Painful memories: Challenges in trauma-focused therapy for torture survivors with PTSD and chronic pain – a narrative review

Iselin Dibaj, Cand.psychol.[1], Joar Øveraas Halvorsen, Cand.psychol., PhD[2], Leif Edward Ottesen Kennair, Cand.psychol., PhD[3], Håkon Inge Stenmark, Cand. psychol. PhD[4]

Key points of interest

- PTSD and chronic pain share mutually maintaining factors and are common in survivors of torture.
- Pain-related avoidance, kinesiophobia and pain catastrophization might mediate the relationship between PTSD and chronic pain but are not directly targeted in trauma-focused therapy. These mutually maintaining factors might function as moderating variables in trauma-focused treatment, in addition to contextual factors.

Abstract

Introduction: PTSD and chronic pain are disorders that researchers increasingly acknowledge to be risk factors that overlap and their comorbidity is associated with poorer treatment outcomes. This review focuses on torture survivors due to the high prevalence of comorbidity in this group, as well as how PTSD and chronic pain might develop, interact and mutually maintain each other.

Methods: A narrative review of empirical studies and theoretical models regarding chronic pain and PTSD in torture survivors, informed by studies conducted in other contexts.

Results and discussion: An overview of PTSD and chronic pain studies of torture survivors is presented. Treatment studies for torture survivors with PTSD are scarce and have been discouraging. Studies in other patient populations and theoretical models of maintaining factors within the cognitive-behavioral paradigm are presented, and focused around how interactions between PTSD and chronic pain might mitigate treatment of both disorders. Mutually maintaining factors between chronic pain and PTSD are presented as potential barriers to healing, and clinical implications involve suggestions for clinicians with intention to overcome these barriers in trauma-focused treatment of torture survivors.

The knowledge base on how chronic pain and PTSD interact within the context of torture is still very limited. Torture is a potent risk factor in itself for both chronic pain and

---

1) Oslo University Hospital, Norway
   Correspondence to: iselin.dibaj@gmail.com
2) Regional unit for trauma treatment, Nidaros DPS, St. Olavs University Hospital

3) Department of Psychology, Norwegian University of Science and Technology (NTNU)
4) Center on violence, traumatic stress and suicide prevention in Mid-Norway, St. Olavs Hospital, Trondheim University Hospital

PTSD. Studies point to complex interactions between pain and PTSD across different trauma-exposed populations, especially when the trauma includes pain. Moreover, the coping strategies that are available and might function as some form of protection during torture [e.g. dissociation, withdrawal], might conversely function to exacerbate symptoms when the survivor is in a safe rehabilitation context.

Observations combined with CPPC literature and recent developments in learning theory challenge clinical practice accordingly. Additionally, the limited knowledge base prevents us from providing clear-cut suggestions, particularly as the majority of scientific enquiry regarding chronic pain and PTSD has been conducted in other populations outside of the torture survivors group. Furthermore, cultural factors, specific needs and characteristics in this group, the human rights perspective and the socio-political context all need to be acknowledged.

Trauma-focused treatment does not appear to specifically target all the mechanisms that are supposedly interacting in maintaining chronic pain and PTSD. Interdisciplinary rehabilitation and close collaboration between physiotherapists and trauma-focused therapists are warranted.

Keywords: Torture survivors, chronic pain, PTSD, comorbidity, exposure therapy.

Introduction

Researchers have increasingly acknowledged the common co-occurrence of PTSD and chronic pain (Asmundson, 2014). Separately, both disorders can be a risk factor for the other (Liedl & Knaevelsrud, 2008), and the comorbidity [CPPC: Chronic Pain and PTSD Comorbidity] has been associated with poorer treatment outcome for PTSD (Carinci et al., 2010), with indications that successful PTSD

treatment can reduce pain, however not vice versa (Asmundson, 2014). CPPC is often considered to be difficult to treat, and an integrated treatment of chronic pain and PTSD has been suggested (Asmundson, 2014; Dibaj et al., 2017; Liedl & Knaevelsrud, 2008).

In a systematic review on trauma-focused treatment, although large effects on PTSD symptoms were found (Cusack et al., 2016), many patients do not benefit from these treatments, which are also associated with substantial drop-out rates (Imel et al., 2013). Treatment-seeking torture survivors is a group in which CPPC is particularly pertinent (Liedl & Knaevelsrud, 2008), and where PTSD treatment studies have been discouraging (Pérez-Sales, 2017). Depending on how one defines effect, systematic reviews have reached conclusions spanning from evaluating the present knowledge base as being too limited to draw conclusions (Patel et al., 2014), to concluding that specific treatments, such as NET and TF-CBT, produce moderate treatments effects (Weiss et al., 2016). No treatment works for all, and it is an important objective in clinical research to explore what works for whom. Recently, theoretical models that explore CPPC have emerged within the cognitive-behavioral framework. Within this framework, CPPC plays a key antagonistic role in trauma-focused treatment but these developments need further investigation.

A large portion of the literature focuses on contextual factors in refugee mental health, and how these can function to maintain psychological distress or as barriers to treatment at different levels (Patel et al., 2016). Nevertheless, a clinical perspective on how the interplay between PTSD and chronic pain might affect patients' potential for successful outcome in trauma-focused treatment is lacking. Several reviews have explored CPPC in other populations than torture survivors

(Afari et al., 2014; Brennstuhl et al., 2014; Kind & Otis, 2019). A recent systematic review on CPPC in refugees included a broader scope on patient characteristics and treatment effects (Rometsch et al., 2019). In this paper we aim to explore challenges and possibilities specifically for trauma-focused treatment for torture survivors with CPPC. First, we will review the relationship between torture and PTSD and chronic pain, separately. Following on, the review will focus on chronic pain and PTSD comorbidity in torture survivors, as well as in other populations. Chronic pain and PTSD comorbidity will be contextualized in a learning perspective, before reviewing theoretical models on chronic pain and PTSD comorbidity. Finally, a discussion on the results, as well as clinical suggestions regarding how these might translate into clinical practice.

Measures
In this review,the aim is to zoom in on specific learning mechanisms in trauma-focused therapy through a critical yet pragmatic lens, where inherently the studies use PTSD and pain symptoms as outcome measures.

Methods
In order to conduct a narrative review, PsychInfo and Researchgate were searched, using the terms "chronic pain" and "PTSD", in combination with "torture survivor", "torture victim" or "refugee", published between 2005-2019. The two first terms were also searched without the latter. Abstracts were then read and evaluated for their relevance and whether they focused on the relationship between pain and PTSD. The aim of the paper was to explore this relationship in torture survivors.However, owing to the scarcity of CPPC-focused studies in this population, the review expanded to encompass literature in other populations to help inform the discussion. Specifically, papers that centered around mechanisms of interaction between the two conditions and defined PTSD and pain as primary outcomes were evaluated as eligible. Both theoretical models, empirical studies and clinical trials were included. Studies that focused exclusively on either PTSD or chronic pain were excluded.

Results and discussion

Torture and PTSD
Most torture survivors in clinical studies are refugees, a population where PTSD prevalence is higher compared to the general population (Teodorescu et al., 2015). Not surprisingly, in samples consisting only of torture survivors, the rate of PTSD is even higher: Torture experience meets all criteria associated with increased risk for PTSD: It is human-made (Frazier et. al., 2009), induces an extreme sense of uncontrollability, is prolonged in time and pain-inducing.

Torture and Chronic Pain
The rate of chronic pain in torture survivors range from 62-92 %, the majority related to the musculoskeletal system (Carinci et al., 2010). Specific torture methods may lead to specific pain sequels that then lead to specific problems. One study found four different neuropathic pain syndromes, related to corresponding torture methods (Thomsen et al., 2000). However, the division of torture and pain into categories in this way may be considered primarily academic, as most survivors are subjected to varying torture methods, within varying time frames, frequency , at different times in the life span, and chronic pain is complex and multi-faceted. Actually, psychological torture is found to be as strongly related to pain as physical torture (Başoğlu et al., 2007). Post torture pain can be un-

derstood through nociceptive, neuropathic, nociplastic and psychological factors (Amris et al., 2019). Torture may lead to pain by all or some of these mechanisms, and this again is probably influenced by individual differences, as well as cultural and contextual factors. Although physiological pain sensations have some universal characteristics, perception and regulation of pain [and emotions] are related to culture and context, in the present as well as in the survivor's developmental learning history (Kirmayer et al., 2018). Torture may lead to *local* changes in pain modulation on specific body parts where the survivor has experienced torture (Prip et al., 2012; Thomsen et al., 2000). Moreover, *central* pain modulation can be enhanced, also in body parts not affected by torture, and that this appeared to be moderated by PTSD (Defrin et al., 2017). In the same vein, Siqveland et al. (2017) found that PTSD moderated the relationship between intentional trauma exposure and chronic pain. Flashbacks can have strong sensory qualities; thus pain can actually form part of the flashbacks. In sum, as torture is designed to inflict suffering without visual traces, chronic pain is often unrelated to actual observable injury.

