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Profiling Chronic Pain Based on Cognitive, Emotional, and Neuropsychological Indicators

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ABSTRACT

Objective: Pain is a phenomenon every person experiences during life, and its prevalence in societies is reportedly 13-47%. Psychological approaches focus on two categories: pain-injury factors and pain-coping skills. Considering the importance of these factors, this study aimed to investigate chronic pain in terms of psychological, cognitive, and emotional indicators.

Methods and Materials: A structural equation correlation design was employed to achieve the current survey's aim. Two hundred Patients with chronic muscular and skeletal pains referred to the pain clinic of Mashhad University of Medical Sciences between 2022 and 2023 were recruited through available sampling. Ambiguous scenarios, as created by Barna and Wisconsin Card Sorting (Grant & Berg, 1948), were used to measure interpretation bias and abstract behavior, respectively. The Stroop color-word test measured selective attention and cognitive flexibility (Stroop, 1935). Assessing emotional, cognitive, and behavioral reactions to ambiguous situations and Anxiety was performed using the Uncertainty Intolerance Scale (UIS) designed by Friston and the Anxiety Susceptibility Scale. Data was analyzed using SPSS (v.16.0) and SmartPLS 3.3.2 software.

Findings: The path of predicting chronic pain by five indicators was significant in all dimensions. It was found that congruent (P<0.01) and incongruent reactions (P<0.01) and ambiguous scenarios (P<0.01) among cognitive indicators, anxiety sensitivity (P<0.01), and completion of classes (P<0.01) among the neurological indicators, intolerance of uncertainty (P 0.01) among the emotional indicators and unstable behavior tendencies (P<0.01) and impulsive behavior tendencies (P<0.01) among the behavioral indicators significantly predicted chronic pain.

Conclusion: Emotional factors are more closely correlated to chronic pain than cognitive factors. Also, it can be said that the structure of anxiety sensitivity has a significant association with chronic pain disorders, and clinicians should pay attention to this emotional structure and its multifaceted effects in working with chronic pain patients.

Keywords: chronic pain, cognitive function, neuropsychological assessment.

Introduction

Pain is a phenomenon experienced by every person throughout life. 13 to 47% of adults in the general population report debilitating musculoskeletal pain (Simons & Kaczynski, 2012). In Iran, the total amount of these pains among homemakers has been reported as 53% (Fazli et al., 2016). Psychological approaches are focused on two categories of harmful factors of pain and coping skills of pain in catastrophizing and intensity of pain (Goli, 2024; Sayed Alitabar & Goli, 2023). Identifying these factors and their mechanisms within the context of pain, as outlined in the fear-avoidance model, can be considered a crucial step in developing effective educational packages for treating chronic musculoskeletal pain. One of the harmful variables of pain perception, in the framework of the fear-avoidance model, is neuroticism. The issue in the field of psychological factors and processes is the discussion of chronic pain. Pain sufferers experience other biological, psychological, and social factors in addition to enduring pain, and in addition to that, the emotional capabilities of the person are reduced. Because the person's desire to eliminate these pains often fails in most cases, this ultimately weakens their spirit. Studies have shown that greater pain acceptance is associated with better social, physical, and psychological functioning (Esteve et al., 2007). Der et al. and Wicksel et al. found that the level of acceptance can predict not only the intensity of pain but also the level of pain interference in daily life, as well as the levels of physical and psychological health. The results of some studies indicate that acceptance is a stronger predictor of anxiety and disability compared to some coping strategies (Viane et al., 2004; Wicksell et al., 2009).

Rheumatic diseases are a type of musculoskeletal disease that are considered to be connective tissue disorders and are among the most common causes of people's disability in various aspects of professional, family, and social life (Behzadi & Rahmati, 2016). Considering that psychological issues are mainly seen in people with joint diseases (Lawrence et al., 2008), a wide range of psychosocial problems, such as chronic stress and anxiety, are seen in these people (Cunha et al., 2016). Psychological approaches have identified the factors that contribute to disaster and the intensity of the resulting pain. Concentrating on and identifying these factors and their mechanisms in the experience of pain can help pinpoint the antecedents and psychological factors that influence the experience of physical pain. Since the relationship between chronic pain and psychological signs and symptoms is still not completely clear, it can be said that there is probably a two-way relationship (van Hecke et al., 2013).

