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Psychological Trauma: Theory, Research, Practice, and Policy

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Posttraumatic Growth and Depreciation in People With Chronic Pain: A Profile Analysis

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Objective: Chronic pain can disrupt everyday life and shatter beliefs about the world. Shattered beliefs may be rebuilt, either positively or negatively, leading to posttraumatic growth (PTG) or posttraumatic depreciation (PTD). According to a transdiagnostic emotion regulation perspective, these phenomena are associated with coping strategies and emotions related to the body, self, others, and the world. Because PTG and PTD can coexist, this study aims to compare different profiles of rebuilt beliefs based on emotions, emotion regulation, and psychopathology. **Method:** People with chronic pain ($N = 1,577$) completed online self-report questionnaires evaluating PTG and PTD, trauma-related emotions, and reactions regarding pain (guilt, shame, mental defeat, injustice, feeling discounted, sensitivity to pain traumatization, sense of body–self unity), difficulties in emotion regulation, coping strategies, and psychopathological symptoms. **Results:** Profiles illustrate four ways to experience potentially traumatic and life-challenging circumstances: no disruption, ambivalence, growth, and distress. Differences were found regarding trauma-related emotions and reactions, levels of comorbid psychopathologies, and emotion regulation. **Conclusions:** Considering trauma as a genuine dimension of chronic pain experience could provide an important framework to better address the resources and trajectories of people with chronic pain.

Clinical Impact Statement

Chronic pain experience can involve a traumatic dimension that shatters the way an individual relates to the self and the world. A person-centered statistical approach of posttraumatic growth and depreciation could give a bigger picture of the subjective experience which may suggest opportunities to personalize treatment. This may be a relevant framework consistent with a transdiagnostic emotion regulation perspective.

Keywords: chronic pain, posttraumatic growth, posttraumatic depreciation, emotion regulation, profile


Supplemental materials: <http://dx.doi.org/10.1037/tra0000969.supp>

Chronic pain, lasting at least three months, affects people all over the world. According to a recent meta-analysis, prevalence rates range from 8.7% to 64.4%, with a pooled mean of 31% (Steingrimsdóttir, Landmark, Macfarlane, & Nielsen, 2017). To

accommodate individual needs of patients living with chronic pain, it is important to understand their experiences (Damsgaard, Norlyk, Jørgensen, & Birkelund, 2016). From a phenomenological perspective, chronic pain can make people feel overwhelmed, ineffective, and powerless (Glas, 2003). Chronic pain disrupts the “taken-for-granted” assumptions and how people think about their life story and themselves (Bury, 1982). People’s core belief system about justice, predictability, or benevolence about the world and self-worth, which provides prior coherence and stability, disintegrates similar to the reaction following exposure to a traumatic event (Janoff-Bulman, 2004). Trauma related to chronic pain is more broadly defined than life-threatening traumatic events as defined in criterion A for posttraumatic stress disorder (PTSD), but a trauma framework fits many of the reactions (American Psychiatric Association, 2013).

When conceptualizing chronic pain as potentially traumatic, a wide range of emotions can arise depending on the types of disruptions patients experience. Patients may perceive their bodies as an unpredictable aggressor or as an “alien” to the self (van

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Rysewyk, 2016). Alienation increases with both functional limitations and pain intensity (Bode, van der Heij, Taal, & van de Laar, 2010). Perceived loss of psychological autonomy influences self-image and humanity. Mental defeat also increases with higher levels of pain (Hazeldine-Baker, Salkovskis, Osborn, & Gauntlett-Gilbert, 2018).

The Impact on Interpersonal Relationships

Adjustment to illness is more difficult when patients feel they are not believed, they experience a lack of compassion or that others do not understand the pain they are experiencing (Nicola, Correia, Ditchburn, & Drummond, 2019). Perceived invalidation decreases psychological well-being and increases physical disability and pain intensity (Kool et al., 2010). These threats to self-image and identity may lead to the development of shame, as people with chronic pain feel that they fail to meet the standards and norms regarding what is appropriate or desirable, which may also increase depressive symptoms and social withdrawal (Broom, Kirby, Adams, & Refshauge, 2015).

Patients with pain often report feeling guilty about the consequences of their pain for themselves and others, and for failing to recover. Pain-related guilt has been associated with greater depression, anxiety, pain intensity and disability (Serbic & Pincus, 2017). Although chronic pain is not typically considered as related to justice, the everyday experience of pain may lead to new justice-related considerations, such as rights, entitlement, blame, fairness, or equity (McParland, Hezsetline, Serpell, Eccleston, & Stenner, 2011). As a result, patients' worldview may be impacted by feelings of injustice associated with greater pain, more severe depressive symptoms, and more disability (Scott, Trost, Bernier, & Sullivan, 2013).

Posttraumatic Growth and Depreciation

Tedeschi and Calhoun (2004) have suggested that severely challenged fundamental assumptions might lead to positive outcomes such as posttraumatic growth (PTG). PTG refers to positive psychological changes and the restructuring of the fundamental components of the assumptive world, experienced as a result of the struggle with highly challenging life circumstances. To date, a few studies have investigated PTG in people with chronic pain. PTG scores have been reported to be weakly but positively associated with illness-related distress and symptoms severity in patients with rheumatoid arthritis and irritable bowel syndrome (Dirik & Karanci, 2008; Purc-Stephenson, 2014). However, inconsistent results regarding the relationship between perceived PTG and self-reported distress have been highlighted. Indeed, while some studies have reported a positive association between both constructs, negative or null associations have also been highlighted (see Jayawickreme & Blackie, 2016, for a literature review). Accordingly, Zoellner and Maercker (2006) have proposed the Janus-Face Model with two ways of conceiving PTG: the constructive aspect related to adjustment, and the illusory, self-deceptive, and self-enhancing component that serves a short-term palliative function. To address this complex relation between PTG and distress, some authors have highlighted that the restructuring of core beliefs can therefore simultaneously lead to negative beliefs (Baker, Kelly, Calhoun, Cann, & Tedeschi, 2008).

