

## Editorial: The affective aspects of chronic pain and potential treatments

Kaufmann, Dan; Yarns, Brandon C.; Gazerani, Parisa

*Published in:*  
Frontiers in behavioral neuroscience

*DOI (link to publication from Publisher):*  
[10.3389/fnbeh.2023.1209561](https://doi.org/10.3389/fnbeh.2023.1209561)

*Creative Commons License*  
CC BY 4.0

*Publication date:*  
2023

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*  
Kaufmann, D., Yarns, B. C., & Gazerani, P. (2023). Editorial: The affective aspects of chronic pain and potential treatments. *Frontiers in behavioral neuroscience*, 17, Article 1209561.  
<https://doi.org/10.3389/fnbeh.2023.1209561>

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

### Take down policy

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.



## OPEN ACCESS

EDITED AND REVIEWED BY  
Richard G. Hunter,  
University of Massachusetts Boston,  
United States

\*CORRESPONDENCE  
Dan Kaufmann  
✉ dan.kaufmann@pharm.utah.edu

RECEIVED 20 April 2023  
ACCEPTED 25 April 2023  
PUBLISHED 10 May 2023

CITATION  
Kaufmann D, Yarns BC and Gazerani P (2023)  
Editorial: The affective aspects of chronic pain  
and potential treatments.  
*Front. Behav. Neurosci.* 17:1209561.  
doi: 10.3389/fnbeh.2023.1209561

COPYRIGHT  
© 2023 Kaufmann, Yarns and Gazerani. This is  
an open-access article distributed under the  
terms of the [Creative Commons Attribution  
License \(CC BY\)](#). The use, distribution or  
reproduction in other forums is permitted,  
provided the original author(s) and the  
copyright owner(s) are credited and that the  
original publication in this journal is cited, in  
accordance with accepted academic practice.  
No use, distribution or reproduction is  
permitted which does not comply with these  
terms.

# Editorial: The affective aspects of chronic pain and potential treatments

Dan Kaufmann<sup>1\*</sup>, Brandon C. Yarns<sup>2,3</sup> and Parisa Gazerani<sup>4,5</sup>

<sup>1</sup>Department of Neurology, University of Utah, Salt Lake City, UT, United States, <sup>2</sup>Department of Mental Health/Psychiatry, VA Greater Los Angeles Healthcare System, Los Angeles, CA, United States, <sup>3</sup>Department of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles, Los Angeles, CA, United States, <sup>4</sup>Faculty of Health Sciences, Department of Life Sciences and Health, Oslo Metropolitan University, Oslo, Norway, <sup>5</sup>Faculty of Medicine, Department of Health Science and Technology, Aalborg University, Aalborg, Denmark

## KEYWORDS

emotion, biopsychosocial, affect, pain treatment, pain, chronic pain

## Editorial on the Research Topic

### The affective aspects of chronic pain and potential treatments

Chronic pain is a major cause of disability and disease burden globally. Various forms of chronic pain diminish the quality of life of affected individuals, their families, and society (Mills et al., 2019). The pathophysiology of chronic pain has been targeted by various medical interventions, including pharmacological and non-pharmacological strategies (Gatchel et al., 2014; Jensen and Turk, 2014; Edwards et al., 2016). However, these interventions seem often to remain insufficient for treating chronic pain (Jensen and Turk, 2014). An increasing body of evidence indicates a bi-directional relationship between psychosocial factors and chronic pain (Kroenke et al., 2011; Goesling et al., 2018). It has been reported that in half of the cases of depression, a physical pain symptom is present (Katona et al., 2005). Moreover, chronic pain increases the risk of psychological and mood disorders (Bair et al., 2003; Asmundson and Katz, 2009; Edwards et al., 2011; IsHak et al., 2018). This complex co-occurrence has been represented by the biopsychosocial model to emphasize the interaction between physiological, psychological, and social factors in understanding and treating chronic pain (Gatchel et al., 2014). The identification of specific mechanisms underlying interactions between the components of this model has attracted significant attention, for instance, how psychological and social factors influence pain pathways in the brain (Edwards et al., 2016).

This Research Topic ([The affective aspects of chronic pain and potential treatments](#)) focused on the affect dimension of chronic pain and aimed to collect novel research to further expand our understanding of the relationship between affect and chronic pain. Five research studies in this collection provide further evidence on the following topics: 1. The changes in brain regions responsible for cognitive/affective tasks in chronic pain patients compared to controls; 2. The importance of social attitudes/beliefs about pain to patient's coping strategies; 3. Preclinical rodent research evaluating the effects of pain models on affect-related behavioral outputs. We believe these important studies contribute to advancing our understanding of the multidimensional nature of pain. This collection also encourages further research to characterize the mechanisms underlying pain and consequently how to target them.