At first glance, abnormality in mood and pain-regulating systems in the brain and spinal cord is considered a common mechanism (Gormsen et al., 2010). However, it seems that depression and anxiety can mutually or independently affect the clinical condition resulting from physical pain (Murphy et al., 2012). Anxiety and depression are associated with pain catastrophizing and poor treatment prognosis in chronic pain sufferers (van Hecke et al., 2013). Research shows that about 90% of patients with chronic pain have depression symptoms, and even in 65% of cases, these two problems may co-occur (Bair et al., 2003). On the other hand, about 35% of people with chronic pain have anxiety symptoms (Wilson et al., 2001). These cases indicate that anxiety, depression, and psychological pressures cause a reduction in the descending inhibition, causing a decrease in the threshold of central sensitivity and an increase in pain intensity (Knaster et al., 2012).

In this research, the profile of chronic pain will be explained based on emotional, cognitive, and neuropsychological indicators. There are a few studies in this field on the Iranian population. Therefore, in the current investigation, we addressed the question of whether it is possible to find a model that explains the profile of chronic pain based on psychological, cognitive (including cognitive bias and executive functions), and emotional (uncertainty tolerance and anxiety sensitivity) indicators.

Methods and Materials

Study Design and Participants

The present research was a structural equation correlation study. The study population consisted of all patients with chronic musculoskeletal pain referred to the pain clinic of Mashhad University of Medical Sciences and two private pain clinics (Mehr Afarin and Dr. Mokarram) between 2022 and 2023. Chronic pain was defined as pain lasting more than three months, and it is likely to be associated with tissue impairment. Two

hundred people who met the inclusion criteria were selected for the available sampling. The study included patients aged 18 to 60 years diagnosed with chronic musculoskeletal pain by a specialist without drug addiction, pregnancy, or serious diseases like cancer. Moreover, patients with acute personality and anxiety disorders, such as depression or obsession, and people unwilling to complete the questionnaire were excluded from the study. Demographic information, including age, education, marital status, medical history, drug use, smoking, and physical activity, was collected using a questionnaire. The patients completed the questionnaires after obtaining the consent form and agreeing to participate in the project.

Instruments

Ambiguous scenarios test: This test was created by Berna et al. to measure interpretation bias in depressed people. This scale has 24 ambiguous scenarios. This questionnaire asks the participants to read each scenario and make mental images. After mental imagery, they should rate the pleasantness of each scenario based on a 9-point Likert scale, from 1 (very unpleasant) to 9 (very pleasant). A higher pleasantness score indicates a positive interpretation bias, and a lower score indicates a negative one. According to Berna et al. (2011) research, Cronbach's alpha for this test was 0.82, indicating good internal consistency. In Iran, Nikbakht et al. (2018) reported a reliability of 0.78 for this tool in a sample of students.

Uncertainty Intolerance Scale (UIS): This scale was designed by Friston and colleagues. This test consists of 27 questions about the unacceptability of uncertainty and ambiguity, which often lead to failure, stress, and a lack of ability to act. This test is answered with a five-point Likert scale (never, rarely, sometimes, often, and always), and each option is scored 1, 2, 3, 4, and 5, respectively. Internal consistency (0.91) and a relatively good retest reliability coefficient with an interval of 4 weeks (0.78) have been obtained. The validity coefficient of this test has been reported to be significant and satisfactory (Zinbarg et al., 1997). Alimardani et al. indicated that the UIS had reliability (Cronbach's $\alpha = .81$) and validity in the Iranian samples (Narimani et al., 2015).

Anxiety Susceptibility Scale: The questionnaire consists of 16 items, each with a five-point Likert scale response option. Each item reflects the belief that anxious feelings are experienced unpleasantly and have the potential to lead to a traumatic outcome. Higher scores indicate the degree of experience of fear and anxiety symptoms. The range of scores is between 0 and 64 (Floyd et al., 2005). The structure of this questionnaire consists of three factors: fear of physical concerns (8 items), fear of lack of cognitive control (4 items), and fear of anxiety being observed by others (4 items) (Zinbarg et al., 1997). Examining the psychometric properties of this scale has shown its high internal stability (alpha between 0.80 and 0.90) (Freeston et al., 1994). Its validity in the Iranian sample was calculated based on three internal consistency methods, retesting and classification, and the validity coefficients of 0.93, 0.95, and 0.97 were obtained for the whole scale (Moradi Manesh, 2007).

The Wisconsin Card Sorting Test was developed by Grant and Berg to measure abstract thinking, set shifting, and executive functions. It is one of the most well-known neuropsychological tests, evaluating the functions of the prefrontal lobe, including abstract reasoning, cognitive flexibility, persistence, problem-solving, concept formation, ability to change direction, hypothesis testing, and feedback utilization. Errors measure the strategy of initiating and terminating actions, as well as maintaining attention (Grant & Berg, 1948). The validity of this test in the Iranian population for measuring cognitive deficits after brain injuries has been calculated to be more than 0.86. Also, the reliability of this test has been reported as 0.85 using the retest method (Yazdi-Ravandi et al., 2018).