Posttraumatic Depreciation (PTD) refers to the negative side of this accommodation. It focuses on the same features as PTG but highlights a negative side of the disruption in relationships with the self and others (Baker et al., 2008). A recent study found moderate to high levels of PTD in a sample of spinal cord injury patients who may experience subsequent pain (Kunz, Joseph, Geyh, & Peter, 2017). PTG was associated with lower depressive symptoms while PTD was associated with poorer psychological adjustment and physical functioning, and more pain.

Transdiagnostic Framework

Furthermore, the effect of PTG and PTD levels on adaptation could be assessed in a transdiagnostic framework. According to this approach, while a somatic pathology activates pain pathways, psychological and social factors contribute to the experience of pain over time (Crowe et al., 2017). The important role of psychological processes is underscored by the way people cope with pain rather than the intensity of pain and is critical in distinguishing between those who are incapacitated and those who are not (Linton, Flink, & Vlaeyen, 2018). Patients with coping skills and strategies, such as acceptance, have lower levels of pain and seem to be most effective in decreasing distress and psychopathological symptoms (Russell & Park, 2018). Beyond frequently associated anxiety and depressive symptoms (e.g., Linton et al., 2018), high comorbidity rates between chronic pain and PTSD after life-threatening traumatic events have been reported (Kind & Otis, 2019).

Mutual maintenance and shared vulnerability models have been proposed to explain the overlap of phenomenological characteristics (e.g., anxiety and hyperarousal, behavioral avoidance, emotional lability) between chronic pain and PTSD (see Beck & Clapp, 2011, for a review). More recently, Kleiman, Clarke, and Katz (2011) have proposed a new transdiagnostic factor called *sensitivity to pain traumatization* for this unique comorbidity between PTSD and chronic pain. They defined it as a tendency to develop somatic, cognitive, emotional, and behavioral responses to pain similar to traumatic reactions (feeling of fear, intrusive cognitions, hyperarousal, emotional avoidance, and numbing related to pain). According to these authors, the construct of sensitivity to pain traumatization is not equivalent to PTSD, although both involve traumatic stress reactions. Considering pain as a potential traumatic stressor itself, sensitivity to pain traumatization is a vulnerability factor for the pain to become chronic and disabling, and for PTSD symptoms to develop following exposure to a life-threatening traumatic event (Katz et al., 2017).

Taken together, combining the phenomenology of chronic pain and a transdiagnostic perspective could be a way to shed light on PTG and PTD patients' report.

Given that PTG and PTD would be independent variables (Barrington & Shakespeare-Finch, 2013; Cann, Calhoun, Tedeschi, & Solomon, 2010), a person-centered statistical approach is relevant to examine the impact of their different associations. A person-centered approach considers the possibility that the sample might include subpopulations characterized by different sets of parameters (Howard & Hoffman, 2018). Based on the relevance of distinguishing two levels of perception of PTG (Wu et al., 2019), one with low levels and one with high levels, we conceptualized four different profiles of PTG and PTD: 1) Low PTG and low PTD; 2)

low PTSD and high PTG; 3) high PTSD, low PTG; and 4) high PTSD and high PTG.

This study aims to investigate the impact of these four profiles on negative feelings experienced in the context of chronic pain. We will compare their use of adaptive and maladaptive emotion regulation strategies and difficulties in emotion regulation while experiencing pain. Mean comparisons of levels of perceived pain, pain interference, anxiety, depressive, and PTSD symptoms will be conducted to assess physical and psychological adjustment within the different groups of people with chronic pain.

To our knowledge, no study has yet been conducted using this person-centered approach based on PTG and PTSD profiles. We hypothesized that the profile characterized by a positive reconfiguration (i.e., low PTSD and high PTG) would have the lowest scores of negative feelings and the highest scores of adaptation. We also hypothesized that the profile characterized by a negative reconfiguration (i.e., low PTG and high PTSD) would have the highest scores of negative feelings and the lowest scores of adaptation.

Method

Participants

French-speaking participants were recruited on social networks using groups and pages dedicated to chronic pain. The study was described to participants as an exploration of the experience of pain (with no reference to trauma). It was explained to potential participants that their participation would remain anonymous and that data would be analyzed for a scientific purpose. No compensation was offered to participate, and inclusion criteria were being 18 and living with a chronic pain condition.

After indicating their willingness to participate, participants were asked to complete several self-report questionnaires. The study followed the ethical guidelines of the Helsinki Declaration and was approved by the Ethics Committee of the University of Toulouse, France (No. 2017–048).

A total of 1,577 participants (mean [*SD*] age = 40.76 [11.84], min = 18, max = 82) completed questionnaires (characteristics of the sample are presented in Table 1 in the online supplemental materials). After reported sociodemographic data and characteristics of their pain, participants were asked about their current mood and their pain-related feelings and reactions. Then, they completed questionnaires focusing on PTG, PTSD, and emotion regulation strategies. To reduce the influence of other events in their answers, they were finally asked about posttraumatic stress disorder symptoms after selecting in a list the most distressing event they have experienced.