In their paper, Goldway et al. measured steady-state visually evoked potentials in response to affective distractors during a cognitive attention task in fibromyalgia patients compared to controls. Visual attentional biases have previously been linked with the course

and severity of several affective disorders (Armstrong and Olatunji, 2012), and using similar methodologies, attention processes have been evaluated in pain-related disorders (Chan et al., 2020). Several other studies have indicated that chronic pain patients allocate attention and process information differently than their pain-free counterparts by fixating more on pain-related stimuli than neutral stimuli (Chan et al., 2020). Moreover, attentional bias may explain the links between cognition, affect, and pain; however, the mechanism is still not fully understood (Pincus and Morley, 2001). In their study, Goldway et al. showed that patients with fibromyalgia had sustained attention to negative cues and impaired affective discrimination during cognitive tasks, compared to controls, which also correlated with pain severity. They also showed that fibromyalgia patients had decreased fronto-occipital task connectivity, which correlated with poor sleep. This study raises the hypothesis of evaluating cognitive-affective attention bias as a measure of disease chronification or a means to evaluate treatment efficacy and therefore opens the door to future longitudinal studies. Moreover, whether these brain changes which are seen in fibromyalgia can be seen in other chronic pain conditions is still unknown.

Another study, by Dobos et al. used fMRI in people living with migraine and controls in order to evaluate brain changes in response to an implicit face emotion processing task. The authors found differences between the groups in brain activity in the supplemental motor area (SMA) and in the insula (the hub of affective processing) in response to fearful and happy faces, respectively. They also evaluated brain changes in both groups in response to a 16-week Autogenic Training (AT), which is considered an evidence-based self-regulation and stress reduction method. While migraine frequency was reduced as a result of AT, the authors found that AT also reduced activation in the parabrachial complex in migraineurs, as well as reduced activation of the SMA and increased activation in the insula in response to happy faces. These changes in the migraine group produced by AT suggested normalization of affect processing and increased openness to positive affect. It is well-known that people living with migraine also experience other psychiatric comorbidities such as anxiety and depression, as well as altered processing in psychological domains such as mood (Marino et al., 2010), tiredness (Raggi et al., 2012), and unpleasantness of environmental stimuli (Demarquay et al., 2006). Yet the mechanism of abnormal emotional processing in migraine is still not completely understood. The changes in activity in the emotional processing areas seen after AT in migraine as reported by Dobos et al. further confirm the importance of these areas in migraine pathophysiology.

The biopsychosocial model of pain asserts the importance of psychosocial influence on chronic pain. Several psychosocial factors can contribute to the development, long-term consequences, and treatment outcomes in chronic pain patients (Edwards et al., 2016). In their study, Alinajimi et al. evaluated the relationship between family caregivers' pain-related attitudes and beliefs and the coping strategies used by chronic musculoskeletal pain patients. They found that the emotion regulation of both patients and caregivers mediates this relationship; therefore, providing emotion regulation strategies is an important consideration when treating chronic pain.

Overall, this study identified an important social and interpersonal factor and its influence on pain-related outcomes and highlighted the importance of educating chronic pain patients and their caregivers on emotion regulation and its effects on pain coping.

This Research Topic also included two pre-clinical studies which evaluated behavioral alteration as a result of painful procedures in rodent models. Ririe et al. evaluated the effects of early-life surgery and anesthesia on long-term anxiety, depression, audiovisual attention, and opioid reward behaviors. They found that the occurrence of a painful procedure early in life caused maladaptive behaviors, including increased anxiety, reduced premature responses in an attention task, and greater escalation of heroin intake, which were evaluated long after the procedure was done. Similarly, Nunez-Badinez et al. evaluated the presence of anxiety behaviors in a mouse model of endometriosis. Using the elevated plus maze and the novel environment-induced feeding suppression models, the authors confirmed the presence of anxiety-related behaviors in endometriosis-induced mice. The results of this study provide further evidence of a link between anxiety and endometriosis, which are often comorbid in patients (Facchin et al., 2017; Laganà et al., 2017). Together, these studies further establish the relationship between painful procedures and changes in affective and behavioral measures in pre-clinical models. The specific mechanism which can explain the affective and behavioral changes resulting from painful procedures is not entirely known; therefore, these studies open the door for future mechanistic evaluation of these reported phenotypes.

Overall, this Research Topic provided additional important evidence for the complex relationships between affect and different chronic pain conditions and opens new avenues for future studies to understand specific mechanisms underlying this complex relationship. We would like to thank the authors for their important contributions to this special collection. We also appreciate the support we received from Frontiers for their editorial contributions throughout the process. We hope that this collection will contribute to expanding research in this fascinating field and to the development of novel treatment options for chronic pain.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

## Funding

BY was supported by the U.S. Department of Veterans Affairs (grant number IK2CX001884).