Consequentially, chronic pain after torture has to be discussed on several different levels. The expression of pain and emotional distress differs between cultures. Kirmayer et al. (2018) propose an eco-social framework that highlights broader systems such as attachment, security, identity, justice and existential meaning. This perspective encompasses contextual factors, and acknowledges that the appraisal of, and response to, pain is culturally rooted. Also, how pain is communicated and understood in a clinical setting is influenced by the extent of cultural sensitivity in the particular clinical context (Kale et al., 2011). Health literacy and cultural idioms of distress are other important factors in this regard, as it affects how a person express and understands his/hers own pain. Refugee torture survivors face several barriers when it comes to access specialized health care, education, work opportunities and social support, which might maintain their pain, and impede healing. In a human right's rehabilitation context, the exile-related challenges form an integral part of the maintaining of pain. Moreover, whether or not the clinician is aware of the patient's torture history can affect the interpretation of the pain symptoms and the consequential choice of interventions or referral. Without knowledge of the torture experience, clinicians risk to misinterpret the pain. Many survivors do not disclose the torture experience unless asked (Amris et al., 2019). Also, outside specialized rehabilitation centers, clinicians might not have the necessary competence or interdisciplinary context to provide the necessary care. Another aspect associated as a stressor with living in exile, includes the waiting for legal recognition of the asylum claim, or issuance of a residence permit. This implies broadening the context to also include the socio-political situation in the patient's home and host country, and whether or not the perpetrators have faced a fair trial.

Another complicating factor is comorbid traumatic brain injury (TBI), as beating of the head is a common torture method (Haarbauer-Krupa et al., 2017; McColl et al., 2010). Buhman (2014) found a TBI rate of 46 % in a sample of treatment-seeking traumatized refugees, which is associated with chronic pain, also when adjusting for PTSD (Mollayeva, Cassidy, Shapiro, Mollayeva, & Colantonio, 2017). In fact, Leung et. al. (2016) found that TBI was related to altered pain perception and modulation. How TBI might affect CPPC and its treatment warrants a review in its own right, however, this is beyond the scope of this paper.

Table 1.

Study	N	Population/ sample	Design/aim	Outcome tools			Results/implications
				PTSD	Chronic pain	Administration	
Defrin, Lahav & Solomon, 2017	103 (males only)	Israeli torture survivors (control group: Non-tortured veterans)	Longitudinal (PTSD trajectories) and experiment, exploring the relationship between torture, pain modulation and PTSD	PTSD Inventory DES-II	MPQ	Self-report and mechanical stimulation	PTSD trajectory influence modulation and perception of pain.
Dibaj et al., 2017	6 (5 male)	Refugee torture survivors in Norway	Case series, evaluation of combined 20 sessions NET and 10 sessions physiotherapy	CAPS PDS	BPI NRS-11	Self-report and clinician rated	Clinical descriptions of PTSD-chronic pain interactions. Heterogeneity in outcomes.
Nordin & Perrin, 2019	197 (119 male)	Refugees referred to specialized torture rehabilitation center in Denmark	Cross-sectional, exploring the mutual maintenance model	HTQ 1-4 PTCI	BPI CSQ	Self-report prior to treatment (64 % through interpreter)	Pain catastrophizing mediated parts of the relationship between PTSD and chronic pain.
Tedorescu et al., 2015	61 (36 male)	Refugees in outpatient psychiatric care in Norway	Cross-sectional, comparison of PTSD patients with/without chronic pain	LEC SCID-PTSD SIDES IES	SIDES IV	Self-report and clinician rated	Rate of chronic pain was high, and associated with increased distress and PTSD, especially in women.
Wang et al., 2017	28 (13 female)	Kosovar torture survivors in a specialized torture rehabilitation center in Kosovo	Pilot Randomized Controlled Trial with wait-list control. Integrated 10 sessions of CBT with biofeedback combined with group physiotherapy	HTQ	SF-MPQ Wong-Baker FACES Pain Rating Scale	Self-report and physical examination	Treatment showed small effects on PTSD and physical functioning, as well as inconsistent effects on pain.

Abbreviations: DES = Dissociative Experience Scale, MPQ = McGill Pain Questionnaire, NET = Narrative Exposure Therapy, CAPS = Clinician-Administered PTSD Scale, PDS = Posttraumatic Diagnostic Scale, BPI = Brief Pain Inventory, NRS = Numeric Rating Scale, HTQ = Harvard Trauma Questionnaire, PTCI = Posttraumatic Cognitions Inventory, CSQ = Coping Strategies Questionnaire, LEC = Life Event Checklist, SCID-PTSD = Structured Clinical Interview for the DSM-IV – PTSD, SIDES = Structured Interview for Disorders of Extreme Stress, IES = Impact of Events Scale, SF-MPQ = Short Form McGill Pain Questionnaire..

CPPC in Survivors of Torture

The empirical studies reviewed are summarized in Table 1. Both PTSD and chronic pain is highly prevalent in torture survivors (Carinci et al., 2010), and the comorbidity is associated with poorer prognosis (Jenewein et al., 2009; Sullivan & Adams, 2010; Shipherd et al., 2007). Identified risk factors for chronic distress in torture survivors include previous trauma, unemployment, lower educational status and reduced social contact (Carlsson, Mortensen & Kastrup, 2006). There seems to be consensus regarding the need for multidisciplinary rehabilitation for torture survivors (Carinci et al., 2010), where chronic pain treatment is integrated with psychological social interventions (such as Keller, 2002). Carinci et al. (2010) compare studies of chronic pain in torture survivors with and without addressing emotional problems and found favorable outcomes when the latter is incorporated.

In an experimental study with a longitudinal design, three different PTSD trajectories in torture survivors were identified; Chronic, delayed and resilient (Defrin et al., 2017). To explore differences in pain modulation, they compared the different groups to each other and to healthy age-matched controls. There were no between-group differences in pain threshold, but rather in pain perception: Thus, pain stimuli were modulated more dysfunctionally in the chronic and delayed groups, compared to the resilient and healthy groups. Furthermore, the duration of PTSD mediated the relationship, independent of duration of the trauma exposure itself. Thus, the same survivors that suffered from PTSD, also had chronic pain and dysfunctional pain modulation, however some survivors exhibited neither of these deficits.

Most clinical trials and reviews regarding torture survivors can be categorized as either trauma-focused or multimodal (Nickerson et al., 2011). As far as we know, Multimodal treatment studies does not address the CPPC specifically, but treat them as part of an integrated biopsychosocial approach. A recent study at such a specialized multidisciplinary treatment center in Copenhagen found that pain catastrophizing mediated the relationship between pain and PTSD in torture survivors (Nordin & Perrin, 2019). Trauma-focused approaches does not necessarily target chronic pain and have been criticized to focus excessively on PTSD symptoms as an outcome measure (Patel et al., 2016). NET and TF-CBT have showed promising effects on PTSD symptoms, however whether this is generalized onto chronic pain is to our knowledge not investigated. A Cochrane review of chronic pain treatment for torture survivors found no effective treatments (Baird et al., 2017). For our purposes here, the knowledge base is even more limited, as there is a lack of studies that examine integrated or combined treatment of CPPC within the trauma-focused tradition. To our knowledge, the only studies of this kind are one RCT on CBT combined with group physiotherapy and biofeedback (Wang et al., 2016) and a case series in which NET was provided with parallel physiotherapy (Dibaj et al., 2017). In both studies, large heterogeneity in outcomes were observed, and PTSD was successfully treated in a third of the patients.

In sum, torture is a potent risk factor in itself for both chronic pain and PTSD. Also, survivors often have multiple trauma experiences (Amris et. al., 2019). Pain is related to torture on several levels, not only as part of PTSD flashbacks, nor as a purely physiological phenomenon. There are probably different pain mechanisms involved (Chimenti et al., 2018). Thus, thorough differential diagnostics and consideration of interdisciplinary treat-

ment seem crucial. In the following, we will target *regulation* of both pain and other trauma-related symptoms within a learning perspective. However, because of the scarcity of studies on CPPC within the context of torture, we will first consider some studies on CPPC in other contexts.

Empirical Studies on CPPC in Other Contexts
The empirical studies reviewed are summarized in Table 2. Numerous studies have investigated CPPC (Roth et al., 2008; Wald et al., 2010). Defrin et al. (2008) found that the association between chronic pain and mental disorders was stronger for PTSD compared to depression and other anxiety-related disorders. In a large general population sample, the prevalence of chronic pain was 21 %, compared to 46 % in those who met diagnostic criteria for PTSD (Sareen et al., 2007). Partly, this link might be explained by the fact that traumatic experiences often involve physical injury. However, since a minority of trauma survivors develop PTSD in the aftermath of trauma (Santiago et al., 2013), there must be more to the story (Stam, 2007). People that have suffered trauma-related bodily injury seem to run an eight-fold higher risk for developing PTSD (Koren, Norman, Cohen, Berman, & Klein, 2005). Furthermore, catastrophizing and kinesiophobia have been found to predict pain-related disability (Guimarra et al., 2017), and PTSD is a more potent risk factor for developing pain than the experience of trauma in itself (Jenewein et al., 2009; Ciccone et al., 2005). Pain-related avoidance, fear-avoidance and pain catastrophizing have been found to mediate the relationship between chronic pain and PTSD (Åkerblom et al., 2018; Andersen et al., 2016). Moreover, Siqveland et al. (2017) found that chronic pain was mediated by PTSD and whether the trauma was inten-

tional. Apparently, intentionality and pain act as catalysts in sensitizing pain and anxiety reactions to trauma, and at the same time, these are categorically inherent in torture. When a torture survivor with CPPC face a trauma-trigger, he/she will possibly experience both pain and fear in a flashback, and a natural response could be to attempt to reduce these sensations, e.g. through avoidance or safety-behavior. This might turn into a vicious circle, as avoidance is a key behavior in both chronic pain and PTSD, which again is associated with an increase in the occurrence of flashbacks (Marx & Sloan, 2005).