Stroop color-word test: Ridley Stroop created the Stroop (color-word) test to measure selective attention and cognitive flexibility. It is one of the most important tests researchers use to measure response inhibition. The reliability of this test is reported as 0.88 for the first and second cards and 0.80 for the third and fourth cards (Stroop, 1935). Ghadiri et al. obtained a retest reliability coefficient of 0.6 for the reaction time of the first step and 0.55 for the number of errors. In the second step, these values were calculated as 0.83 and 0.78, respectively, and in the final step, they were reported as 0.97 and 0.79, respectively (Ghadiri et al., 2006).

Chronic Pain Acceptance Questionnaire: Like its original version, the Persian version evaluated chronic pain acceptance in two subscales: commitment to activity (11 items) and satisfaction with pain (9 items). The respondent should indicate their answer on a seven-point Likert scale (ranging from 0 to 6). On this scale, the

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score ranges from 0 to 120, with higher scores indicating greater acceptance of pain. In examining the psychometric properties of the Persian version, Cronbach's alpha coefficient was 0.89, and the retest coefficient was 0.71. Also, convergent validity was confirmed by examining the correlation with pain self-efficacy and divergent validity by calculating the correlation with physical disability, depression, anxiety, pain intensity, and catastrophizing (Buhr & Dugas, 2002).

Data Analysis

Data analysis was performed using SPSS version 16.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). Descriptive statistics were presented by mean (SD) for continuous variables. The reliability statistics method was used to analyze the data. A reliability index test was used to predict Cronbach's alpha. P-values less than 0.05 were considered Significant. Additionally, SmartPLS 3.3. was used to analyze the data via a partial least squares (PLS) approach, which is suitable for variables with non-normal distributions.

Findings and Results

A partial least squares (PLS) approach was employed to analyze the data, given the exploratory nature of the model, the small sample size, and the non-normal distribution of variables. After the assumptions were met, the conceptual model of the research was evaluated using SmartPLS software. Descriptive indices and correlation coefficients of predictor and criterion variables are given in Table 1. The results show that anxiety sensitivity has the highest correlation, and consonant reaction has the lowest correlation with algebraic obsession (-0.72 against -0.34). Cognitive, nervous, and emotional indicators exhibit a negative correlation, while behavioral indicators show a positive and significant correlation with algebraic obsession (P< 0.001).

Table 1

Descriptive indices and correlation coefficients

Variables	Markers	Descriptive indicators		Correlation with the criterion variable	
		Mean	Standard Deviation	Statistics	P-value
Cognitive indicators	Congruent reaction	988.53	9.12	-0.36	0.001
	Incongruent reaction	1011.21	8.12	-0.34	0.001
	Ambiguous scenarios	118.48	4.52	-0.56	0.001
Neurocognitive indicators	Stop moving forward	18.69	3.04	-0.53	0.001
	Completion of floors	7.01	2.55	-0.42	0.001
	Anxiety sensitivity	19.85	3.71	-0.39	0.001
Emotional indicators	Intolerance of uncertainty	91.33	4.81	-0.44	0.001
Behavioral indicators	Unstable behavioral tendencies	5.87	3.55	0.37	0.001
	Impulsive behavior tendencies	10.49	3.19	0.57	0.001
	Chronic pain syndromes	83.25	4.83	-	-

Descriptive findings about the research subjects revealed that, in terms of gender, 51% of the sample members (N = 101) were women, and 49% (N = 89) were men. Standard error was estimated using the bootstrap method and model reproduction with 5000 repetitions. Index reliability, convergent validity, and divergent validity were used to evaluate measurement models. Examining the factor loadings of each reflective indicator on its corresponding structure shows the reliability of the measurement models. Suitable coefficients for this index include values of 0.40 and above. Coefficients higher than 0.70 for Cronbach's alpha and composite reliability (CR) indicate the internal consistency of the constructs. Table 2 shows that all constructs have adequate reliability and convergent validity. Divergent validity has also been achieved for all constructs.