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated

organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

## References

- Armstrong, T., and Olatunji, B. O. (2012). Eye tracking of attention in the affective disorders: a meta-analytic review and synthesis. *Clin. Psychol. Rev.* 32, 704–723. doi: 10.1016/j.cpr.2012.09.004
- Asmundson, G. J., and Katz, J. (2009). Understanding the co-occurrence of anxiety disorders and chronic pain: state-of-the-art. *Depress. Anxiety* 26, 888–901. doi: 10.1002/da.20600
- Bair, M. J., Robinson, R. L., Katon, W., and Kroenke, K. (2003). Depression and pain comorbidity: a literature review. *Arch. Intern. Med.* 163, 2433–2445. doi: 10.1001/archinte.163.20.2433
- Chan, F. H., Suen, H., Jackson, T., Vlaeyen, J. W., and Barry, T. J. (2020). Pain-related attentional processes: a systematic review of eye-tracking research. *Clin. Psychol. Rev.* 80, 101884. doi: 10.1016/j.cpr.2020.101884
- Demarquay, G., Royet, J. P., Giraud, P., Chazot, G., Valade, D., and Ryvlin, P. (2006). Rating of olfactory judgements in migraine patients. *Cephalalgia* 26, 1123–1130. doi: 10.1111/j.1468-2982.2006.01174.x
- Edwards, R. R., Cahalan, C., Mensing, G., Smith, M., and Haythornthwaite, J. A. (2011). Pain, catastrophizing, and depression in the rheumatic diseases. *Nat. Rev. Rheumatol.* 7, 216–224. doi: 10.1038/nrrheum.2011.2
- Edwards, R. R., Dworkin, R. H., Sullivan, M. D., Turk, D. C., and Wasan, A. D. (2016). The role of psychosocial processes in the development and maintenance of chronic pain. *J. Pain* 17(9 Suppl.), T70–92. doi: 10.1016/j.jpain.2016.01.001
- Facchin, F., Barbara, G., Dridi, D., Alberico, D., Buggio, L., Somigliana, E., et al. (2017). Mental health in women with endometriosis: searching for predictors of psychological distress. *Hum. Reprod.* 32, 1855–1861. doi: 10.1093/humrep/dex249
- Gatchel, R. J., McGeary, D. D., McGeary, C. A., and Lippe, B. (2014). Interdisciplinary chronic pain management: past, present, and future. *Am. Psychol.* 69, 119–130. doi: 10.1037/a0035514
- Goesling, J., Lin, L. A., and Clauw, D. J. (2018). Psychiatry and pain management: at the intersection of chronic pain and mental health. *Curr. Psychiatry Rep.* 20, 12. doi: 10.1007/s11920-018-0872-4
- IsHak, W. W., Wen, R. Y., Naghdechi, L., Vanle, B., Dang, J., Knosp, M., et al. (2018). Pain and depression: a systematic review. *Harv. Rev. Psychiatry* 26, 352–363. doi: 10.1097/HRP.0000000000000198
- Jensen, M. P., and Turk, D. C. (2014). Contributions of psychology to the understanding and treatment of people with chronic pain: why it matters to ALL psychologists. *Am. Psychol.* 69, 105–118. doi: 10.1037/a0035641
- Katona, C., Peveler, R., Dowrick, C., Wessely, S., Feinmann, C., Gask, L., et al. (2005). Pain symptoms in depression: definition and clinical significance. *Clin. Med.* 5, 390–395. doi: 10.7861/clinmedicine.5-4-390
- Kroenke, K., Wu, J., Bair, M. J., Krebs, E. E., Damush, T. M., and Tu, W. (2011). Reciprocal relationship between pain and depression: a 12-month longitudinal analysis in primary care. *J. Pain* 12, 964–973. doi: 10.1016/j.jpain.2011.03.003
- Laganà, A. S., La Rosa, V. L., Rapisarda, A. M. C., Valenti, G., Sapia, F., Chiofalo, B., et al. (2017). Anxiety and depression in patients with endometriosis: impact and management challenges. *Int. J. Womens. Health* 9, 323–330. doi: 10.2147/IJWH.S119729
- Marino, E., Fanny, B., Lorenzi, C., Pirovano, A., Franchini, L., Colombo, C., et al. (2010). Genetic bases of comorbidity between mood disorders and migraine: possible role of serotonin transporter gene. *Neurol. Sci.* 31, 387–391. doi: 10.1007/s10072-009-0183-y
- Mills, S. E. E., Nicolson, K. P., and Smith, B. H. (2019). Chronic pain: a review of its epidemiology and associated factors in population-based studies. *Br. J. Anaesth.* 123, e273–e283. doi: 10.1016/j.bja.2019.03.023
- Pincus, T., and Morley, S. (2001). Cognitive-processing bias in chronic pain: a review and integration. *Psychol. Bull.* 127, 599–617. doi: 10.1037/0033-2909.127.5.599
- Raggi, A., Giovannetti, A. M., Quintas, R., D'Amico, D., Cieza, A., Sabariego, C., et al. (2012). A systematic review of the psychosocial difficulties relevant to patients with migraine. *J. Headache Pain* 13, 595–606. doi: 10.1007/s10194-012-0482-1