Measures

Posttraumatic growth and depreciation. Levels of PTG and PTSD were assessed using the Paired Format Posttraumatic Growth Inventory-42 items (PTG-42; Baker et al., 2008). This self-report questionnaire consists of 21 pairs of items, one evaluating a positive change corresponding to PTG and one evaluating a negative one (i.e., PTSD). Participants had to indicate the frequency, over the past 30 days, of thoughts regarding the described changes on a 6-point Likert-type scale ranging from 0 to 5 (total score: 0 to 105). A high score indicates high levels of PTG and PTSD. Cron-

bach's alphas for the PTG and the PTSD in this sample were .88 and .91, respectively.

Pain. The impact of pain was assessed using the French version of the Brief Pain Inventory (Brasseur, 1997). The mean intensity of pain was reported on a numeric scale from 0 (*no pain*) to 10 (*worse pain ever*). Participants had to rate the impact of pain on several daily activities on seven numeric scales ranging from 0 (*does not bother me at all*) to 10 (*totally bothers me*) with a total score ranging from 0 to 70. A high score indicates an important impact on daily activities. Cronbach's alpha in this sample was .87.

Guilt. The feeling of guilt related to pain was evaluated using the Self-Blame subscale of the French version of the Pain Beliefs and Perception Inventory (Dany, Roussel, Carayon, Blois, & Apostolidis, 2009). Participants had to answer to these three items using a 4-point Likert-type scale ranging from 0 to 3 (total score: 0 to 9). A high score indicates a strong belief in being responsible for pain. Cronbach's alpha in this sample was .78.

Injustice. The feeling of injustice related to pain was evaluated using the French version of the Injustice Experiences Questionnaire (Sullivan et al., 2008), a 12-item self-report questionnaire. Participants had to answer on a 5-point Likert-type scale ranging from 0 to 4 (total score: 0 to 48). A high score indicates an elevated feeling of injustice. Cronbach's alpha in this sample was .89.

Shame. The feeling of shame was evaluated using the Internalized Shame Scale (Cook & Coccimiglio, 2001), a 24-item self-report questionnaire. Participants had to answer on a 5-point Likert-type scale ranging from 0 to 4 (total score: 0 to 96). A high score indicates an elevated feeling of shame. Cronbach's alpha in this sample was .95.

Sensitivity to pain traumatization. The tendency to develop traumatic-like reactions to pain was assessed using the Sensitivity to Pain Traumatization Scale (Katz et al., 2017), a 12-item self-report questionnaire. Participants had to rate on a 5-point Likert-type scale from 0 to 4 (total score: 0 to 48). A high score indicates an elevated sensitivity to pain traumatization. Cronbach's alpha in this sample was .84.

Body-self unity. Feeling of body-self unity was measured using the Body Experience Questionnaire (Bode et al., 2010), a 10-item self-report questionnaire divided into two subscales: alienation and harmony. Participants had to rate on a 4-point Likert-type scale ranging from 1 to 4. A high score on the alienation subscale (total score: 6 to 24) indicates an elevated feeling of disruption while a high score on the harmony subscale (total score: 4 to 16) reflects a feeling of body-self unity. In our sample, Cronbach's alphas for the alienation and harmony subscales in this sample were .85 and .72, respectively.

Mental defeat. The mental defeat was evaluated using the Pain Self Perception Scale (Tang, Salkovskis, & Hanna, 2007), a 24-item self-report questionnaire. Answers are rated on a 5-point Likert-type scale ranging from 0 to 4 (total score: 0 to 96). A high score indicates a disrupted feeling of autonomy and self-integrity. Cronbach's alpha in this sample was .96.

Invalidation. Feeling of invalidation (i.e., feeling of not being recognized) was evaluated using the Illness Invalidation Inventory (Kool et al., 2010), an 8-item self-report questionnaire. Answers are rated on a 5-point Likert-type scale ranging from 1 to 5 (total score: 8 to 40). A high score is an indicator of an elevated feeling of being discredited. Cronbach's alpha in this sample was .84.

Emotion regulation. Usual cognitive strategies aiming at managing emotions were assessed using the French version of the Cognitive Emotion Regulation Questionnaire-short (Garnefski & Kraaij, 2006; Jermann, Van der Linden, d'Acremont, & Zermatten, 2006). Answers on this 18-item self-report questionnaire are rated on a 5-point Likert-type questionnaire (ranging from 1 to 5). Two different types of emotional regulation can be measured. Adaptive emotional regulation (including acceptance, positive reappraisal, planning, positive refocusing, and putting in perspective) was assessed using 10 items. Maladaptive emotional regulation (including self-blame, rumination, catastrophizing, and other-blame) was assessed using 8 items. Cronbach's alphas for the adaptive and maladaptive emotional regulation subscales in this sample were .85 and .80, respectively.

Difficulties in emotion regulation in a flare-up of pain were assessed using the Difficulties in Emotion Regulation Scale, a 29-item self-report questionnaire (DERS; Bardeen, Fergus, Hannan, & Orcutt, 2016; Dan-Glauser & Scherer, 2013). Answers are rated on a 5-point Likert-type questionnaire (from 1 to 5), and five subscales exist: nonacceptance of emotions (DERS-Nonacceptance; 6 items; Cronbach's alpha = .90), difficulties to direct behaviors to goals (DERS-Goals; 5 items; Cronbach's alpha = .88), difficulties to control impulses (DERS-Impulse; 6 items; Cronbach's alpha = .91), limited access to emotional regulation strategies (DERS-Strategies; 6 items; Cronbach's alpha = .85), and lack of identification of emotions (DERS-Identification; 6 items; Cronbach's alpha = .78). Instructions were adapted to focus on difficulties perceived while pain is elevated.