PTSD has been found to contribute to more severe pain experience and greater pain-related disability (Phifer et al., 2011). Contrary to this notion, in a laboratory setting, patients with PTSD and chronic pain had actually decreased pain perception compared to patients with only chronic pain (Geuze et al., 2007). Possibly, this relates to emotional numbing or dissociation (Strigo et al., 2010). Dissociation during trauma might function to regulate intense negative affect during trauma, and might be the only possible flight for a person suffering torture. In fact, peritraumatic dissociation is found to predict PTSD symptoms in the short term in other populations (Kumpula et. al., 2011), but if this can generalize onto torture survivors remains an empirical question.

In sum, these studies point to complex interactions between pain and PTSD across different trauma-exposed populations, especially when the trauma includes pain. Torture can last for hours, days or even years. At the core of the torture experience lie intense fear and pain, in addition to a limited range of behavioral options as the victim has no control or means to escape. Moreover, the coping strategies that are available and might function as some form of protection during torture [e.g. dissociation,

Table 2.

Study	N	Population/sample	Design/aim	Outcome tools		Admin.	Results/implications
				PTSD	Chronic pain		
Andersen et al., 2016	198 (77 male)	Cohort of whiplash injury patients	Longitudinal, comparing pain intensity and PTSD symptoms in different trajectories of recovery	HTQ-IV	NRS, PCS, ÖMPSQ	Self report and physical examination	Non-recovered patients had higher rates of pain intensity and PTSD symptoms. This relationship was mediated by fear avoidance and pain catastrophizing.
Ciccione et al., 2005	104 (all female)	Stratified community sample in the U.S., divided in four combinations with/without fibromyalgia and/or MDD	Longitudinal, test of PTSD, MDD and interpersonal trauma as predictors for fibromyalgia	PCL, IASP	SIP, CPGQ, Physical examination	Self-report, clinician rated, telephone interview	PTSD mediated the relationship between trauma and fibromyalgia.
Defrin et al., 2008	32	Israeli with combat- or terror-related PTSD (control groups: Outpatient anxiety patients and healthy university employees)	Experiment, investigating differences in rates of chronic pain, pain threshold and intensity between subjects with PTSD, anxiety and healthy controls	SCID-PTSD, PTSD Inventory	MPQ	Self-report, clinician rated and mechanical stimulation	PTSD was associated with higher rates of chronic pain, greater pain intensity, more pain locations and increased sensitivity to pain.
Geuze et al., 2007	24 (all male)	Dutch veterans with PTSD (control group: Veterans without PTSD)	Experiment, correlational study of neural correlates (fMRI) to pain processing in veterans with/without PTSD	CAPS	Physical examination, fMRI	Clinician rated	PTSD was associated with altered pain processing, and lower sensitivity to heat pain stimuli.
Guimarra et al., 2017	433 (324 male)	Patients with traumatic injury in an orthopedic unit in Australia	Cross-sectional, investigating rate of PTSD, chronic pain and shared feature after traumatic injury	PCL-C, PCS	BPI, PSEQ, AIS, TSK, RMDG	Self-report and clinician rated	Chronic pain increased risk for PTSD, which was mediated by catastrophizing and low self-efficacy.
Jenewein et al., 2009	323 (209 male)	Injured accident victims in a trauma ward in a Swiss hospital	Longitudinal, investigating relationship between PTSD and chronic pain across time post injury	CAPS, DTS, PDQ	VAS	Self-report and clinician rated	PTSD symptoms was associated with increased rates of pain intensity in the short term. A mutual maintenance relationship between pain and PTSD was found on the short term, but only PTSD influenced pain intensity in the long term.
Koren et al., 2005	100 (males only)	Israeli veterans with and without combat-related bodily injury	Cohort, investigating the effect of bodily injury on rate of PTSD	CAPS, PDQ	AIS	Self-report and clinician rated	Bodily injury is a risk factor for development of PTSD.

Author	N	Population/Setting	Study description	PTSD measure	Pain measure	Assessment	Findings
Phifer et al., 2011	376 (143 male)	General hospital medical patients in the U.S.	Cross-sectional, investigating rate of PTSD, chronic pain and use of pain medication	CAPS, PSS, TEI	SF-36, Physical examination	Self-report and clinician rated	All PTSD symptoms was associated with increased rates of chronic pain, and avoidance correlated with use of opioids.
Roth, Geisser & Bates, 2008	241 (99 male)	Chronic pain patients with accident-related pain	Cross-sectional, investigating interactions between PTSD, depression, chronic pain and functional impairment through structural equation modelling	PCPT	MPQ, PDI	Self-report	PTSD correlated with severity of depression and functional impairment. Depressive symptoms had an effect on pain intensity, both directly and indirectly through functional impairment.
Sareen et al., 2007	36084	Community sample in Canada	Study of unique effects from PTSD onto physical health, pain and quality of life, using data from a community sample	Question "Do you suffer from PTSD?"	CCI	Interviewers (non-clinical setting)	PTSD was in greater proportion associated with increased rates of chronic pain, physical imlness and low quality of life compared to other psychological disorders.
Sigveland, Ruud & Hauff, 2017	63 (23 male)	Patients in a specialized pain clinic in Norway	Cross-sectional, comparing intentional and non-intentional trauma exposure's effect on PTSD, pain severity and treatment outcome in chronic pain patients	MINI, LEC	VAS	Self-report and clinician rated	Intentional trauma was associated with increased risk for PTSD and greater pain severity, and PTSD mediated this relationship however was unrelated to treatment outcome.
Wald et al., 2010	5 (females only)	Motor Vehicle Accident survivors in Canada	Case series, 4 sessions IE followed by 8 sessions of TRE	CAPS	BPI	Self-report and clinician rated	Most patients had short-terms effect on PTSD and pain that was not maintained after 3 months.
Åkerblom et al., 2017	315 (91 male)	Chronic pain patients in a Swedish pain rehabilitation center	Cross-sectional, comparing chronic pain patients with/without PTSD across different facets of the Psychological Flexibility Model	PDS	MPI, CPAQ, CPVI, PIPS	Self-report	

Abbreviations: HTQ = Harvard Trauma Questionnaire, NRS = Numeric Rating Scale, PCS = Pain Catastrophizing Scale, ÖMPSQ = Örebro Muskuloskeletal Pain Screening Questionnaire, MDD = Major Depressive Disorder, PCL = PTSD Check List, IASP =Interview for Assessing Sexual and Physical Abuse, SIP = Sickness Impact Profile, CPGQ = Chronic Pain Grade Questionnaire, SCID-PTSD = Structured Clinical Interview for the DSM-IV – PTSD, MPQ = McGill Pain Questionnaire, CAPS = Clinician-Administered PTSD Scale, fMRI = functional Magnetic Resonance Imaging, BPI = Brief Pain Inventory, PSEQ = Pain Self-Efficacy Questionnaire, AIS = Abbreviated Injury Scale, TSK = Tampa Scale of Kinesiophobia, RMDG = Roland-Morris Disability Questionnaire, DTS = Davidson Trauma Scale, PDQ = Peritraumatic Dissociation Questionnaire, VAS = Visual Analog Scale, PSS = PTSD Symptom Scale, TEI = Traumatic Events Inventory, SF = Short Form, PCPT = Post-Traumatic Chronic Pain Test, PDI = Pain Disability Index, CCI = Charlson Comorbidity Index, MINI = Mini International Neuropsychiatric Interview, LEC =Life Events Checklist, IE = Interoceptive Exposure, TRE = Trauma-Related Exposure Therapy, PDS = Posttraumatic Diagnostic Scale, MPI = Multidimensional Pain Inventory, CPAQ = Chronic Pain Acceptance Questionnaire, CPVI = Chronic Pain Values Inventory, PIPS = Psychological Inflexibility in Pain Scale.

withdrawal], might conversely function to exacerbate symptoms when the survivor is in a safe rehabilitation context.

