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DISENTANGLING THE UNDERLYING MECHANISMS OF CHRONIC PAIN:

THE PROTECTIVE ROLE OF POSITIVE BODY IMAGE AND POSITIVE EMBODIMENT

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Abstract

Chronic pain is a complex and distressing health condition affecting a large percentage of the global population, being among the first leading causes of disability worldwide. Recently, a cognitive-behavioral model of chronic pain has been proposed (Sunderaman et al., 2020), in which the role of body image (BI) (e.g., body dissatisfaction) in the experience of pain is highlighted. However, this model neglects the variables involved in positive BI (i.e., body appreciation and body functionality appreciation) and positive embodiment (i.e., trust in the body), which have stood out as protective variables in several psychopathological conditions (e.g., eating disorders). The current study aims at analyzing the effect of positive BI (i.e., functionality appreciation and body appreciation) and positive embodiment (i.e., body trusting) on buffering the interference and intensity of pain, through the mediational role of two well-known maladaptive coping strategies (i.e., catastrophizing and kinesiophobia) in chronic pain. A cross-sectional design was conducted in a sample of 82 Spanish participants suffering from different chronic pain conditions, such as musculoskeletal or neuropathic pain (mean age: 44.11 (9.83); 85.4% women; mean duration of the pain condition (in years): M = 12.5, SD = 9.70). The following variables were measured with self-report questionnaires: body appreciation (BAS, Tylka & Wood-Barcalow, 2015a), body functionality appreciation (FAS, Alleva et al., 2017), trust in the body (MAIA-2, Mehling et al., 2018), pain catastrophizing (PCS, Sullivan et al., 1995), kinesiophobia (TSK, Wobi et al., 2005), pain intensity, and interference of pain (BPI, Tan et al., 2004). Pearson's correlations showed negative, significant associations between all the protective factors, and the non-adaptive coping strategies, as well as intensity and interference of pain. A path analysis performed with lavaan in R showed that only body trust (MAIA-2) was a significant, negative predictor of pain catastrophizing which, in turn, predicted both pain outcomes (intensity and interference of pain). The fit indexes were adequate ($\chi 2$ (6) = 17864.14, p = .009, CFI = .92, SRMR = .08), and the explained variance of intensity and interference of pain were 21.4% and 45.5%, respectively. This study points out the relevant role of positive BI and positive embodiment in shaping the personal experience of chronic pain. Specifically, this study shows that the positive bond and the confidence one has in their body may constitute a protective variable against developing a negative cognitive-affective response to pain -

specifically pain catastrophizing-, and in turn, may impact positively in relevant pain outcomes. However, future studies should replicate these results with longitudinal and experimental designs, in larger samples, and specific chronic pain conditions. These preliminary findings suggest the potential usefulness of mind-body approaches as complementary treatments for managing chronic pain.

Keywords: chronic pain; positive embodiment; positive body image; body trust; catastrophizing; cognitive-behavioral model.

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1. Introduction

This chapter provides the conceptual background of the two central topics of this study: chronic pain and positive body image (BI). Firstly, a general overview and definition of chronic pain will be offered, focusing on the three main models (i.e., biomedical, biopsychosocial and enactive model) and their contribution to a better understanding of this debilitating condition. Secondly, an introduction to BI, with a focus on its positive facet, and the description of the three factors analyzed in the study, namely body appreciation, body functionality appreciation and positive embodiment, will be presented. Lastly, a short paragraph about the current available studies combining positive BI and chronic pain will summarize the contemporary state of the art on the subject.

1.1 Chronic pain

Chronic pain is a condition that impacts significantly our society, representing a high individual, social and economic burden (Blyth & Schneider, 2018; Breivik et al., 2013; Cohen et al., 2021; Fayaz et al., 2016; Jackson et al., 2016). The Centers for Disease Control (CDC) have estimated the prevalence rate of chronic pain comprised between 11% and 40% in the general adult population. Three chronic pain conditions are among the first leading causes of disability worldwide: chronic low back pain (LBP) -which is the one with the highest number of years lived with disability-, followed by headache and neck pain (Buchbinder et al., 2013; Cohen et al., 2021). To date, the financial cost of chronic pain on the American national healthcare system overcomes the combined expenses for heart diseases, cancer and diabetes (Gaskin & Richard, 2012). Similarly, it represents 3-10% of the gross national domestic product in Europe (Breivik et al., 2013). Considering these numbers, it is compelling to achieve a better understanding and develop effective prevention strategies and treatments to improve the individual quality of life, but also to decrease the economic and social pressure of this condition (Cohen et al., 2021).

Pain has always represented a challenge for human beings, as it constitutes a controversial adaptive phenomenon that either preserves the integrity of the body from damage but also provokes undesirable side effects for the individual (Gilam et al., 2020). Evolutionary, pain has a fundamental role of protection and survival, aiming to maintain

the homeostasis of the body, together with other mechanisms such as hunger or thirst. Pain is a strong motivational driver, that compels the individual to act, eliciting a behavioral response in order to be safe (Eccleston, 2018). Hence, this phenomenon can be better conceptualized as "awareness of a need state", rather than a sensation, as it promotes the healing process, more than avoiding harm, directing attention to a specific threatened area of the body (Wall, 1979). In its original function, pain has an important life-preserving role for humans, but problems arise when it is dysregulated and continuous, becoming chronic.