Mental health. Depressive and anxiety symptoms were assessed using the French version of the Hamilton Anxiety and Depression Scale (Lépine, Godchau, Brun, & Lempérière, 1985), a 14-item self-report questionnaire. Answers are rated on a 4-item Likert-type scale ranging from 0 to 3. Two dimensions can be assessed: the anxiety dimension and the depressive one, each containing 7 items (total score: 0 to 21; cut-off at 11). Cronbach's alphas for the depressive and the anxiety subscales in this sample were .82 and .77, respectively.

After identifying the most life-threatening event experienced by participants, PTSD symptoms were assessed using the French version of the PTSD Checklist for *DSM-5* (Ashbaugh, Houle-Johnson, Herbert, El-Hage, & Brunet, 2016). We only take into account responses meeting criterion A for PTSD (i.e., a life-threatening event experienced directly, as a witness or indirect exposure) according to the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* (American Psychiatric Association, 2013). Answers on this 20-item self-report questionnaire are rated on a 5-point Likert-type scale ranging from 0 to 4 (total score: 0 to 80; recommended cut-off at 31). A high score is an indicator of elevated PTSD symptoms. Cronbach's alpha was .93.

Statistical Analyses

To determine participants' assignment to the four profiles tested, PTG and PTD total scores were converted to z-scores and the K-means cluster analysis was used. Discriminant analysis was performed to evaluate the quality of the participants' distribution. Mean scores (not converted to z-scores) of the different groups were then compared for each variable, using a series of one-way

analyses of variance (ANOVAs), Tukey's post hoc tests, and calculations of effect size (eta squared, η^2). These are interpreted as small ($\eta^2 > .01$), medium ($\eta^2 > .06$), or large ($\eta^2 > .14$) effects (Kirk, 1996). Tested variables were total scores of PTG, PTD, intensity and impact of pain, feelings and reactions to pain, difficulties and types of emotional regulation, and psychopathological variables.

Results

The four-cluster classification (see Figure 1 in the online supplemental materials) demonstrated clear discrimination between groups (Wilks's $\lambda = .09$, $p < .01$), with 93.8% of participants correctly classified. Given the lack of consensus regarding cut-off scores for PTG and PTD (Wu et al., 2019), an ad hoc approach was used to characterize the levels of self-reported PTG and PTD. Median scores distinguished low and high levels of perception. Values lower than the first quartiles were considered as very low, and those higher than the third quartiles as very high. Thus, regarding PTG, scores for very low levels were below 29, those for low levels were between 29 and 42, those for moderate levels were between 42 and 53, and those for high levels were higher than 53. For PTD, very low levels were below 26, low levels were 26 to 45, moderate levels were 45 to 59, and high levels were higher than 59.

Based on this distinction, the first group (22.0% of our sample, $n = 347$) was characterized by very low levels of self-reported PTG and PTD. Given that such perception highlights a disruption of core beliefs, this group was labeled *nondisrupted cluster*. As the second group (17.3% of our sample, $n = 273$) was characterized by a high perception of PTG and a very low perception of PTD, it was labeled *growing cluster*. The third group (39.1% of our sample, $n = 617$), characterized by a moderated perception of both PTG and PTD, was labeled *ambivalent cluster*. The fourth group (21.6% of our sample, $n = 340$), characterized by an elevated perception of PTD and a low perception of PTG, was labeled *distressed cluster*.

Regarding mean scores for self-perception of PTG, results of ANOVAs and Tukey's post hoc tests (see Table 2 in the online supplemental materials) showed significant differences ($p < .01$, $\eta^2 = .67$) between groups except for the nondisrupted cluster and the distressed cluster (ascending order: distressed cluster < nondisrupted cluster < ambivalent cluster < growing cluster). Regarding mean scores of PTD, significant differences were found ($p < .01$, $\eta^2 = .92$) among the four groups (ascending order: nondisrupted cluster < growing cluster < ambivalent cluster < distressed cluster). The same ascending order was found for the mean impact and intensity of pain, and for each feeling and reaction to pain except for the feeling of harmony. Likewise, this order was found for each difficulty regarding emotional regulation (except for the emotional identification), for the maladaptive emotional regulation, and for anxiety, depressive, and PTSD symptoms.

Regarding the mean intensity of daily experienced pain, while no significant difference was found between the distressed cluster and the ambivalent cluster ($p > .05$), significant differences were found between groups ($p < .01$). Significant differences were found among groups regarding scores of impact of pain on daily activities ($p < .01$), feeling of injustice ($p < .01$), mental defeat ($p < .01$), body-self alienation ($p < .01$), and sensitivity to pain traumatization ($p < .01$). Except for the nondisrupted cluster and

the growing cluster ($p > .05$), the mean scores of the feeling of invalidation were significantly different between groups ($p < .01$). The mean scores of the feeling of shame were significantly different at $p < .01$ for each group except for the nondisrupted cluster and the growing cluster, which were significantly different at $p < .05$. Regarding mean scores of guilt, the difference between the nondisrupted cluster and the growing cluster was not significant ($p > .05$), whereas others were significant at $p < .01$ for each comparison except for the ambivalent cluster and distressed cluster, which significantly differed at $p < .05$. Regarding mean scores of the feeling of body-self harmony, significant differences were found among groups at $p < .01$, except for the nondisrupted cluster and the ambivalent cluster ($p > .05$), with ascending order as follows: distressed cluster < ambivalent cluster < nondisrupted cluster < growing cluster.