Table 2

Reliability and convergent and divergent validity

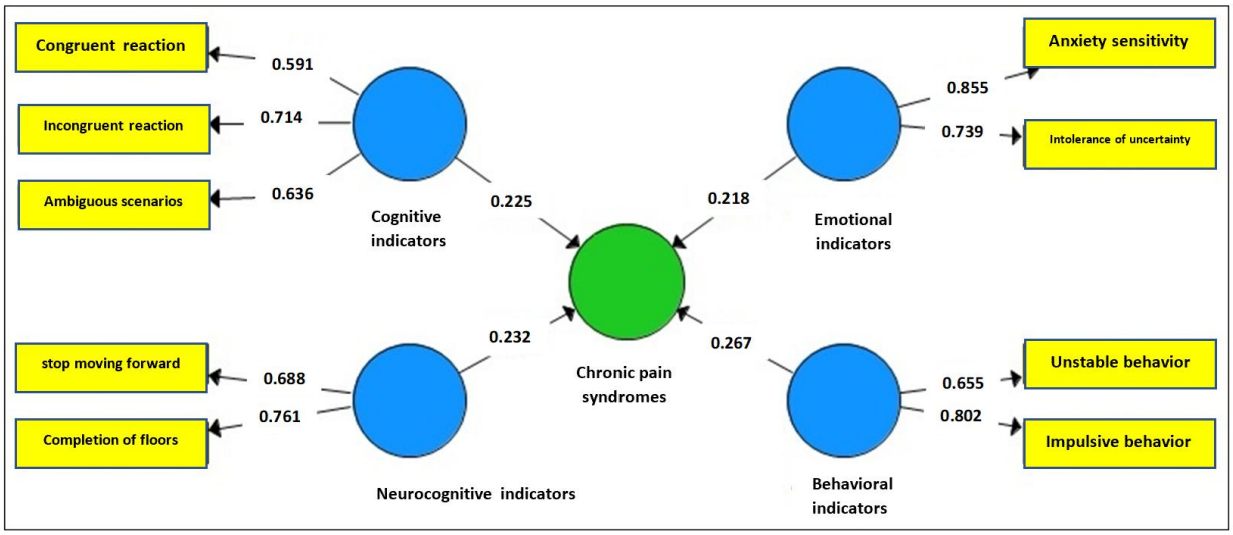
Variables	Reliability						Index reliability	
	Divergent					Convergent		
	1	2	3	4	5	AVE	Cronbach's alpha	CR

Cognitive indicators	0.54					0.34	0.73	0.43
Neurocognitive indicators	0.43	0.64				0.42	0.78	0.55
Emotional indicators	0.61	0.43	0.63			0.38	0.76	0.51
Behavioral indicators	-0.49	-0.45	-0.50	0.58		0.48	0.75	0.67
Chronic pains	-0.57	-0.61	-0.59	-0.68	1	1	1	1

The path and the standardized parameters of the chronic pain prediction model are presented in Figure 1.

Figure 1

Path diagram and standardized coefficients of the chronic pain prediction model



The t coefficients for the factor loadings listed in Figure 1 were also greater than 1.96 and significant (P<0.01). The standardized coefficients in the measurement models show that the discordant reaction has the highest factor loading in the cognitive indicators measurement model. In the model for measuring neurological indicators, completing classes has a higher factor load in the model for measuring emotional indicators and anxiety sensitivity, as well as in the model for measuring behavioral indicators, impulsive behavior tendencies have a higher factor load. The structural standardized coefficients in Figure 1 indicate that behavioral indicators have the highest path coefficient on chronic pain symptoms (β = 0.29). Other results indicate that cognitive, nervous, emotional, and behavioral indicators have a positive and significant effect on chronic pain symptoms (P < 0.01). Importance-performance map analysis (IPMA) was employed to examine the importance of each structure and indicator in predicting chronic pain symptoms. Based on this analysis, structures with high importance and low performance can be identified, allowing for targeted interventions to improve them.

Discussion and Conclusion

This study aimed to evaluate the possibility of developing a model that elucidates the characteristics of chronic pain by considering psychological, cognitive, and emotional elements. The findings obtained from the data analysis showed that the structures evaluated in the multidimensional model had significant paths in explaining chronic pain. Several studies are consistent with our findings (Boswell et al., 2013; Bruin et al., 2020; Pagliaccio et al., 2021; Picó-Pérez et al., 2020; Pujol et al., 2019)).

