stimulus. In other words, pain catastrophizers have a predictably higher probability of having worse pain [12, 26]. Among the patients assessed for pain catastrophizing in this study, 83% expressed feeling at least one element of catastrophizing (rumination, magnification, or helplessness), and 70% ruminated on their pain. Of the three catastrophizing elements, rumination has been shown to most accurately predict worse pain experiences and greater pain-related disability [12]. We interpret the prevalence of pain catastrophizing, especially rumination, as high in this population. Preoperative assessment of pain catastrophizing may be useful in predicting which patients may have worse pain after inguinal hernia repair. And postoperatively, mitigating the effects of pain catastrophizing with psychological therapy may improve outcomes in patients with CPIP.

Disability due to pain was present in this population with CPIP, as median PDI scores showed that patients suffered moderate disability in all seven functional domains assessed. These results are supported by Staal et al., who also found that patients with chronic groin pain after inguinal hernia repair reported disability in all seven functional domains evaluated with the PDI [27]. Disability associated with CPIP may contribute to worse psychological outcomes and vice versa. Rusu et al. showed that patients with disability from

chronic pain are at risk for developing depression [28], and Arnow et al. found that depression predicted greater pain-related disability [29]. The relationship between psychological health and disability from CPIP may be intertwined, with one factor contributing negatively to the other. Thus, an evaluation by a behavioral health professional may help guide surgeons and patients in determining the most appropriate therapies for treating CPIP-related disability.

Substance use disorders have been shown to be associated with chronic pain [30]. Rates of alcohol, nicotine, and marijuana use in this group of patients with CPIP were 42, 17, and 12%, respectively. Rates of alcohol, nicotine, and marijuana use in the U.S. are 51, 17, and 13%, respectively [31], indicating that substance use among the studied cohort was similar to that of the U.S. at large. However, we also found that 12% of patients in this study had previously undergone treatment for substance abuse. Grant et al. found the estimated lifetime risk of developing a substance use disorder to be about 10%, but only 25% of people with a substance use disorder ever received treatment [32]. This implies that this study may have underestimated the prevalence of substance use disorders in patients with CPIP. For patients with CPIP, substance use assessment and treatment may be an important consideration in their global evaluation.

Psychological testing in our inter-disciplinary groin pain clinic revealed that patients with CPIP may have higher rates of psychological disorders than the general population. We do not know if antecedent psychological disorders placed patients at risk for developing CPIP or vice versa. Nevertheless, a psychological evaluation for patients with CPIP, or referral to a center that can provide this expertise, may be wise before attempting surgical intervention. After psychological assessment in our groin pain clinic, recommendations are made by the psychologist for appropriate next steps in care. These recommendations, based on clinical judgement and the results of the psychological testing, may include pain rehabilitation or additional psychological evaluation and treatment prior to surgical intervention. The psychologist may also conclude that there are no psychological contraindications to surgery.

This study has limitations. It represents the retrospective findings of a single institution and is a small sample size. This study is further limited in that we did not compare the CPIP group to a control group to determine statistical significance of any results evaluated. Additionally, we do not know if the psychological assessments and interventions in this population impacted clinical outcomes. We also do not know if the higher than expected rates of psychological disorders seen in this cohort are due to pre-existing psychological disorders that place these patients at higher risk of developing CPIP, or because patients with CPIP are more likely to develop psychological disorders. Further prospective work needs to be done in this area. Finally, this study represents the findings of a high-volume hernia center, and our results may not be generalizable.

In conclusion, an inter-disciplinary groin pain clinic has revealed that patients with CPIP often have complex psychosocial issues, including mental illness, a history of childhood abuse, pain catastrophizing, disability, and a history of substance misuse. A multispecialty approach to CPIP may improve preoperative assessments and identify patients who may benefit from further psychological evaluation and treatment. Future research should also seek to identify the relationship of these psychological disorders with outcomes after the surgical treatment of CPIP.

Author contributions BTM contributed to study design, data acquisition and interpretation, manuscript writing, and final approval. JS, CCP, LRAB, ASP, MJR, and DMK contributed to study design, data interpretation, manuscript revision, and final approval.