CPPC in a Learning Perspective
From an evolutionary perspective, both pain and anxiety function as an alarm system, signaling potential harm to the organism. Avoidant behavior is considered a natural response that optimally would decrease over time. However, in CPPC, the avoidance strategy has become excessive, as it has generalized out of proportion. When an organism responds to anxiety with a behavior that provides short-term reduction of distress (e.g. avoidance, safety strategies) over time, the long-term consequence is sensitization, generalization and automatization of the alarm response (Pittig et al., 2018). Levy-Gigi et al. (2012) found that PTSD patients tend to overgeneralize fear responses. Similarly, these very same mechanisms have been implicated in the transition from acute into chronic pain (Hollander et. al., 2010). Thus, CPPC may be understood in terms of associative learning and conditioned fear responses to pain, as both disorders are associated with cyclical learning, sensitization and overgeneralizations of fear (López-Martínez, 2015). Sueki et al.(2014) relate this to cortical and subcortical changes in levels of processing, in individuals suffering from chronic pain as well as PTSD. Accordingly, Brewin, Gregory, Lipton and Burgess (2010) argue that PTSD may be understood as a learning disorder rather than a stress- and anxiety disorder. In this framework, chronic pain may be understood as an integral part of PTSD.

Recent developments in learning theory have moved from a habituation and extinction paradigm onto that of inhibitory learning (Craske et al., 2014). In other words, the goal in treatment of chronic pain or anxiety disorders (including PTSD) has moved from direct reduction of symptoms [habituation] to learning new responses to distress [inhibitory learning] (Brown et al., 2017). Interestingly, only *thinking* about movement produced pain in chronic pain patients, and this was modulated by catastrophizing, which also seemed to increase the tendency to respond to stress with dissociation (Moseley et al., 2008). Thus, catastrophizing [a response to distress] might amplify pain signals which leads to neural sensitization (López-Martínez, 2015). Taken together, these findings highlight some of the learning mechanisms that might play a role in maintenance of CPPC, through the patients' regulatory strategies when confronted with trauma-related symptoms.

Cognitive behavioral models of CPPC
To our knowledge, The Mutual Maintenance Model (MMM) (Sharp & Harvey, 2001) was the first to examine the relationship between chronic pain and PTSD, closely followed by the Shared Vulnerability Model (Asmundson et al., 2002). In a review, Brennstuhl, Tarquinio and Montel (2015) summarized support for both theories: The onset of PTSD seem to predict the occurrence of chronic pain, while the strength of pain at the time of the trauma predicts the development of PTSD. In addition, they found that PTSD is more interrelated to pain compared to depression and other anxiety-related disorders. Both pain and PTSD seem to function both as triggers for the other disorder, as well as a maintaining factor. Accordingly, Brennstuhl et al. (2015) postulate that PTSD and chronic pain can be understood as part of the same *reactive disorder*, where CPPC is one potential *reaction* to trauma.
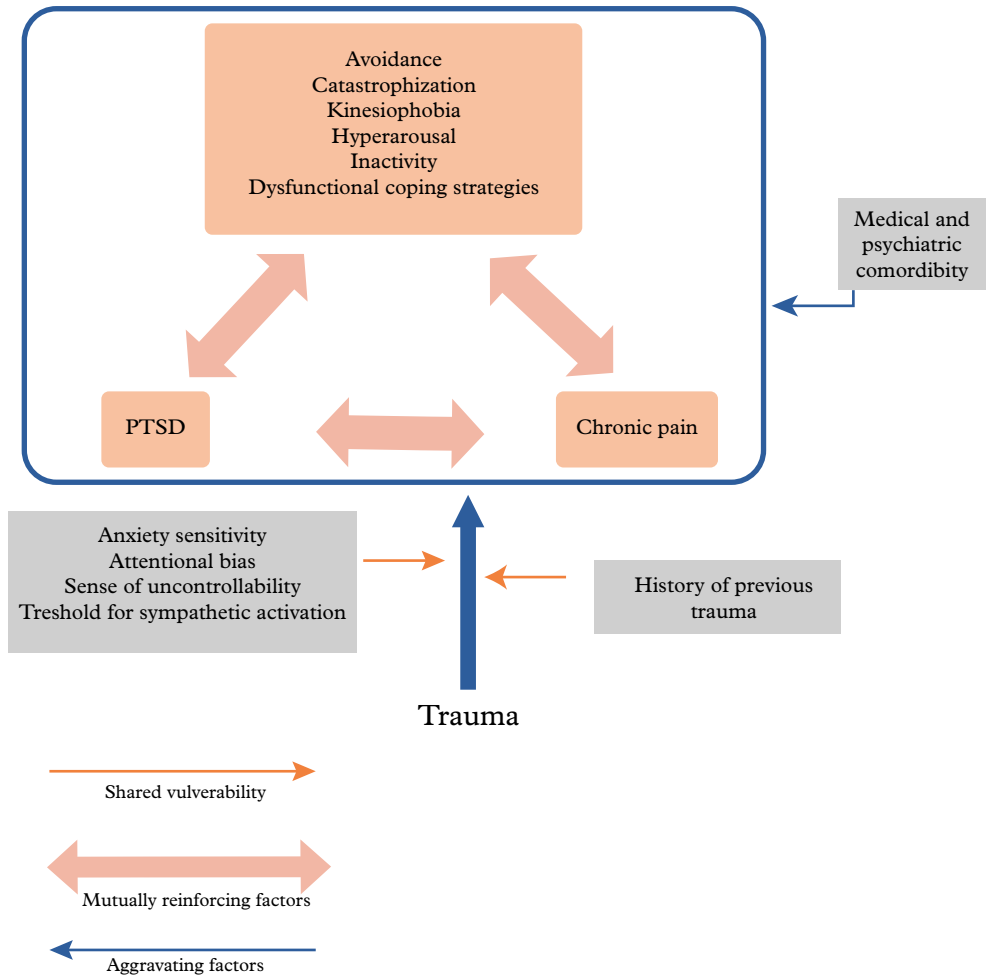
The Perpetual Avoidance Model (PAM) (Liedl & Knaevelsrud, 2008) is a fusion of the Ehlers and Clark's (2000) cognitive model of

PTSD and the Fear Avoidance Model for chronic pain (Crombez et al., 2012). The PAM is of particular relevance as it is presented and discussed within the context of refugee torture survivors. In a Western health care context, they argue that a combination of trauma-focused therapy, psychoeducation about mutual maintenance, physical activity, relaxation techniques and biofeedback might be particularly useful for refugee patients such as torture survivors from non-Western cultures. Finally, Bosco et al. (2013) have developed a comprehensive model that integrated the three above-mentioned models.

See figure 1 for an overview of mutual maintaining and shared vulnerability factors, and table 3 for a summary of CPPC models and their distinguished features.

Figure 1

General discussion

The literature points to certain common themes that can be valuable for clinicians working with this particular patient group. PTSD can be understood as a learning disorder (Brewin et al., 2010), where pain is part of an overgeneralized fear network, either as a trigger or as part of the anxiety response. However, leading researchers in the field warn against treating pain solely as part of PTSD (Baird et al., 2017). Regardless of whether one understands the chronic pain as comorbid to, or as an integral part of, PTSD, it seems to be more challenging to treat patients for either disorder if the other is present.

The abovementioned models converge on several aspects. First, they all acknowledge avoidance and catastrophizing as key maintaining factors that should be targeted in treatment. Second, they highlight how these processes function similarly in both PTSD and chronic pain, in addition to aggravate each other. Pain and anxiety are both generalized, sensitized and made more automatic through repeated avoidance and catastrophizing. In these models, the (dys)regulation of pain and anxiety are in focus, as this is assumed to be maintaining symptoms and impeding natural recovery. This is consistent with the inhibitory learning hypothesis, where how an organism responds to anxiety, shapes the reaction over the long term. Finally, instead of focusing on habituating to pain or flashbacks, the focus in these models is placed on replacing strategies that impede recovery, to pave the way to new learning. In this framework, removing the maintaining factors of CPPC is believed to break a vicious circle where symptoms are self-sustained. Thus, inhibitory learning, or emotion regulation, is the assumed mediator between trauma-focused therapy and reduced PTSD symptoms, which in turn is believed to increase functioning and quality of life. See figure 2 for an overview over mediating and moderating variables in this context.

When treatment effects are poorer than expected, we tend to search for moderating variables that might explain it. Often, this lack of effect is attributed to population characteristics, cultural factors or problems with the PTSD diagnosis. While acknowledging these factors, there is also the possibility that the comorbid pain might be partly to blame. In fact, several of the mutually maintaining factors are not targeted directly in trauma-focused treatment protocols. An important notion in this regard is that PTSD treatment or cognitive-behavioral models does not include an understanding of underlying pain mechanisms. In other words, even though psychological therapies might tap into some of the shared mechanisms in chronic pain (e.g., fear-avoidance), they are not specific. Exposure for movement is not usually performed, despite the presence of kinesiophobia. Conversely, physical therapy might focus on kinesiophobia, however fall short in regard to trauma processing. In this way, when focusing on either pain or PTSD, the other comorbid disorder might function as a therapy impeding moderating factor. Thus, close collaboration between the physiotherapist and trauma-therapist might be advantageous, where physiotherapeutic evaluation could inform psychologists of relevant pain mechanisms (Chimenti et al., 2018). Moreover, to conduct exposure therapy within an array of different contexts appear to be essential for successful outcome (Craske et al., 2014). Accordingly, to integrate exposure for movement and memory content might prove fruitful.