Regarding emotional regulation difficulties, mean scores on the DERS-Goal subscale were significantly different among groups ($p < .01$). Mean scores on the DERS-Impulse subscale were significantly different at $p < .01$ among groups except for the nondisrupted cluster and the growing cluster, which significantly differed at $p < .05$. Regarding mean scores on the DERS-Strategies, the DERS-Nonacceptance, and the DERS-Identification subscales, mean scores were significantly different among groups at $p < .01$, except for the nondisrupted cluster and the growing cluster ($p > .05$). Except for the nondisrupted cluster and the ambivalent cluster ($p > .05$), mean scores of adaptive strategies were significantly different among groups ($p < .01$), with ascending order as follows: distressed cluster < nondisrupted cluster < ambivalent cluster < growing cluster.

Regarding mean scores on scales assessing psychopathological symptoms, mean scores of anxiety and depressive symptoms were significantly different among groups ($p < .01$), except for the nondisrupted cluster and growing cluster ($p > .05$). Among participants who experienced a life-threatening event meeting criterion A for PTSD according to the *DSM-5*, mean scores of PTSD symptoms were significantly different among groups at $p < .01$, except for the nondisrupted cluster and growing cluster, which differed at $p < .05$.

Except for guilt ($\eta^2 = .03$), effect sizes of one-way ANOVAs were large, or close to large, for most of pain-related emotions and reactions variables: mental defeat ($\eta^2 = .29$), shame ($\eta^2 = .27$), perceived injustice ($\eta^2 = .24$), body self-alienation ($\eta^2 = .23$), sensitivity to pain traumatization ($\eta^2 = .15$), perceived invalidation ($\eta^2 = .13$), and body-self harmony ($\eta^2 = .13$). Effect sizes were medium for pain intensity ($\eta^2 = .06$), and large for pain interference ($\eta^2 = .20$). Concerning emotion regulation variables, effect sizes were mostly large: DERS-Strategies ($\eta^2 = .25$), DERS-Nonacceptance ($\eta^2 = .22$), DERS-Goals ($\eta^2 = .19$), DERS-Impulse ($\eta^2 = .14$), DERS-Identification ($\eta^2 = .09$), maladaptive regulation ($\eta^2 = .16$), and adaptive regulation ($\eta^2 = .11$). Finally, effect sizes were large for psychopathology variables: anxiety symptoms ($\eta^2 = .15$), depressive symptoms ($\eta^2 = .31$), and PTSD symptoms ($\eta^2 = .15$).

Discussion

The examination of four groups based on self-perceptions of PTG and PTD allows to identify distinct patterns of adjustment to chronic pain. In the first group, the nondisrupted cluster, the very

low frequency of self-reported PTG and PTD suggests a lack of change in core beliefs. The second group, the growing cluster, is characterized by a high level of self-reported PTG, suggesting an active process of positive reconstruction. The third group, the ambivalent cluster, reported moderate levels of self-reported PTG and PTD. Considering the elevated self-reported PTD and the low level of perceived PTG, the fourth group was labeled the distressed cluster.

Our study emphasizes the impact of the type of posttraumatic reconstruction on negative emotions developed following stress related to chronic pain, and the difficulty to develop appropriate emotional regulation strategies. By focusing the attention on self-evaluations, emotional experiences elicited by pain may be increased (van Rysewyk, 2016). The disruption of the I-self relationship, in its interaction with the world, is then more likely to occur (Glas, 2003) and to induce a breakdown in the capacity to regulate internal states. This particular collapse of the self-regulating protective system has been defined as the core of a traumatic experience even though the "life-threatening" criterion is not met (Krupnik, 2019). As Guina et al. (2017) argued, trauma is a normal reaction to an aversive experience that negatively changes the perception about the self and/or the world. They emphasized the impact of trauma in a dimensional way rather than the event's details (i.e., regardless of criterion A for PTSD). According to these authors, posttraumatic reactions should be seen as one of the possible outcomes across conditions to capture the full spectrum of trauma-related psychopathology.

Among our study variables, the level of sensitivity to pain traumatization manifests the propensity to develop responses to pain similar to PTSD symptoms. Hence, while pain does not meet criterion A (i.e., exposure to a life-threatening event) for PTSD according to the *DSM-5*, pain itself is viewed as a potential traumatic stressor. Moreover, Katz et al. (2017) identified sensitivity to pain traumatization as a vulnerability factor to both pain chronicity and PTSD. In line with Guina et al. (2017), paying attention to the traumatic dimension of pain experience could inform the course of pain-related symptoms and comorbidities.

Our results showed that levels of sensitivity to pain traumatization and PTSD symptoms are consistently the highest for the distressed cluster and the lowest for the nondisrupted group. It is noteworthy that the ambivalent and the growing cluster reported higher levels of sensitivity to pain traumatization compared to the nondisrupted cluster. The perception of PTG would not reflect an absence of pain traumatization responses compared to those who did not engage in a restructuring process. Nevertheless, according to a self-enhancement perspective, PTG would reflect a reappraisal of the situation to reduce the individual's sense of threat without eliminating it (Jayawickreme & Blackie, 2016).

In line with Krupnik (2019), difficulties in emotion regulation due to pain flare-ups and maladaptive coping strategies are higher in all subdimensions for the distressed and the ambivalent clusters, in which levels of PTD are moderate to high. Interestingly, when compared to the nondisrupted cluster, participants in the growing cluster reported not only higher levels of adaptive regulation strategies but also higher levels of maladaptive strategies, more difficulties in engaging in goal-directed behaviors, and more impulse control difficulties. This could be a manifestation of the paradoxical nature of PTG in the growing cluster: on the one hand,

positive outcomes stemming from active struggle distress (Tedeschi & Calhoun, 2004), and on the other hand, significant distress.