Declarations

Conflict of interest Dr. Ajita S. Prabhu is a consultant for Verb Surgical and CMR Surgical. She has also been a speaker for and has received grant support from Intuitive Surgical. Dr. Michael J. Rosen receives salary support as medical director of the Abdominal Core Health Quality Collaborative and is a board member of Ariste Medical with stock options. Drs. Benjamin T. Miller, Judith Scheman, Clayton C. Petro, Lucas R. A. Beffa, and David M. Krpata have no conflicts of interest or financial ties to disclose.

Human and animal rights and Informed consent The Cleveland Clinic Foundation Institutional Review Board reviewed and approved this study.

References

1. Nguyen DK, Amid PK, Chen DC (2016) Groin pain after inguinal hernia repair. Adv Surg 50(1):203–220. https://doi.org/10.1016/j.yasu.2016.04.003
2. Kehlet H, Jensen TS, Woolf CJ (2006) Persistent postsurgical pain: risk factors and prevention. Lancet 367(9522):1618–1625. https://doi.org/10.1016/S0140-6736(06)68700-X
3. Fafaj A, Tastaldi L, Alkhatib H, Zolin S, Alaedeen D, Petro C, Prabhu AS, Rosenblatt S, Rosen MJ, Krpata DM (2020) Surgical treatment for chronic postoperative inguinal pain—short term outcomes of a specialized center. Am J Surg 219(3):425–428. https://doi.org/10.1016/j.amjsurg.2019.10.020
4. Kalliomaki ML, Sandblom G, Gunnarsson U, Gordh T (2009) Persistent pain after groin hernia surgery: a qualitative analysis of pain and its consequences for quality of life. Acta Anaesthesiol Scand 53(2):236–246. https://doi.org/10.1111/j.1399-6576.2008.01840.x
5. Fine PG (2011) Long-term consequences of chronic pain: mounting evidence for pain as a neurological disease and parallels with other chronic disease states. Pain Med 12(7):996–1004. https://doi.org/10.1111/j.1526-4637.2011.01187.x
6. Dobscha SK, Corson K, Perrin NA, Hanson GC, Leibowitz RQ, Doak MN, Dickinson KC, Sullivan MD, Gerrity MS (2009)