The findings obtained from the data analysis and the reviewed model indicated that emotional indicators played a significant role in explaining chronic pain. In explaining this finding, it can be said that chronic pain is a complex phenomenon influenced by a variety of factors, including physiological, psychological, and social elements. Emotional indicators play a crucial role in

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understanding and explaining chronic pain due to their significant impact on pain perception and management (Allaz & Cedraschi, 2015). For example, some studies indicated that emotional states trigger physiological responses, including changes in heart rate, blood pressure, muscle tension, and hormonal levels. These physiological changes can directly influence the experience of pain, either by intensifying or dampening it (Vachon-Presseau et al., 2016). Bushnell et al. stated that emotional states and attentional direction can profoundly influence the perception of pain. Multiple brain regions in pain processing are also crucial for emotion and attention. Furthermore, they stated that pain control through emotional modulation is believed to be regulated by a circuit involving the frontoparietal gray matter of the brainstem. This circuit can either increase or decrease the experience of pain depending on the emotion being felt. For instance, when individuals experience empathy for someone else's pain, their pain sensation may increase. Pain can be reduced by attention through distraction, and it is thought that this process relies on insula-parietal-somatosensory corticocortical pathways (Bushnell et al., 2013).

On the other hand, anxiety sensitivity is one of the factors proposed in this field that can help to understand the symptoms of chronic pain as well as improve explanatory models and treatment processes. Anxiety sensitivity is an emotional style that leads to a severe fear of anxiety symptoms (Den Ouden et al., 2020). People sensitive to anxiety symptoms recognize anxiety symptoms as dangerous or catastrophic consequences of problems such as physical and mental illnesses, loss of control, and embarrassment, and usually, the rate and intensity of experiencing such situations are different (Desnoyers & Arpin-Cribbie, 2015). Curtin and Norris showed that ruminative anxiety indicated a positive correlation with pain catastrophizing, pain-related fear and avoidance, pain interference, and pain severity. However, it showed a negative correlation with mindfulness. The study also found that individuals with high levels of ruminative anxiety were more likely to experience chronic pain (Curtin & Norris, 2017). Considering that the theoretical foundations confirm that anxiety sensitivity is a hierarchical and multifaceted structure and includes high-level factors (general anxiety sensitivity) and low-level factors (fear of bodily sensations, fear of losing cognitive control, and fear of social cues), based on this, it can be said that the higher the level of anxiety sensitivity, the higher the severity of chronic pain symptoms in these people (Laposa et al., 2015).

Furthermore, neurological indicators were also significant explanations for chronic pain. In the explanation of this finding, it can also be said that as it has been mentioned about the distress related to attitudes and thoughts related to chronic pains, in chronic pains, more activity has been observed in the prefrontal cortex, the visual communication cortex and the somatosensory area, which indicates the greater involvement of this Brain areas during symptom stimulation indicate dysfunctional emotional processing (Maia et al., 2008). This heightened neural activity reflects altered pain perception and emotional regulation, indicating that chronic pain involves complex interactions between sensory, emotional, and cognitive processes in the brain, contributing to the maintenance and exacerbation of pain symptoms (Crofford, 2015). Salberg et al. conducted a study to investigate the impact of early-life stress on pain sensitivity and emotional function in adolescent rats. The results showed that emotional function led to increased anxiety-like behavior and altered nociceptive responsivity, with adolescent rats exhibiting heightened and prolonged pain-related behavior. Additionally, emotional factors resulted in changes at the molecular level, including increased expression of genes related to stress response, mood regulation, neuroplasticity, and elevated inflammatory markers (Salberg et al., 2020). It has been proven that people with chronic pain disorder have significant differences from normal people in terms of cognitive, emotional, and neuropsychological characteristics, and the profile assumed by the researcher can be considered applicable to these patients. Emphasizing that the reduction and lack of attention in patients with chronic pain disorder can be seen and explained, it is based on the fact that chronic pain is the result of cognitive defects and inefficiency in processing information in these patients, which includes defects in behavioral control.

Also, in explaining the problem of behavioral control in people suffering from chronic pain, it can be said that following the behavioral theory, considering that chronic pain disorder is a kind of response to stimuli that stimulate thoughts of chronic pain, the balance in the

goal-oriented attention system and The attention system of the stimulus is destroyed, and as a result, due to a defect in behavioral control, the patient's performance is impaired in performing behavioral tasks (Turk & Okifuji, 2002).

This study highlights the significant role of emotional factors, particularly anxiety sensitivity, in the experience and management of chronic pain among Iranian patients. Despite its contributions, the research is limited by its small, region-specific sample size and reliance on self-reported measures, which may affect the generalizability and causality of the findings. The study underscores the need for a multidimensional approach to chronic pain that includes psychological and emotional assessments alongside physical evaluations in clinical practice. Future research should focus on these relationships in miscellaneous populations and over time, along with advocating for interdisciplinary treatment strategies to improve chronic pain management.