Trauma processing are included in some, but not all, models. One perspective to understand CPPC in the context of trauma processing is that it impedes the trauma-focused therapy in one or several ways. For instance,
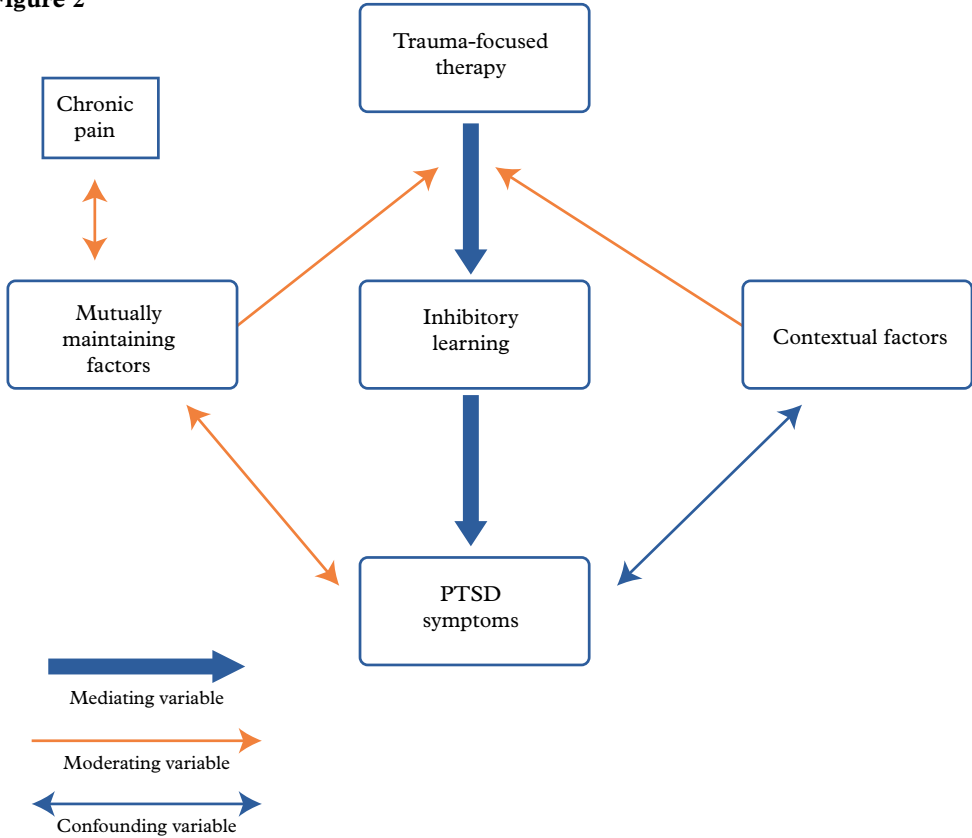
Table 3. Cognitive Behavioral Models of CPPC

Model	Distinguishing features
Mutual Maintenance Model (Sharp & Harvey, 2001)	Shared cognitive and behavioral aspects of PTSD and chronic pain function as maintaining factors for both disorders. The result is a mutually maintaining relationship between PTSD and chronic pain.
Shared Vulnerability Model (Asmundson et al., 2002)	Emphasis on a collection of personality traits as vulnerability factors for both PTSD and chronic pain. Persons high on these traits will thus be more likely to react to trauma with a heightened anxiety response and avoidant coping behavior, which increase likelihood for developing CPPC, as postulated by the *Mutual Maintenance Model*.
Perpetual Avoidance Model (Liedl & Knaevelsrud, 2008)	Pain sensation and intrusions are appraised as acute threats, leading to dysfunctional emotion and pain regulation. Cognitive and behavioral control strategies become inflexible and context insensitive when applied over the long term, that is when threat is no longer present. As in the other models, avoidance plays a key role, as it functions to maintain both PTSD and pain. Here, it is also motivated by pain-related fear, catastrophizing and kinesiophobia.
Comprehensive Fear-Avoidance Cycle of Chronic Pain and PTSD (Bosco et al., 2013)	An integration of the Mutual Maintenance Model, Shared Vulnerability Model and Fear Avoidance Model (Vlaeyen & Linton, 2000). Chronic avoidance is emphasized as it impedes the survivors' engagement in therapeutic activity, which leads to increased catastrophizing and strengthened belief in their own inability to cope with pain/intrusion. This relationship is depicted as a self-perpetuating cycle, where chronic avoidance function as the main maintaining factor, motivated by trauma- and pain-related fear.

that the patient is afraid of feeling pain triggered when engaging in trauma processing, and avoids or drops out of treatment, or that the patient is (dys)regulating pain throughout processing. Confronting the trauma is not about enduring pain and suffering, but rather to learn new, dignified ways to relate to one's own story. Successful trauma processing is assumed to involve the patient experiencing that he/she can be in contact with the trauma memory, and still feel safe and coping.

If the experience instead is characterized by increased pain and an inability to cope with it, the new learning could perhaps become aversive rather than empowering. Another pitfall, given that the patient manage trauma processing in spite of the pain, could be that the patient is still avoiding activities that might trigger pain, and thus still maintains an avoidant coping style, which works against the exposure therapy and strengthens the mutual maintaining factors instead of breaking their

Figure 2

patterns. In this vein, the therapist and patient would need to work together to break this pattern throughout, in parallel or before engaging in trauma processing. Timing of trauma processing is an important clinical evaluation, that might be informed by early identification and reduction of potential barriers to exposure, preferably in an interdisciplinary context.

Another perspective on treatment of CPPC does not necessarily involve trauma processing. In the transition from habituation to inhibitory learning, the treatment focus changes from reducing fear/pain response through repeated exposure to changing the

way the patient regulates fear/pain. This entails a move away from a focus on PTSD and pain symptoms, over to how the survivor responds to and aims to regulate these aversive experiences. These [automatic] regulatory strategies are then seen as the motor in a self-sustaining system, at work to maintain and exacerbate symptoms. To break this pattern through learning new ways to regulate affect and pain appear to be the key, consistent with practices in so-called 3rd wave cognitive behavioral therapies (CBT). In this framework, processing of the trauma could be one, of several, ways

to break the pattern as this would entail less avoidance.

Outcome Measures

The few empirical studies in this review highlight the diverging practice and use of outcome measures, where only a minority of studies used the gold standard. Arguably, few of the tools directly tap into the maintaining variables described in the abovementioned models. A few exceptions are the CSQ and TSK that measure pain catastrophizing and kinesiophobia, respectively. Otherwise, the pain outcome measures mostly focus on physiological or descriptive aspects of the pain that are not necessarily directly relevant for trauma processing. That is to say, it provides descriptive rather than functional characteristics of the pain in terms of cognitive-behavioral models. Although behavioral avoidance is covered in PTSD scales, fear-avoidance or pain-related fear is not accounted for. Clinically, it could be useful to implement outcome tools that measured these variables in addition to PTSD scales during trauma-focused therapy. Moreover, these could be used across disciplines in the treatment team. Then, both the patient and therapists would receive feedback on their treatment's progression, that perhaps might facilitate timing of interventions accordingly. Ideally, a monitoring feedback system like this ought to be integrated in an interdisciplinary rehabilitation team (Horn & Keefe, 2016).

Clinical Reflections

Rehabilitation for torture survivors requires an interdisciplinary specialized treatment team, that work with long term medical, psychological, physical and social care that facilitates the empowerment, well-being and functioning of the survivor through collaboration with the survivor and across professions (IRCT, 2018). Specialized, interdisciplinary torture rehabilitation centers are increasingly monitoring patients' treatment progression as well as focus on the relationship between pain and PTSD. However, this level of expertise is not available for all torture survivors, as many are met by clinicians in non-specialized health services (IRCT, 2017), including trauma-focused treatment outside an interdisciplinary context (Norwegian Red Cross, 2020). In an explorative study (Dibaj et al., 2017), it was observed that pain-related problems could impede such trauma-focused treatment in several ways, arguably serving as negative moderators directly or by reducing compliance. For instance, sitting in a chair was difficult because of physical disabilities caused by torture or recollection of trauma could trigger intense painful flashbacks. In sum, these observations combined with CPPC literature and recent developments in learning theory challenge us to adjust our clinical practice accordingly. Naturally, the limited knowledge base prevents us from providing clear-cut suggestions - however, we attempt to extract some general principles of relevance to trauma-focused therapy.

Avoidance and kinesiophobia:

Challenges: (1) Imaginary exposure is common in trauma-focused therapies, and though it targets mental avoidance of the memory, it may not encompass avoidance of movement, pain or external triggers. (2) Kinesiophobia might make patients reluctant to fully engage in exposure or physiotherapy, and thus potentially reduce treatment effect (Dibaj et al., 2017). (3) Torture survivors often present pain in several body parts, thus physical movement will trigger both the pain and PTSD system.

