

Commentary

The overlap of PTSD and chronic pain: a challenge for rehabilitation interventions

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Invited commentary on 'The role of associative learning and fear in the development of chronic pain – A comparison of chronic pain and post-traumatic stress disorder', Sueki et al.

The paper entitled 'The role of associative learning and fear in the development of chronic pain – a comparison of chronic pain and post-traumatic stress disorder'¹ is focused on those neurobiological processes that underlie the associative learning and conditioned responses to fear. Based on the framework of associative learning theory, the authors argued that conditioned fear might be a critical variable in prior experience of pain. As associative learning suggests that persistent pain may be the result of conditioned responses to those events attached to the pain experience, the identification of stimuli that trigger painful responses is of relevance. The starting point of this ample review is that associative learning may be involved in the processing of both post-traumatic stress disorder (PTSD) and pain. The authors conduct a thorough review, paying special attention to the brain activity that takes part in both chronic pain and PTSD, as related to the conditioning of fear responses. As a consequence, maladaptive chronic behaviors are developed in both disorders, and the authors point to the notion that this process might increase their susceptibility. The link between complex regional pain syndrome and PTSD is discussed as an illustration of the clinical implications of associative learning during physical therapy treatment of patients in whom both disorders co-occur. It is a suggestive article taking into account that fear extinction has been suggested as a model for translational behavioral neuroscience² and an opportunity for the development of new treatment options when both conditions overlap.

The high rate of comorbidity between PTSD and chronic pain certainly points to the notion that there may be biological and psychological vulnerabilities that contribute to the development of both conditions. Regarding specific psychological vulnerability, it has been argued that both disorders share a tendency to respond to physical sensations with fear.^{3–5} Fear conditioning is relevant in the context of chronic pain syndromes due to the frequent presence of stress and anxiety disorders in these patients. Further, deficits in inhibitory learning have been proposed in the etiology of anxiety disorders.⁶ In fact, PTSD is beginning to be considered as a learning disorder, and not merely a stress and anxiety problem.⁷ Relatedly, it has been suggested that when exposed to stimuli with a negative valence, individuals with PTSD tend to generalize fear responses to stimuli outside the trauma context.⁸ In line with this, there are results showing overgeneralization of autobiographical memories among subjects with PTSD.⁹ The diminished medial temporal lobe activation and/or reduced hippocampal volume could lead to inappropriate generalization, as a small hippocampus may increase the risk of inappropriate traumatic responses at a later time and place, whereby individuals form inappropriate representations of context.⁸

It must be borne in mind that PTSD is characterized by intrusive memories related to the trauma event that occur with the same intense feeling of fear as experienced in the traumatic situation.¹⁰ This leads to a cycle of retraumatization and fear that results in the avoidance of external and internal stimuli not only related to the traumatic event but also associated with unrelated situations.¹¹ A cyclical fear-avoidance process also occurs with chronic pain, as proposed by the fear-avoidance model of chronic pain,¹² the roots of which arise from the cognitive-behavioral treatment of anxiety disorders. The core of this conceptual framework is how patients interpret pain, pain catastrophizing being a key variable. However, to our knowledge, there are no studies focusing on associative learning and catastrophizing in chronic pain samples, although it seems reasonable to speculate that catastrophizers may be more prone to learn an association between the context and pain from a negative orientation.

Patients with chronic pain and PTSD symptoms have recently been found to report significantly

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greater use of catastrophizing.^{13,14} It is worth noting that pain catastrophizing and emotional numbing have been found to share some common variance.¹⁵ In addition, emotional numbing has been considered a dissociative symptom, functionally similar to avoidance and escape behaviors.¹⁶ Furthermore, pain catastrophizing has been found to predict increased dissociation in response to a painful task,¹⁷ suggesting that a catastrophic evaluation of a stressful event may increase the dissociative response to stress. Importantly, the study by Moseley *et al.*¹⁸ with patients diagnosed with complex regional pain syndrome showed that the mere intention to move increased pain in the affected body part, and that this effect was modulated by catastrophism.

Some findings support the hypothesis that catastrophizing influences pain perception through its effect on affective and attentional responses to pain. Moreover, catastrophizing has shown to be associated with activation in brain areas involved in the evaluative and affective aspects of pain processing.¹⁹ It has been proposed that by engaging in cognitive activity that amplifies pain signals, central neural mechanisms in catastrophizers may become more sensitized. An underlying hypothesis is that early aversive learning experiences as represented by trauma exposition might alter neural structures yielding a chronic hyperalgesic state.²⁰ It is noteworthy that results showed that catastrophizing appeared to be diminished in response to physical therapy,²¹ in particular elements, such as goal setting, support, encouragement, education, positive expectancies and therapist demeanor.²² Nevertheless, the results of the new study by Slepian *et al.*²³ indicated that when catastrophizing is coupled with symptoms of mental health problems, physical therapy is less effective in these patients. In addition, the findings by Smith *et al.*²⁴ demonstrated reductions in pain catastrophizing after post-cervical radiofrequency neurotomy, while no significant changes in post-traumatic stress symptoms were found. Their results are in line with a previous longitudinal study²⁵ demonstrating that in the chronic stage, PTSD symptoms impacted pain, but not vice versa. Taken as a whole, all these results suggest that those patients characterized by a combination of high pain catastrophizing and PTSD symptoms should be referred for psychological intervention.²³

In sum, despite remarkable advances, the nature of the relationship between PTSD and (chronic) pain remains unresolved. The analysis of those variables involved in associative learning is certainly a challenge for researchers, as well as an opportunity for multi-disciplinary collaboration in the design of interventions for chronic pain patients with PTSD symptoms.

Disclaimer Statements

Funding This work was partly supported by a grant from the Spanish Ministry of Economy and Competitiveness (PSI2013-42512-P).

Conflicts of interest This work has not received financial arrangements that may represent a possible conflict of interest.

Ethics approval Not applicable.

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