We conducted a study of chronic pain in a limited group of Iranian patients and found that emotional factors are more closely correlated to chronic pain than cognitive factors. Finally, it can be said that the structure of anxiety sensitivity has a significant association with chronic pain disorders, and clinicians should pay attention to this emotional structure and its multifaceted effects in working with chronic pain patients. Although it seems that examining chronic pain disorder as a multidimensional structure helps to understand the relationship between anxiety sensitivity and this disorder, very few studies have investigated this issue.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

Following the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this study.

References

Allaz, A.-F., & Cedraschi, C. (2015). Emotional aspects of chronic pain. In *Pain, emotion and cognition: A complex nexus.* (pp. 21-34). Springer International Publishing/Springer Nature. https://doi.org/10.1007/978-3-319-12033-1_2

Bair, M. J., Robinson, R. L., Katon, W., & Kroenke, K. (2003). Depression and pain comorbidity: a literature review. *Arch Intern Med*, *163*(20), 2433-2445. https://doi.org/10.1001/archinte.163.20.2433

Behzadi, Z., & Rahmati, S. (2016). A comparison of the prevalence of obsessive beliefs in people with rheumatoid arthritis and healthy people. *Research in Psychological Health*, *10*(1), 44–51. https://rph.khu.ac.ir/article-1-2591-fa.pdf

Berna, C., Lang, T. J., Goodwin, G. M., & Holmes, E. A. (2011). Developing a measure of interpretation bias for depressed mood: An ambiguous scenarios test. *Pers Individ Dif*, *51*(3), 349–354. https://doi.org/10.1016/j.paid.2011.04.005

Boswell, J. F., Farchione, T. J., Sauer-Zavala, S., Murray, H. W., Fortune, M. R., & Barlow, D. H. (2013). Anxiety sensitivity and interoceptive exposure: a transdiagnostic construct and change strategy. *Behav Ther*, *44*(3), 417–431. https://doi.org/10.1016/j.beth.2013.03.006

Bruin, W. B., Taylor, L., Thomas, R. M., Shock, J. P., Zhutovsky, P., Abe, Y., Alonso, P., Ameis, S. H., Anticevic, A., Arnold, P. D., Assogna, F., Benedetti, F., Beucke, J. C., Boedhoe, P. S. W., Bollettini, I., Bose, A., Brem, S., Brennan, B. P., Buitelaar, J. K., . . . van Wingen, G. A. (2020). Structural neuroimaging biomarkers for obsessive-compulsive disorder in the ENIGMA-OCD consortium: medication matters. *Transl Psychiatry*, *10*(1), 342. https://doi.org/10.1038/s41398-020-01013-y

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: psychometric properties of the English version. *Behav Res Ther*, *40*(8), 931-945. https://doi.org/10.1016/s0005-7967(01)00092-4

Bushnell, M. C., Ceko, M., & Low, L. A. (2013). Cognitive and emotional control of pain and its disruption in chronic pain. *Nat Rev Neurosci*, *14*(7), 502–511. https://doi.org/10.1038/nrn3516

Crofford, L. J. (2015). Chronic Pain: Where the Body Meets the Brain. *Trans Am Clin Climatol Assoc*, *126*, 167–183. https://pubmed.ncbi.nlm.nih.gov/26330672/

Cunha, M., Almeida Ribeiro, A., & André, S. (2016). Anxiety, Depression, and Stress in Patients with Rheumatoid Arthritis. *Procedia - Social and Behavioral Sciences*, *217*, 337-343. https://doi.org/10.1016/j.sbspro.2016.02.098

Curtin, K. B., & Norris, D. (2017). The relationship between chronic musculoskeletal pain, anxiety, and mindfulness: Adjustments to the Fear-Avoidance Model of Chronic Pain. *Scandinavian journal of pain*, *17*, 156–166. https://doi.org/10.1016/j.sjpain.2017.08.006

Den Ouden, L., Tiego, J., Lee, R. S. C., Albertella, L., Greenwood, L. M., Fontenelle, L., Yücel, M., & Segrave, R. (2020). The role of Experiential Avoidance in transdiagnostic compulsive behavior: A structural model analysis. *Addict Behav*, *108*, 106464. https://doi.org/10.1016/j.addbeh.2020.106464

Desnoyers, A., & Arpin-Cribbie, C. (2015). Examining cognitive performance: Do perfectionism and rumination matter? *Personality and Individual Differences*, *76*. https://doi.org/10.1016/j.paid.2014.11.050

Esteve, R., Ramírez-Maestre, C., & López-Marínez, A. E. (2007). Adjustment to chronic pain: the role of pain acceptance, coping strategies, and pain-related cognitions. *Ann Behav Med*, *33*(2), 179-188. https://doi.org/10.1007/bf02879899