Along with these aforementioned results, levels of pain intensity, interference in daily life, anxiety and depressive symptoms, and negative pain-related feelings showed the same ascending order among clusters. All mean score differences were significant except between the nondistressed and growing clusters, for levels of guilt, illness invalidation, and anxiety and depressive symptoms. The lowest levels were reported by the nondistressed cluster, followed by the growing cluster, then the ambivalent one, and finally the distressed cluster. For each group, similar patterns were found for dysfunctional emotion regulation strategies, pain intensity, disability, and negative feelings. This is in line with prior studies, based on the transdiagnostic approach, in which higher levels of difficulties in emotional regulation and maladaptive strategies were shown to be associated with higher levels of pain, disability, and both anxiety and depressive symptoms, as well as negative feelings (Koechlin, Coakley, Schechter, Werner, & Kossowsky, 2018; Linton et al., 2018).

These profiles also seem to be relevant for differentiating several feelings that might be considered as highlighting a posttraumatic experience: feelings of shame, guilt, injustice, lack of recognition, and mental defeat (Maercker, & Horn, 2013). Among the feelings, as found for the growing cluster, low levels of shame and guilt might have adaptive social value and could lead to PTG perception (Dekel, Mamon, Solomon, Lanman, & Dishy, 2016; Willie et al., 2016). While experiencing one of these emotions does not allow to postulate the existence of a traumatic experience related to chronic pain, the consistency of our findings within the different groups supports the idea that the experience of chronic pain may involve a traumatic component. Finally, growing participants reported the highest level of body–self harmony. Such finding highlights a nuanced understanding of PTG: being aware of a positive development despite residual distress (Tedeschi & Calhoun, 2004).

Summary

Our person-centered statistical approach, based on perceived levels of PTG and PTSD, could add additional knowledge to prior studies reporting either positive, negative, or null association between perceived PTG and both distress and emotion regulation (Dirik & Karanci, 2008; Jayawickreme & Blackie, 2016; Pat-Horenczyk et al., 2015). Our analyses allowed us to discriminate participants similarly reporting low levels of PTG but related to different clinical features, that is, nondistressed and distressed participants. Notwithstanding the absence of validated cut-off scores for pain-related feelings scores, scores of anxiety, depressive, and posttraumatic stress disorder symptoms are under recommended cut-offs for the nondistressed cluster and growing cluster participants, and above for the distressed cluster. Moreover, the best indicators of adjustment were not reported by the growing participants, with high PTG, but by the nondistressed participants, with both low PTG and PTSD. According to Kleim and Ehlers's proposal (2009), the growing participants would have enough emotion regulation skills to face their situation and engage optimal PTG process, while nondistressed participants would not feel enough vulnerability to induce a restructuring of fundamental assumptions.

Individuals in the distressed group would not have sufficient emotion regulation skills to handle their situation and rather attribute excessively negative meaning to the experience of pain, which can lead to a negative “over-correction” of core beliefs (Baker et al., 2008; Joseph, Murphy, & Regel, 2012). Our results are in line with recent findings showing an association between a strong perception of PTSD and a high level of pain intensity and interference, as well as poor indicators of mental health (Barrington & Shakespeare-Finch, 2013; Kunz et al., 2017).

Limitations

Despite interesting findings focusing on the subjective traumatic experience of chronic pain, our study has some limitations. Given the cross-sectional study design, we cannot determine causation. Moreover, as recruitment was made using the Internet, a lack of representativeness remains. Participants seeking social support and/or information about atypical or medically unexplained symptoms might be overrepresented (Lacourt, Houtveen, & van Doornen, 2013). However, it is plausible that this selection bias is small, as the type of recruitment has been shown to have little impact on prevalence estimates in epidemiological surveys (Steingrimsdóttir et al., 2017). While participants' diagnoses are not confirmable, we can hypothesize that the relation to pain is not more related to physiological variables than psycho-sociological processes (Linton et al., 2018). Among these processes, we measured invalidation without making distinctions of its sources (family, friends, coworkers, and health care professionals). Further investigation is required to explore whether or not these sources may impact PTG or other study variables.

While it is well-known that women report more chronic pain than men (van Hecke, Torrance, & Smith, 2013), the high proportion of women in our sample also limits the generalization of these results. Even though this gender bias is common in studies using an Internet recruitment process, it has been reported to reduce the desirability bias (Kesse-Guyot et al., 2016). Moreover, compared with recruitment in health care facilities, this method allows to recruit participants who, because of isolation or feeling of shame, do not seek treatment (Baltar & Brunet, 2012). Finally, even if we purposefully asked participants about other events at the end of the online questionnaire, we cannot exclude a possible effect of the order chosen for others questionnaires.

Despite these limitations, our study suggests a framework to understand feelings and reactions related to chronic pain. Future research should take into account the subjective experience of pain and the transdiagnostic processes of emotional regulation. This could contribute to better communication with health professionals by integrating the existential aspects of the patient experience and responding to their request to be understood (Damsgaard et al., 2016). In addition, the transdiagnostic approach might allow to treat pain-related difficulties and their impact on mental health without treatments considered as psychiatric, and then, reduce the risk of stigmatization (Kohrt, Griffith, & Patel, 2018). Finally, the notion of a traumatic subjective experience of chronic pain could allow the development of narrative therapies in this particular context (Eccleston, 2018). Indeed, according to Park (2010), reestablishing a sense of meaningfulness could enhance patients' ability to cope with their illness. To support patients in the development of adaptive coping strategies, a better understanding of the

traumatic impact of pain as a loss of meaning and a threat to the integrity of identity is needed.