Suggested interventions: (1) Psychoeducation on mutual maintenance, and the paradoxical function of avoidance. (2) Include

interoceptive exposure. If the patient is familiar with imaginal exposure, the therapist can help him/her generalize the principles onto interoceptive (Wald, 2008) and/or in vivo exposure (Craske et al., 2014). (3) Close collaboration with a physiotherapist and encourage patients to apply exposure principles while engaging in physiotherapy. The physiotherapist should know idiosyncratically how the trauma memory triggers avoidance and pain. In collaboration, shared mechanisms of pain and PTSD can be identified and form the basis for an idiosyncratic case formulation, where interoceptive and imaginary exposure is integrated with the physical therapy. The aim will be to loosen the connection between pain and trauma memory. Through psychoeducation and processing of the traumatic event we may help the survivor become aware that pain sensation in movement does not mean that he/she is in the torture situation again. The physiotherapist could also strive to reframe physical movements as positive activity to fight connections between movement, pain and re-experiencing of torture.

Catastrophization and coping strategies:
Challenges: (1) Expectations about one's ability to cope with pain/trauma memory seems to be maintained by chronic avoidance, and further exacerbate the pain-fear cycle as it hinders the patient to select constructive coping strategies that could have facilitated a natural recovery process (Bosco et al., 2013) (2) Appraisal of distress and coping strategies will often be related to culturally rooted beliefs, that may or may not be congruent with CBT rationale (Beck, 2016).

Suggested interventions: (1) Interventions from CBT or Interdisciplinary Pain Programs can help patients identify and modify dysfunctional beliefs. One example is to identify and replace maladaptive coping strategies. With

behavioral experiments, it is possible to investigate a belief such as "pain during exercise will make me worse". 2) Help the patient find more constructive coping strategies (see also; Linton, 2013 for a discussion on how to apply DBT emotional regulation strategies to both pain and emotional distress). (3) One could use the Cultural Formulation Interview (American Psychiatric Association, 2012) to help patients connect with familiar practices to deal with pain and suffering, such as religion. In this interview, the emphasis is placed on the formulating the patient's problem, beliefs about their health and treatment options, resources, coping strategies as well as challenges within a culturally sensitive context.

Anxiety sensitivity and attentional processes:
Challenges: Heightened awareness and attention towards potential threatening stimuli tend to increase anxiety, which enhances pain perception. This might lead to more intense pain during trauma-processing.

Suggested interventions: (1) Help patients become aware of and flexibly shift their attention, through interventions such as detached mindfulness training. (2) Teach patients relaxation techniques or other adaptive coping strategies to use in their everyday life. (3) By processing the traumatic event the patient will be able to better distinguish between trauma-related anxiety and triggers.

Reduced activity levels:
Challenges: (1) Inactivity is related to maintenance of depression, chronic pain and PTSD. When patients are depressed, it might be more challenging for them to actually perform the planned exposure because of fatigue, lack of motivation, etc. (2) Occupational deprivation and daily life functioning might mutually maintain inactivity and depression (Morville et al., 2015).

Suggested interventions: (1) Educate patients about behavioral activation and the promotion of engagement in enjoyable activities. (2) Help patients to plan in vivo exposure tasks that also promote increased activity. (3) Plan activities with low levels of pain to counter inactivity and then gradually set up more challenging tasks. (4) Collaborate with an occupational therapist to help patients develop necessary skills to improve functioning in their daily life and re-connect with values and roles.

To What Extent is the Literature on CPPC Relevant for Torture Survivors?
When traumatic experiences include pain, as torture clearly does, the risk for PTSD and pain-related fear increase, especially if the survivor respond to pain/anxiety cues with avoidance. Probably, many of the same learning mechanisms are involved when torture survivors develop PTSD, as is the case for the other trauma survivors included in the studies in this review. However, there are factors of particular importance when working with torture survivors. To treat torture as a violation of human rights and place the blame on those committing torture, plays an important part in psychological rehabilitation. Redemption and whether the perpetrators have faced a fair trial are other factors of importance for recovery (Smith, Patel & MacMillan, 2010). However, , reports show that a minority of survivors actually obtain their rightful redress (IRCT, 2017). Thus, treatment of posttraumatic symptoms and pain is one of several important steps in rehabilitation after torture, that aim to restore the survivor's dignity.

Limitations
• Inherent bias in narrative review towards clinical and trauma-focused papers, including a broad discipline base and non-clinical literature.

• Inferences about the clinical applicability of these models is problematic as they have not been empirically studied in the current context.
• Caution must be taken when generalising CPPC findings amongst torture survivors due to the lack of longitudinal, empirical studies on this population. Most of the findings on CPPC regard other types of trauma (motor accidents, childhood abuse) and thereby reflect harm and context specific implications. Torture trauma sequela is distinct from other trauma experiences (de Williams & Baird, 2016) and there are many other compounding variables related to exile and displacement, such as social supports available and previous trauma history. Lastly, the psychometric instruments used in these studies are not validated cross-culturally proving problematic for generalisation (Patel et al., 2016).
• The general and vague conceptualization of chronic pain limits the analysis of determining clinically meaningful factors such as etiology or underlying pain mechanisms. Given pain management options will depend on how chronic pain interacts with PTSD, it is important to distinguish the pain mechanism. Thus, is the lack of treatment response due to the unavailability of effective treatment for a particular pain condition or comorbid PTSD?

Reflections for Future Research:
The new classification of chronic pain in the ICD-11 (Treede et al., 2015), moves beyond descriptive diagnosis to encompass etiology and pathophysiological mechanisms. In this framework, musculoskeletal pain is differentiated from neuropathic pain, posttraumatic pain, postsurgical visceral pain, headaches, cancer pain and primary pain. For our purposes here, this is useful as it makes it pos-

sible to explore how different pain conditions might be affected by the patient's attempts at its regulation, as well as their interaction with PTSD. If we expand our knowledge about pathophysiological mechanisms, this might enable us to better refine treatment interventions for torture survivors with CPPC.

Moreover, development and validation of relevant outcome tools for torture survivors is in order (Horn & Keefe, 2016; Patel & Williams, 2014). The scarcity of cross-culturally validated psychometric tools is of importance for several reasons. Naturally, because it has implications for the validity of the assessment of torture survivors in a clinical setting and could improve the quality of clinical research data. Also, reliable data collection of torture survivors needs paves the way for system providers to organize their health services accordingly. In addition, documentation of torture and its consequences has implications beyond health care, as it is related to international human rights' work against torture as well as possibilities for the redress and persecution process which is inherent in torture rehabilitation.

Another suggestion is to investigate the theoretical models on CPPC within the context of torture. Will torture-related pain comorbid to PTSD respond to reduced fear-avoidance in the same way as e.g., chronic musculoskeletal back pain? Are the same mutual maintaining mechanisms at play when the pain is posttraumatic compared to e.g. neuropathic or primary?

One potential pathway could be to include variables such as pain catastrophizing or fear-avoidance as outcome variables in studies of CPPC. Thus, to conduct clinical trials incorporating elements from the theoretical models on CPPC. Primarily, pilot studies would be required, and if indicated, one could eventually design larger, systematic studies. Within this framework, one could investigate whether treatment effect could be explained by factors as predicted by the theoretical models: Would more patients with CPPC respond to trauma-focused treatment if they work with mutually maintaining factors within an inhibitory learning perspective? Can this facilitate treatment by means of an increase in compliance or decrease in drop-out rates? Is treatment effect related to reduction in avoidance, catastrophization or other maintaining factors? Are there differences in effect of trauma-focused treatment with and without interventions targeting mutual maintenance? Hopefully, this could help reduce barriers to benefit from trauma-focused treatment.

Summary and conclusions

In this review we have found torture to be a potent risk factor for both PTSD and chronic pain, and often both. Despite a recent upsurge in knowledge on how the two conditions interact, clinically relevant knowledge is still sparse. Whereas contextual and psychosocial factors as barriers to healing are thoroughly represented in the literature on torture rehabilitation, mutually maintaining factors are less studied as barriers for this group. In this narrative review, we have presented a clinical perspective and discussed different strategies for encompassing CPPC factors in trauma focused therapy for torture survivors that suffer from these conditions. Our hope is that this perspective will inspire clinical practice and reduce barriers to effective treatment for torture survivors.