Fazli, B., Ansari, H., Noorani, M., Jafari, S. M., Sharifpoor, Z., & Ansari, S. (2016). The Prevalence of Musculoskeletal Disorders and its Predictors among Iranians' Housewives. https://www.sid.ir/paper/351393/fa

Floyd, M., Garfield, A., & LaSota, M. T. (2005). Anxiety sensitivity and worry. *Personality and individual differences*, *38*(5), 1223–1229. https://doi.org/10.1016/j.paid.2004.08.005

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences*, *17*(6), 791-802. https://www.sciencedirect.com/science/article/pii/0191886994900485

Ghadiri, F., Jazayeri, A., Ashaeri, H., & Ghazi Tabatabaei, M. (2006). Deficit in Executive Functioning in Patients With Schizo-Obsessive Disorder. *icss*, *8*(3), 11-24. http://icssjournal.ir/article-1-203-en.html

Goli, F. (2024). Beyond Biology: The Personality Underpinnings of Chronic Pain. *Journal of Personality and Psychosomatic Research (JPPR)*, *2*(2), 1–3. https://doi.org/10.61838/kman.jppr.2.2.1

Gormsen, L., Rosenberg, R., Bach, F. W., & Jensen, T. S. (2010). Depression, anxiety, health-related quality of life, and pain in patients with chronic fibromyalgia and neuropathic pain. *Eur J Pain*, *14*(2), 127.e121-128. https://doi.org/10.1016/j.ejpain.2009.03.010

Grant, D. A., & Berg, E. A. (1948). A behavioral analysis of the degree of reinforcement and ease of shifting to new responses in a Weigl-type card-sorting problem. *J Exp Psychol*, *38*(4), 404-411. https://doi.org/10.1037/h0059831

Knaster, P., Karlsson, H., Estlander, A. M., & Kalso, E. (2012). Psychiatric disorders as assessed with SCID in chronic pain patients: the anxiety disorders precede the onset of pain. *Gen Hosp Psychiatry*, *34*(1), 46-52. https://doi.org/10.1016/j.genhosppsych.2011.09.004

Laposa, J. M., Collimore, K. C., Hawley, L. L., & Rector, N. A. (2015). Distress tolerance in OCD and anxiety disorders, and its relationship with anxiety sensitivity and intolerance of uncertainty. *J Anxiety Disord*, *33*, 8–14. https://doi.org/10.1016/j.janxdis.2015.04.003

Lawrence, R. C., Felson, D. T., Helmick, C. G., Arnold, L. M., Choi, H., Deyo, R. A., Gabriel, S., Hirsch, R., Hochberg, M. C., Hunder, G. G., Jordan, J. M., Katz, J. N., Kremers, H. M., & Wolfe, F. (2008). Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum*, *58*(1), 26-35. https://doi.org/10.1002/art.23176

Maia, T. V., Cooney, R. E., & Peterson, B. S. (2008). The neural bases of obsessive-compulsive disorder in children and adults. *Dev Psychopathol*, *20*(4), 1251–1283. https://doi.org/10.1017/s0954579408000606

Moradi Manesh, F., Mirjafari, S. A., Goudarzi, M. A., & Mohammadi, N. (2007). Examining the psychometric properties of the Revised Anxiety Sensitivity Index (ASIR). *Iranian Journal of Psychology*, *4*(44). https://www.sid.ir/paper/436486/fa

Murphy, L. B., Sacks, J. J., Brady, T. J., Hootman, J. M., & Chapman, D. P. (2012). Anxiety and depression among US adults with arthritis: prevalence and correlates. *Arthritis Care Res (Hoboken)*, *64*(7), 968–976. https://doi.org/10.1002/acr.21685

Narimani, M., Almardani-Some'eh, S., Mikaeeli, N., & Basharpoor, S. (2015). The Comparison of Intolerance of Uncertainty, Emotion Regulation, and Marital Satisfaction in OCD-Patients and Normal Individuals. *Journal of Clinical Psychology*, *6*(4), 21–32. https://doi.org/10.22075/jcp.2017.2179

Nikbakht, A., Neshat doost, H. t., & Mehrabi, H. (2018). Effect of Positive Imagery-Based Interpretation Bias Modification, Interpretation Bias Modification Based Self-Generation and Computerized Cognitive-Behaviour Training on Depressed Students. *Clinical Psychology Studies*, *8*(29), 45–67. https://doi.org/10.22054/jcps.2018.8314

Pagliaccio, D., Durham, K., Fitzgerald, K. D., & Marsh, R. (2021). Obsessive-Compulsive Symptoms Among Children in the Adolescent Brain and Cognitive Development Study: Clinical, Cognitive, and Brain Connectivity Correlates. *Biol Psychiatry Cogn Neurosci Neuroimaging*, *6*(4), 399–409. https://doi.org/10.1016/j.bpsc.2020.10.019