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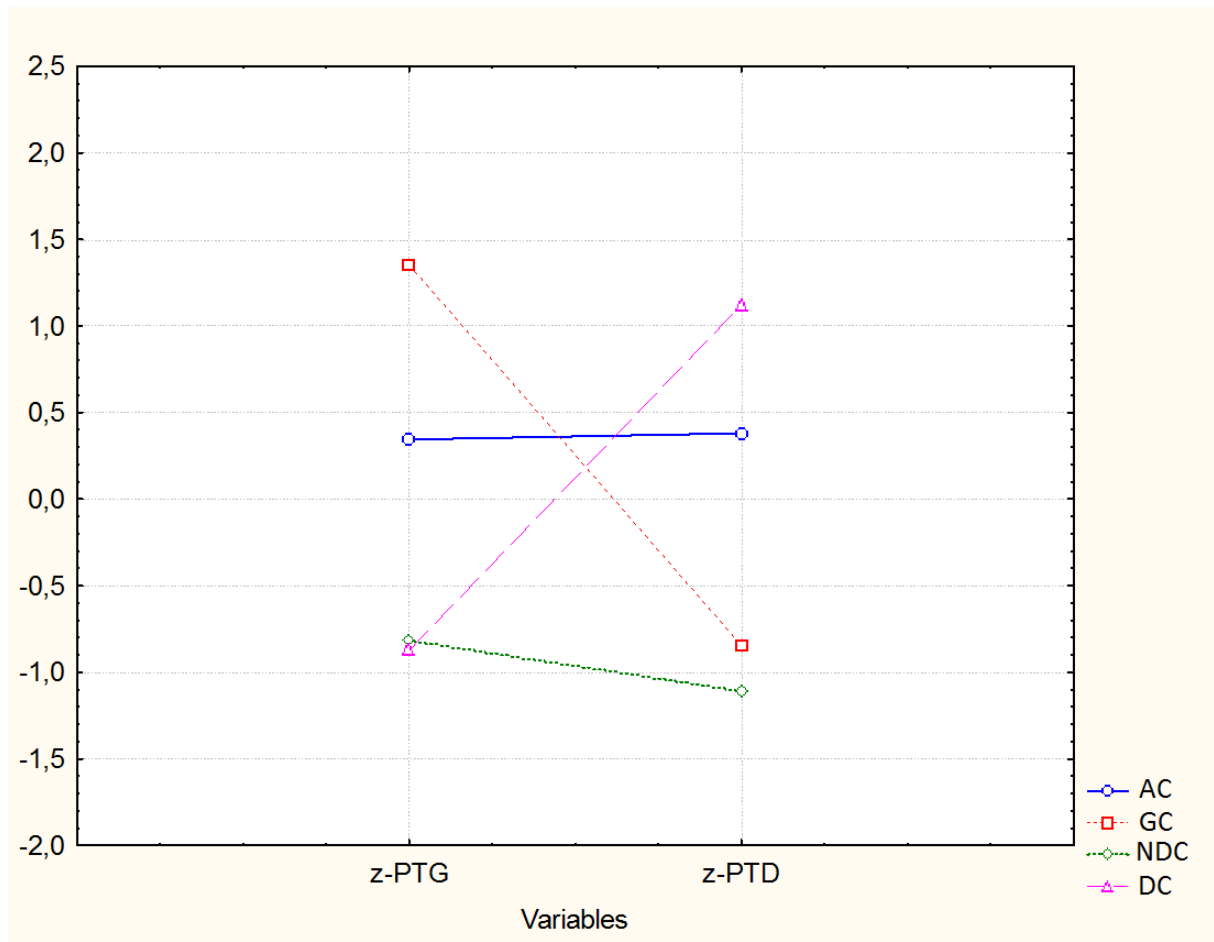


Figure 1. Four-cluster solution based on posttraumatic growth and posttraumatic depreciation levels converted to z-scores. Posttraumatic growth (PTG) and posttraumatic depreciation (PTD) were assessed using the Paired-Format Posttraumatic Growth Inventory-42 items (PTGI-42). NDC: nondisrupted cluster; GC: growing cluster; AC: ambivalent cluster; DC: distressed cluster.

Table 1

Socio-Demographic and Health Characteristics of Study Sample

Variable	<i>n</i>	%
Women	1,438	91.65
Personal status		
Single	335	21.69
Cohabitation	297	19.23
Married or in a civil partnership	653	42.29
Separated or divorced couple	208	13.47
Professional activity		
Full-time job	601	39.30
Part-time job	291	19.03
Diagnosis status		
Unexplained pain	309	19.59
Fibromyalgia	298	18.89
Ankylosing spondylitis	132	8.37
Ehlers-Danlos syndrome	124	7.86
Osteoarthritis	74	4.69
Inflammatory bowel disease	57	3.61
Rheumatoid arthritis	53	3.36
Complex regional pain syndrome	51	3.23
Pain-killers use		
None	316	20.03
Acetaminophen (paracetamol)	661	41.91
Nonsteroidal anti-inflammatory drugs	477	30.24
Opioid drugs	311	19.72
Ongoing psychological care	307	20.31

Note. *N* = 1,577.