References

Afari, N., Ahumada, S. M., Wright, L. J., Mostoufi, S., Golnari, G., Reis, V., & Cuneo, J. G. (2014). Psychological trauma and functional somatic syndromes: A systematic review and meta-analysis. *Psychosomatic Medicine, 76*(1), 2-11. doi: 10.1097/PSY.0000000000000010

Åkerblom, S., Perrin, S., Fischer, M. R., McCracken, L. M. (2018) The relationship between posttraumatic stress disorder and chronic pain in people seeking treatment for chronic pain. The

mediating role of psychological flexibility. *Clinical Journal of Pain, 34*(6), 487-496. https://doi.org/10.1097/AJP.0000000000000561

American Psychiatric Association (2012). DSM-5: Cultural Formulation Interview. http://www.dsm5.org/proposedrevision/Documents/DSM5%20Draft%20CFI.pdf_

Amnesty International (2013). *Amnesty International report 2013: The state of the world's human rights.* http://files.amnesty.org/air13/AmnestyInternational_AnnualReport2013_complete_en.pdf_

Amris, K., Lester, J. E. & de Williams, A. C. C. (2019). Pain from torture: Assessment and management. *PAIN Reports, 4*(6). https://doi.org/10.1097/PR9.0000000000000794

Andersen, T. E., Karstoft, K-I., Brink, O., & Elklit, A. (2016). Pain-catastrophizing and fear-avoidance beliefs as mediators between post-traumatic stress symptoms and pain following whiplash injury – A prospective cohort study. *European Journal of Pain, 20*,1241-1252. https://doi.org/10.1002/ejp.848

Asmundson, G. J. G., Coons, M. J., Taylor, S., & Klatz, J. (2002). PTSD and the experience of pain: Research and clinical implications of shared vulnerability and mutual maintenance models. *Canadian Journal of Psychiatry, 47*, 903-907. https://doi.org/10.1177/070674370204701004

Asmundson, G. J. G. (2014). The emotional and physical pains of trauma: Contemporary and innovative approaches for treating co-occurring PTSD and chronic pain. *Depression and Anxiety, 31*(9), 717-720. https://doi.org/10.1002/da.22285

Baird, E., de Williams, A. C. C., Hearn, L., & Amris, K. (2017). Interventions for treating persistent pain in survivors of torture. *Cochrane Database of Systematic Reviews* (8). https://doi.org/10.1002/14651858.CD012051.pub2

Başoğlu, M., Livanou, M., & Crnobarić, C. (2007). Torture vs other cruel, inhuman, or degrading treatment: Is the distinction real or apparent? *Archives of General Psychiatry, 64*(3), 277-285. https://doi.org/10.1001/archpsyc.64.3.277

Beck, A. (2016). *Transcultural Cognitive Behaviour Therapy for Anxiety and Depression: A Practical Guide.* Taylor & Francis

Bosco, M. A., Gallinati, J. L., & Clark, M. E. (2013). Conceptualizing and Treating Comorbid Chronic Pain and PTSD. *Pain Research and Treatment.* https://doi.org/10.1155/2013/174728

Brennstuhl, M. J., Tarquinio, C., & Montel, S. (2014). Chronic Pain and PTSD: Evolving Views on Their Comorbidity. *Perspectives on Psychiatric Care, 51*(4), 295-304. https://doi.org/10.1111/ppc.12093

Brewin, C. R., Gregory, J. D., Lipton, M., & Burgess, N. (2010). Intrusive Images in Psychological Disorders: Characteristics, Neural Mechanisms, and Treatment Implications. *Psychological Review, 117*(1), 210-232. https://doi.org/10.1037/a0018113

Brown, L. A., LeBeau, R. T., Chat, K-Y. & Craske, M. G. (2016). Associative learning versus fear habituation as predictors of long-term extinction retention. *Cognition & emotion, 31*(4), 687-698. https://doi.org/10.1080/02699931.2016.1158695

Buhmann, C. (2014). Traumatized refugees: Morbidity, treatment and predictors of outcome. *Danish Medical Journal, 61*(8): B4871.

Carinci, A. J., Mehta, P., & Christo, P. J. (2010). Chronic Pain in Torture Victims. *Current Pain and Headache Reports, 14*(2), 73-79. https://doi.org/10.1007/s11916-010-0101-2

Carlsson, J. M., Mortensen, E. M., & Kastrup, M. (2006). Predictors of mental health and quality of life in male tortured refugees. *Nordic Journal of Psychiatry, 60*(1), 51-57. https://doi.org/10.1080/08039480500504982

Chimenti, R. L., Frey-Law, L. A., & Sluka, K. A. (2018). A mechanism-based approach to physical therapist management of pain. *Physical Therapy, 98*(5), 302-314, https://doi.org/10.1093/ptj/pzy030

Ciccone, D. S., Elliott, D. K., Chandler, H. K., Nayak, S., & Raphael, K. G. (2005). Sexual and physical abuse in women with fibromyalgia syndrome: a test of the trauma hypothesis. *Clinical Journal of Pain*, 21, 378-386. https://doi.org/10.1097/01.ajp.0000149796.08746.ea.

Craske, M. G., Treanor, M., Conway, C., Zbozinek, T., & Vervliet, B. (2014). Maximizing Exposure Therapy: An inhibitory learning approach. *Behaviour Research and Therapy, 58*, 10-23. doi:10.1016/j.brat.2014.04.006

Crombez, G., Eccleston, C., Van Damme, S., Vlaeyen, J. W., & Karoly, P. (2012). Fear-avoidance model of chronic pain: The next generation. *Clinical Journal of Pain, 28*(6), 475-483. https://doi.org/10.1097/AJP.0b013e3182385392

Cusack, K., Jonas, D. E., Forneris, C. A., Wines, C., Sonis, J., Middleton, J. C., . . . Gaynes, B. N. (2016). Psychological treatments for adults with posttraumatic stress disorder: A systematic review and meta-analysis. *Clinical Psychology Review, 43*, 128-141. https://doi.org/10.1016/j.cpr.2015.10.003

de Williams, A. C. C., & Baird, E. (2016). Special Considerations for the Treatment of Pain from Torture and War. *Current Anesthesiology Reports,*

6(4), 319-326. https://doi.org/10.1007/s40140-016-0187-0

de Williams, A. C. C. & van der Merwe, J. (2013). The psychological impact of torture. *British Journal of Pain, 7*(2), 101-106. https://doi.org/10.1177/2049463713483596

Defrin, R., Ginzburg, K., Solomon, Z., Polad, E., Bloch, M., Govezensky, M., & Schreiber, S. (2008). Quantitative testing of pain perception in subjects with PTSD — Implications for the mechanism of the coexistence between PTSD and chronic pain. *Pain, 138*(2), 450-459. https://doi.org/10.1016/j.pain.2008.05.006

Defrin, R., Lahav, Y., & Solomon, Z. (2017). Dysfunctional Pain Modulation in Torture Survivors: The Mediating Effect of PTSD. *Journal of Pain, 1*, 1-10. https://doi.org/10.1016/j.jpain.2016.09.005Ehlers, A., & Clark, D. (2000). A cognitive model of persistent posttraumatic stress disorder. *Behaviour Research and Therapy, 15*(3), 319-345. https://doi.org/10.1016/S0005-7967%2899%2900123-0

Dibaj, I., Halvorsen, J. O., Kennair, L. E. O., & Stenmark, H. I. (2017). An Evaluation of Combined Narrative Exposure Therapy and Physiotherapy for Comorbid PTSD and Chronic Pain in Torture Survivors *Torture, 27*(1), 13-27. https://doi.org/10.7146/torture.v27i1.26534

Ehlers, A., & Clark, D. (2000). A cognitive model of persistent posttraumatic stress disorder. *Behaviour Research and Therapy*, 8, 319-45

Frazier, P., Anders, S., Perera, S., Tomich, P., Tennen, H., Park, C., & Tashiro, T. (2009). Traumatic events among undergraduate students: Prevalence and associated symptoms. *Journal of Counseling Psychology, 56*(3), 450-460. https://doi.org/10.1037/a0016412

Geuze, E., Westenberg, H. G., Jochims, A., de Kloet, C. S., Bohus, M., Vermetten, E., & Schmahl, C. (2007). Altered pain processing in veterans with posttraumatic stress disorder. *Archives of General Psychiatry, 64*(1), 76-85. https://doi.org/10.1001/archpsyc.64.1.76

Greenhalgh, T, Thorne, S, Malterud, K. (2018). Time to challenge the spurious hierarchy of systematic over narrative reviews? *European Journal of Clinical Investigation*, 48 https://doi.org/10.1111/eci.12931

Giummarra, M. J., Casey, S. L., Devlin, A., Ioannou, L. J., Gibson, S. J., Georgiou-Karistianis, N., Jennings, P. A., Cameron, P. A., & Ponsford, J. (2017). Co-occurrence of posttraumatic stress symptoms, pain, and disability 12 months after traumatic injury. *Pain reports*, 2(5). https://doi.org/10.1097/PR9.0000000000000622

Haarbauer-Krupa, J., Taylor, C. A., Yue, J. K., Winkler, E. A., Pirracchio, R., Cooper, S. R., . . . Manley, G. T. (2017). Screening for Post-Traumatic Stress Disorder in a Civilian Emergency Department Population with Traumatic Brain Injury. *Journal of Neurotrauma, 34*(1), 50-58. https://doi.org/10.1089/neu.2015.4158

Hayes, S. C., & Hofmann, S. G. (2017). The third wave of cognitive behavioral therapy and the rise of process-based care. *World psychiatry: Official journal of the World Psychiatric Association (WPA)*, 16(3), 245–246. https://doi.org/10.1002/wps.20442

Hollander, M., Jong, J., Volders, S., Goossens, M., Smeets, R. & Vlaeyen, J. (2010). Fear reduction in patients with chronic pain: A learning theory perspective. *Expert review of neurotherapeutics, 10*(11). https://doi.org/10.1586/ern.10.115

Horn, R., & Keefe, A. (2016). Measuring change and changing measures: The development of a torture survivor specific measure of change, *Torture, 26*(2), 19-40. https://doi.org/10.7146/torture.v26i2.108116

Imel, Z. E., Laska, K., Jakupcak, M., & Simpson, T. L. (2013). Meta-analysis of dropout in treatments for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 81*(3), 394–404. https://doi.org/10.1037/a0031474

International Rehabilitation Council for Torture Victims (2017). *People on the Move: Torture and Migration - Data in the Fight against Impunity Thematic Report 2017*. https://irct.org/assets/uploads/pdf_20170906095246.pdf .