Pain is defined as chronic when it lasts more than 12 weeks. Hence, it is possible to distinguish between an acute (less than 2 weeks) and a subacute phase (from 2 to 12 weeks) when the pain mechanisms are functional to the recovery, and a chronic phase (more than 12 weeks), in which the pain persists becoming dysfunctional (Kent et al., 2017; Nicholas et al., 2019). Thus, when pain is experienced constantly, it can lead to multiple undesirable impacts on everyday routines and it can influence all the domains of human lives (Phelps et al., 2021). The International Association for the Study of Pain (IASP) has proposed an operational and broad definition of pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey, 1979). Some crucial points can be highlighted in this definition. Firstly, the framing includes both, a *sensory and emotional experience*, pointing out the anatomic-related side and an emotional-motivational aspect. Furthermore, this condition is defined as *unpleasant*, stressing the undesirable side of pain, that affects the individual's daily life. Finally, the pivotal aspect of this definition is the *actual or potential damage,* implying that it is not necessary to have noticeable damage to tissues or nerves to experience pain, which is a ground-breaking aspect.

Nowadays, as the understanding of pain is improving and advancing, it is becoming more and more evident that the pain intensity alone cannot represent this multifaced experience. Whereas the severity of pain has always been considered the most relevant predictor of patient's quality of life, another factor is currently deemed relevant, namely pain interference. It is important to shortly depict the difference between these two factors and explain why both of them are crucial when assessing the role of chronic pain in people's life (Jensen, 2012). The *pain intensity* is defined as the magnitude of the experience of pain and it might be a useful diagnostic information, especially when

assessing acute pain, in order to register the variance in the intensity of pain and its progress (Cook et al., 2013). Pain intensity is often connected with pain relief, and it is a relevant factor in managing acute and subacute pain, through the use of analgesic medicaments, to decrease the strength of the nociceptive stimulus. However, as it will be further explained later, nociception is not a primary factor in determining chronic pain. In fact, when pain becomes chronic, there is a shift from the importance of the tissue damage (crucial in the acute phase) to other emotional and psychosocial elements (more relevant in the chronic phase). Therefore, to fully evaluate the impact of pain on the patients' lives, the meaning of pain -and not only its magnitude- is considered in evaluating the role and impact of chronic pain in daily life (Ballantyne & Sullivan, 2015). Thus, the *pain interference* is defined as the influence and the effects that pain has in the individual's everyday life. It has been conceptualized as a 2-facet construct as it has an impact on daily activity (e.g., walking, working) but also on the affective side (e.g., mood, relationships) (Miettinen et al., 2019). On one hand, the impact of daily activity has shown to be more connected with pain intensity, as some of the ordinary activities might be limited by the severity of the pain experience (Hølen et al., 2008). On the other hand, affective interference is associated with catastrophizing and emotional dysregulation (e.g., depression), underlying the importance of the individual's interpretation end emotional response to the experience (Walton et al., 2016). These progresses in conceptualizing chronic pain as an elaborate and multiform phenomenon are improving the understanding and quality of treatments; however, to better comprehend how they have been reached, it is necessary to look back at the evolution of the approaches to chronic pain.

Originally, the experience of pain was mostly approached from a biomedical point of view, which implies stigmatizing and excluding all those patients that did not show signs of physical injury. However, pain is a complex and multifaced experience that involves the whole individual with their physical body, but also their feelings and their connections with the environment. Thus, it cannot be simply reduced to its physical anatomical correlate (Stilwell & Harman, 2019). The biomedical paradigm focused on the component of injury for years, aiming to define a noticeable and measurable dimension of pain. Nevertheless, this approach, essentially medical, disqualified entirely the patient's subjective experience of pain. Unfortunately, pain, and especially chronic

pain, is an idiosyncratic experience, absolutely personal, indescribable objectively, and therefore, often stigmatized (Vlaeyen & Crombez, 2020; Zelaya et al., 2020). Being a multifaced phenomenon that involves different human life aspects, scholars and researchers with different backgrounds have approached it from several viewpoints (Johnson, 2019; Stilwell & Harman, 2019).

Below, different paradigms on pain will be presented. Firstly, the neurological and physical aspects of pain will be summarized, representing the biomedical paradigm as a starting point. Secondly, the psychological and social components will be added, presenting the biopsychosocial paradigm, focusing on Sündermann's model (2020). Lastly, a new proposed model ("5E model") aiming to combine the biopsychosocial paradigm and the environmental influences will be introduced (Stilwell & Harman, 2019).

1.1.1 The biomedical model: central and peripheral anatomical underpinnings of pain

The primary approach to the study of pain has been performed from the neurological and medical points of view. Although today this approach is overcome, these studies have furnished interesting insights into the anatomical processes and physiological pathways that occur in pain. First of all, it is important to clarify the distinction between pain and nociception to avoid misunderstandings and misconceptions (Gilam et al., 2020). *Nociception* is a peripheral, neurophysiological and unconscious process. It involves the transmission -through the sensory system- of the input from the targeted area to prevent the harmful stimulus from producing tissue injury. This is a fast process that happens out of the individual's awareness, representing the first defense mechanism against harm (Gilam et al., 2020). Instead, *pain* is a conscious process that can be, but does not necessarily have to be, the result of nociceptive information. The input can either be from an internal or an external stimulus and it is processed in different brain areas. Therefore, pain is an aware experience and a composite phenomenon that involves the representation of the characteristics of the stimulus (e.g., intensity, sensory and emotional qualities) but also complex behavioral features (e.g., bodily, verbal) (Gilam et al., 2020).

Once clarified the differences between both experiences, the mechanisms underlying pain perception will be described. The central nervous system (CNS) is physiologically informed about the status of the body in the space by three sensory