Table 2

Means, Standard Deviations, One-Way ANOVAs, and Effect Sizes (η^2) of Study Measures by Cluster

Variable	Nondisrupted cluster <i>n</i> = 347 (22.0%)		Growing cluster <i>n</i> = 273 (17.3%)		Ambivalent cluster <i>n</i> = 617 (39.1%)		Distressed cluster <i>n</i> = 340 (21.6%)		<i>F</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Posttraumatic growth	27.05 ^{a**b**c}	12.8	66.31 ^{a**e**f**}	12.12	48.09 ^{b**e**g**}	8.49	26.11 ^{df**g**}	8.62	1095.68 ^{**}	.67
Posttraumatic depreciation	18.38 ^{a**}	11.78	24.18 ^{a**}	12.57	51.13 ^{a**}	10.19	67.43 ^{a**}	12.96	1361.05 ^{**}	.72
Injustice	20.72 ^{a**}	11.49	26.20 ^{a**}	10.62	31.97 ^{a**}	8.25	35.26 ^{a**}	7.99	167.09 ^{**}	.24
Mental defeat	31.72 ^{a**}	23.8	44.64 ^{a**}	24.61	60.31 ^{a**}	19.73	69.41 ^{a**}	20.27	212.95 ^{**}	.29
Guilt	1.57 ^{ac**d**}	2.08	1.67 ^{be**f**}	2.04	2.15 ^{c**e**g*}	1.98	2.53 ^{d** f**g*}	2.42	15.18 ^{**}	.03
Illness invalidation	20.92 ^{ac**d**}	7.21	21.49 ^{be**f**}	7.28	25.66 ^{c**e**g**}	6.77	27.76 ^{d** f**g**}	6.56	78.89 ^{**}	.13
Internalized shame	31.11 ^{a*b**c**}	19.44	34.99 ^{a*d**e**}	19.18	50.07 ^{b**d**f**}	17.07	60.82 ^{c**e**f**}	18.62	193.23 ^{**}	.27
Body-self alienation	14.57 ^{a**}	4.47	16.30 ^{a**}	4.35	18.59 ^{a**}	3.41	20.40 ^{a**}	3.14	160.16 ^{**}	.23
Body-self harmony	11.52 ^{a**bd**}	2.37	12.97 ^{a**e**f**}	2.04	11.45 ^{ce**g**}	2.09	9.78 ^{d**f**g**}	2.50	76.41 ^{**}	.13
Sensitivity to pain traumatization	17.38 ^{a**}	8.6	21.62 ^{a**}	9.57	25.68 ^{a**}	8.37	27.57 ^{a**}	9.61	94.37 ^{**}	.15
Pain intensity	4.40 ^{a**b**c**}	1.94	4.93 ^{a**d**e**}	1.94	5.48 ^{b**d**f}	1.80	5.62 ^{c**e**g}	1.84	33.31 ^{**}	.06
Pain interference	30.35 ^{a**}	15.36	36.19 ^{a**}	14.11	44.48 ^{a**}	12.36	48.15 ^{a**}	12.19	131.74 ^{**}	.20

Note. Means sharing the same superscript are significantly different from each other.

** $p < .01$. * $p < .05$.

Table 2 (continued)

Variable	Nondisrupted cluster		Growing cluster		Ambivalent cluster		Distressed cluster		F	η^2
	M	SD	M	SD	M	SD	M	SD		
Emotion regulation variables										
DERS-Identification	12.16 ^{ac**d**}	4.61	12.09 ^{be**f**}	4.56	14.07 ^{c**e**g**}	4.79	16.09 ^{d**f**g**}	5.22	51.12**	.09
DERS-Impulse	9.69 ^{a*b**c**}	4.76	11.22 ^{a*d**e**}	5.61	14.05 ^{b**d**f**}	5.93	16.66 ^{c**e**f**}	7.05	87.98**	.14
DERS-Nonacceptance	12.60 ^{ac**d**}	6.39	13.54 ^{be**f**}	6.47	18.24 ^{c**e**g**}	6.3	21.80 ^{d**f**g**}	6.67	151.08**	.22
DERS-Goals	12.21 ^{a**}	5.08	13.65 ^{a**}	5.46	16.43 ^{a**}	4.75	18.83 ^{a**}	4.34	125.42**	.19
DERS-Strategies	14.07 ^{ac**d**}	5.19	14.39 ^{be**f**}	5.65	18.51 ^{c**e**g**}	5.26	22.22 ^{d**f**g**}	5.22	176.32**	.25
Maladaptive regulation	14.68 ^{a**}	5.22	17.05 ^{a**}	6.16	18.90 ^{a**}	5.95	20.64 ^{a**}	6.12	67.08**	.16
Adaptive regulation	30.21 ^{a**bd**}	8.29	36.04 ^{a**e**f**}	7.59	30.45 ^{ce**g**}	7.42	25.47 ^{d**f**g**}	7.00	98.54**	.11
Psychopathology										
Anxiety symptoms	8.58 ^{ac**d**}	3.50	9.31 ^{be**f**}	4.13	11.57 ^{c**e**g**}	3.77	12.8 ^{d**f**g**}	3.87	92.60**	.15
Depressive symptoms	6.08 ^{ac**d**}	3.45	6.36 ^{be**f**}	3.59	9.64 ^{c**e**g**}	3.47	12.50 ^{d**f**g**}	3.89	240.73**	.31
PTSD symptoms (n = 1281)	21.47 ^{a*b**c**} (n = 284)	16.53	26.14 ^{a*d**e**} (n = 225)	16.3	36.11 ^{b**d**f**} (n = 500)	16.46	40.31 ^{c**e**f**} (n = 272)	17.96	78.60**	.15

Note. Means sharing the same superscript are significantly different from each other. DERS: Difficulties in Emotion Regulation Scale; PTSD: posttraumatic stress disorder.

** $p < .01$. * $p < .05$.