Picó-Pérez, M., Moreira, P. S., de Melo Ferreira, V., Radua, J., Mataix-Cols, D., Sousa, N., Soriano-Mas, C., & Morgado, P. (2020). Modality-specific overlaps in brain structure and function in obsessive-compulsive disorder: Multimodal meta-analysis of case-control MRI studies. *Neurosci Biobehav Rev*, *112*, 83-94. https://doi.org/10.1016/j.neubiorev.2020.01.033

Pujol, J., Blanco-Hinojo, L., Maciá, D., Alonso, P., Harrison, B. J., Martínez-Vilavella, G., Deus, J., Menchón, J. M., Cardoner, N., & Soriano-Mas, C. (2019). Mapping Alterations of the Functional Structure of the Cerebral Cortex in Obsessive-Compulsive Disorder. *Cereb Cortex*, *29*(11), 4753-4762. https://doi.org/10.1093/cercor/bhz008

Salberg, S., Noel, M., Burke, N. N., Vinall, J., & Mychasiuk, R. (2020). Utilization of a rodent model to examine the neurological effects of early life adversity on adolescent pain sensitivity. *Developmental Psychobiology*, *62*(3), 386–399. https://doi.org/10.1002/dev.21922

Sayed Alitabar, S. H., & Goli, F. (2023). The Interplay of Neuroticism and Self-Efficacy in Pain Catastrophizing: A Quantitative Analysis. *Journal of Personality and Psychosomatic Research (JPPR)*, *1*(2), 19-24. https://journals.kmanpub.com/index.php/jppr/article/view/2197

Simons, L. E., & Kaczynski, K. J. (2012). The Fear Avoidance model of chronic pain: examination for pediatric application. *J Pain*, *13*(9), 827-835. https://doi.org/10.1016/j.jpain.2012.05.002

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, *18*(6), 643-662. https://doi.org/10.1037/h0054651

Turk, D. C., & Okifuji, A. (2002). Psychological factors in chronic pain: evolution and revolution. *J Consult Clin Psychol*, *70*(3), 678-690. https://doi.org/10.1037//0022-006x.70.3.678

Vachon-Presseau, E., Centeno, M. V., Ren, W., Berger, S. E., Tétreault, P., Ghantous, M., Baria, A., Farmer, M., Baliki, M. N., Schnitzer, T. J., & Apkarian, A. V. (2016). The Emotional Brain as a Predictor and Amplifier of Chronic Pain. *J Dent Res*, *95*(6), 605-612. https://doi.org/10.1177/0022034516638027

van Hecke, O., Torrance, N., & Smith, B. H. (2013). Chronic pain epidemiology and its clinical relevance. *Br J Anaesth*, *111*(1), 13-18. https://doi.org/10.1093/bja/aet123

Viane, I., Crombez, G., Eccleston, C., Devulder, J., & De Corte, W. (2004). Acceptance of the unpleasant reality of chronic pain: effects upon attention to pain and engagement with daily activities. *PAIN*, *112*(3), 282-288. https://doi.org/10.1016/j.pain.2004.09.008

Wicksell, R. K., Melin, L., Lekander, M., & Olsson, G. L. (2009). Evaluating the effectiveness of exposure and acceptance strategies to improve functioning and quality of life in longstanding pediatric pain--a randomized controlled trial. *PAIN*, *141*(3), 248-257. https://doi.org/10.1016/j.pain.2008.11.006

Wilson, K. G., Mikail, S. F., D'Eon, J. L., & Minns, J. E. (2001). Alternative diagnostic criteria for major depressive disorder in patients with chronic pain. *PAIN*, *91*(3), 227-234. https://doi.org/10.1016/s0304-3959(00)00440-1

Yazdi-Ravandi, S., Shamsaei, F., Matinnia, N., Shams, J., Moghimbeigi, A., Ghaleiha, A., & Ahmadpanah, M. (2018). Cognitive Process in Patients With Obsessive-Compulsive Disorder: A Cross-Sectional Analytic Study. *Basic Clin Neurosci*, *9*(6), 448–457. https://doi.org/10.32598/bcn.9.6.448

Zinbarg, R. E., Barlow, D. H., & Brown, T. A. (1997). Hierarchical structure and general factor saturation of the Anxiety Sensitivity Index: Evidence and implications. *Psychological Assessment*, *9*(3), 277–284. https://doi.org/10.1037/1040-3590.9.3.277

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