Collaborative care for chronic pain in primary care: a cluster randomized trial. JAMA 301(12):1242–1252. https://doi.org/10.1001/jama.2009.377
7. Courtney CA, Duffy K, Serpell MG, O'Dwyer PJ (2002) Outcome of patients with severe chronic pain following repair of groin hernia. Br J Surg 89(10):1310–1314. https://doi.org/10.1046/j.1365-2168.2002.02206.x
8. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, 5th edn. American Psychiatric Association, Washington
9. Henry JD, Crawford JR (2005) The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. Br J Clin Psychol 44(2):227–239. https://doi.org/10.1348/014466505X29657
10. Pollard CA (1984) Preliminary validity study of the pain disability index. Percept Mot Skills 59(3):974. https://doi.org/10.2466/pms.1984.59.3.974
11. Pain disability index. https://www.med.umich.edu/1info/FHP/practiceguides/pain/detpdi.pdf Accessed 15 April 2022
12. Sullivan MJL (1995) The pain catastrophizing scale: user manual. https://aspecthealth.ca/wp-content/uploads/2017/03/PCSManual_English1.pdf Accessed 15 April 2022
13. Darnall BD, Sturgeon JA, Cook KF, Taub CJ, Roy A, Burns JW, Sullivan M, Mackey SC (2017) Development and validation of a daily pain catastrophizing scale. J Pain 18(9):1139–1149. https://doi.org/10.1016/j.jpain.2017.05.003
14. Terlizzi EP, Zablotsky B (2019) Mental health treatment among adults: United States, 2019. NCHC Brief no. 380, September 2020. https://www.cdc.gov/nchs/products/databriefs/db380.htm#:~:text=Interview%20Survey%2C%202019.-,Summary,from%20a%20mental%20health%20professional Accessed 30 Mar 2022
15. Major depression. National institute of mental health. https://www.nimh.nih.gov/health/statistics/major-depression Accessed 30 Mar 2022
16. Any anxiety disorder. National institute of mental health. https://www.nimh.nih.gov/health/statistics/any-anxiety-disorder#part_2579 Accessed 30 Mar 2022
17. Villarroel MA, Terlizzi EP (2019) Symptoms of depression among adults: United States, 2019. Centers for disease control and prevention. https://www.cdc.gov/nchs/products/databriefs/db379.htm Accessed 30 Mar 2022
18. Terlizzi EP, Villarroel MA (2019) Symptoms of generalized anxiety disorder among adults: United States, 2019. Centers for disease control and prevention. https://www.cdc.gov/nchs/products/databriefs/db378.htm Accessed 30 Mar 2022
19. Kind S, Otis JD (2019) The interaction between chronic pain and PTSD. Curr Pain Headache Rep 28(23):91. https://doi.org/10.1007/s11916-019-0828-3
20. Post-traumatic stress disorder. National Institute of Mental Health. https://www.nimh.nih.gov/health/statistics/post-traumatic-stress-disorder-ptsd Accessed 30 Mar 2022
21. Siqveland J, Hussain A, Lindstrøm JC, Ruud T, Hauff E (2017) Prevalence of posttraumatic stress disorder in persons with chronic pain: a meta-analysis. Front Psychiatry 8:1–8. https://doi.org/10.3389/fpsyt.2017.00164
22. Lampe A, Doering S, Rumpold G, Solder E, Krismer M, Kantner-Rumplmair W, Schubert C, Sollner W (2003) Chronic pain syndromes and their relation to childhood abuse and stressful life events. J Psychosom Res 54(4):361–367. https://doi.org/10.1016/S0022-3999(02)00399-9
23. Wildeman C, Emanuel N, Leventhal JM, Putnam-Hornstein E, Waldfogel J, Lee H (2014) The prevalence of confirmed maltreatment among US children, 2004 to 2011. JAMA Pediatr 168(8):706–713. https://doi.org/10.1001/jamapediatrics.2014.410
24. Leung L (2012) Pain catastrophizing: an updated review. Indian J Psychol Med 34(3):204–217. https://doi.org/10.4103/0253-7176.106012
25. Kneeland ET, Griffin ML, Taghian N, Weiss RD, McHugh RK (2019) Associations between pain catastrophizing and clinical characteristics in adults with substance use disorders and co-occurring chronic pain. Am J Drug Alcohol Abuse 45(5):488–494. https://doi.org/10.1080/00952990.2019.1581793
26. Sansone RA, Sansone LA (2012) Rumination. Innov Clin Neurosci 9(2):29–34
27. Staal E, Nienhuijs SW, Keemers-Gels ME, Rosman C, Strobbe LJA (2008) The impact of pain on daily activities following open mesh inguinal hernia repair. Hernia 12:153–157. https://doi.org/10.1007/s10029-007-0297-1
28. Rusu AC, Santos R, Pincus T (2016) Pain-related distress and clinical depression in chronic pain: a comparison between two measures. Scand J Pain 12:62–67. https://doi.org/10.1016/j.sjpain.2016.04.001
29. Arnow BA, Blasey CM, Constantino MJ, Robinson R, Hunkeler E, Lee J, Fireman B, Khaylis A, Feiner L, Hayward C (2011) Catastrophizing, depression, and pain-related disability. Gen Hosp Psychiatry 33(2):150–156. https://doi.org/10.1016/j.genhosppsych.2010.12.008
30. Kaye AD, Kandregula S, Kosty J, Sin A, Guthikonda B, Ghali GE, Craig MK, Pham AD, Reed DS, Gennuso SA, Reynolds RM, Ehrhardt KP, Cornett EM, Urman RD (2020) Chronic pain and substance use disorders: preoperative assessment and strategies. Best Pract Res Anaesthesiol 34(2):255–267. https://doi.org/10.1016/j.bpa.2020.04.014
31. Key substance use and mental health indicators in the United States: results from the 2019 National survey on drug use and health. https://www.samhsa.gov/data/sites/default/files/reports/rpt29393/2019NSDUHFFRPDFWHTML/2019NSDUHFFR090120.htm Accessed 1 April 2022
32. Grant BF, Saha TD, Ruan WJ, Goldstein RB, Chaou SP, Jung J, Zhang H, Smith SM, Pickering RP, Huang B, Hasin DS (2016) Epidemiology of DSM-5 drug use disorder: results from the national epidemiological survey on alcohol and related conditions-III. JAMA Psychiat 73(1):39–47. https://doi.org/10.1001/jamapsychiatry.2015.2132