International Rehabilitation Council for Torture Victims (2018). *UNCAT Implementation Tool 2018 - Providing rehabilitation to victims of torture and other ill-treatment*. https://cti2024.org/content/images/CTI-Rehabilitation_Tool5-ENG-final.pdf

Jenewein, J., Wittmann, L., Moergeli, H., Creutzig, J., & Schnyder, U. (2009). Mutual influence of posttraumatic stress disorder symptoms and chronic pain among injured accident survivors: a longitudinal study. *Journal of Traumatic Stress, 22*(6), 540-548. https://doi.org/10.1002/jts.20453

Kale, E., Finset, A., Eikeland, H. L., & Gulbrandsen, P. (2011). Emotional cues and concerns in hospital encounters with non-Western immigrants as compared with Norwegians: An exploratory study. *Patient Education and Counseling, 84*(3), 325-331, https://doi.org/10.1016/j.pec.2011.05.009

Keller, A. S. (2002). Caring and advocating for

victims of torture. *The Lancet, 360 (Suppl)*, 55-56. https://doi.org/10.1016/S0140-6736(02)11823-X

Kind, S., & Otis, J. D. (2019) The Interaction Between Chronic Pain and PTSD. *Current Pain Headache Report, 23*(12): 91. https://doi.org/10.1007/s11916-019-0828-3.

Kirmayer, L.J., Ban, L., & Jaranson, J. (2018). Cultural logics of emotion: implications for understanding torture and its sequelae. *Torture, 28*(1), 84–100.

Koren, D., Norman, D., Cohen, A., Berman, J., & Klein, E. M. (2005). Increased PTSD Risk With Combat-Related Injury: A Matched Comparison Study of Injured and Uninjured Soldiers Experiencing the Same Combat Events. *The American Journal of Psychiatry, 162*(2), 276-282. https://doi.org/10.1176/appi.ajp.162.2.276

Kumpula, M., Orcutt, H., Bardeen, J. & Varkovitzky, R. (2011). Peritraumatic Dissociation and Experiential Avoidance as Prospective Predictors of Posttraumatic Stress Symptoms. *Journal of Abnormal Psychology, 120*(3), 617-627. https://doi.org/10.1037/a0023927.

Leung, A., Shukla, S., Fallah, A., Song, D., Lin, L., Golshan, S., Tsai, A., Jak, A., Polston, G. & Lee, R. (2016). Repetitive Transcranial Magnetic Stimulation in Managing Mild Traumatic Brain Injury Related Headaches. *Neuromodulation: Technology at the Neural Interface*, *19:* 133-141. https://doi.org/10.1111/ner.12364

Levy-Gigi, E., Kéri, S., Myers, C. E., Lencovsky, Z., Sharvit-Benbaji, H., Orr, S. P., . . . Gluck, M.A. (2012). Individuals with posttraumatic stress disorder show a selective deficit in generalization of associative learning. *Neuropsychology, 26*(6), 758-767. https://doi.org/10.1037/a0029361

Liedl, A., & Knaevelsrud, C. (2008). Chronic pain and PTSD: The perpetual avoidance model and its treatment implications. *Torture, 18*, 69-76.

Linton, S. (2013). A Transdiagnostic Approach to Pain and Emotion. *Journal of Applied Biobehavioral Research, 18*(2), 82-103. https://doi.org/10.1111/jabr.12007

López-Martínez, A. E. (2015). The overlap of PTSD and chronic pain: a challenge for rehabilitation interventions. *Physical Therapy Review, 20*(1), 59-61. https://doi.org/10.1179/1743288X14Y.0000000159

Marx, B., & Sloan, D. (2005). Peritraumatic dissociation and experiential avoidance as predictors of traumatic stress symptomatology. *Behaviour research and therapy, 43*(5), 569-83. https://doi.org/10.1016/j.brat.2004.04.004

McColl, H., Higson-Smith, C., Gjerding, S., Omar, M. H., Rahman, B. A., Hamed, M., . . . Awad, Z. (2010). Rehabilitation of torture survivors in five countries: Common themes and challenges. *International Journal of Mental Health Systems, 4*(16), 4-16. https://doi.org/10.1186/1752-4458-4-16

Merskey, H., & Bogduk, N. (1994). *Classification of Chronic Pain.* (2nd ed.). IASP Press.

Mollayeva, T., Cassidy, J. D., Shapiro, C. M., Mollayeva, S., & Colantonio, A. (2017). Concussion/mild traumatic brain injury-related chronic pain in males and females: A diagnostic modelling study. *Medicine (Baltimore)*, *96*(7), https://doi.org/10.1097/MD.0000000000005917

Morville, A-L., Erlandsson, L-K., Danneskiold-Samsoe, B., Amris, K., & Eklund, M. (2015). Satisfaction with daily occupations amongst asylum seekers in Denmark. *Scandinavian Journal of Occupational Therapy, 22*(3), 207- 215. https://doi.org/10.3109/11038128.2014.982702

Moseley, G. L. Z., N., Birklein, F., Marinus, J., van Hilten, J. J., & Luomajoki, H. (2008). Thinking about movement hurts: The effect of motor imagery on pain and swelling in people with chronic arm pain. *Arthritis Care & Research, 59*(5), 623-631. https://doi.org/10.1002/art.23580

Neuner, F. (2008). Stabilisierung vor Konfrontation in der Traumatherapie –Grundregel oder Mythos? *Verhaltenstherapie, 18*(2), 109-118. https://doi.org/10.1159/000134006

Nickerson, A., Bryant, R. A., Silove, D., & Steel, Z. (2011). A critical review of psychological treatments of posttraumatic stress disorder in refugees. *Clinical Psychology Review, 31*(3), 399-417. https://doi.org/10.1016/j.cpr.2010.10.004

Nordin, L, Perrin, S. (2019). Pain and posttraumatic stress disorder in refugees who survived torture: The role of pain catastrophizing and trauma-related beliefs. *European Journal of Pain*. 2019; 23: 1497– 1506. https://doi.org/10.1002/ejp.1415

Norwegian Red Cross (2020) *Torturert og glemt? Identifsering og rehabilitering av torturutsatte i Norge.* Oslo: Røde Kors. https://www.rodekors.no/globalassets/globalt/rapporter-program-avtaler/humanitar-analyse-rapporter/torturert-og-glemt-2020.pdf [Accessed May 2020]

Patel, N., Kellezi, B., & de Williams, A. C. C. (2014). Psychological, social and welfare interventions for psychological health and well-being of torture survivors. *Cochrane Database Systematic Reviews*. https://doi.org/10.1002/14651858.CD009317.pub2

Patel, N., de Williams, A. C. C., & Kellezi, B. (2016). Reviewing outcomes of psychological interventions with torture survivors: Conceptual,

methodological and ethical Issues. *Torture, 26*(1), 2-16. https://doi.org/10.7146/torture.v26i1.108060

Peacock, S., & Patel, S. (2008). Cultural Influences on Pain. *Reviews in Pain, 1*(2), 6–9. https://doi.org/10.1177/204946370800100203

Perez-Sales, P. (2017). Editorial: Psychotherapy for torture survivors – Suggested pathways for research. *Torture, 27*(1). https://doi.org/10.7146/torture.v27i1.26528

Phifer, J., Skelton, K., Weiss, T., Schwartz, A. C., Wingo, A., Gillespie, C. F., . . . Ressler, K. J. (2011). Pain symptomatology and pain medication use in civilian PTSD. *Pain, 152*(10), 2233-2240. https://doi.org/10.1016/j.pain.2011.04.019

Pittig, A., Treanor, M., LeBeau, R. & Craske, M. G. (2018). The role of associative fear and avoidance learning in anxiety disorders: Gaps and directions for future research. *Neuroscience & Biobehavioral Reviews, 88*, 117-140. https://doi.org/10.1016/j.neubiorev.2018.03.015.

Prip, K., Persson, A.L., & Sjölund, B. H. (2012). Sensory functions in the foot soles in victims of generalized torture, in victims also beaten under the feet (falanga) and in healthy controls - A blinded study using quantitative sensory testing. *BMC International Health & Human Rights, 39*. https://doi.org/10.1186/1472-698X-12-39

Quiroga, J., & Jaranson, J. M. (2005). Politically-motivated torture and its survivors: A desk study review of the literature. *Torture (Thematic Issue), 15*(2-3), 1-111.

Rometsch-Ogioun El Sount, C., Windthorst, P., Denkinger, J., Ziser, K., Nikendei, C., Kindermann, D., . . . Junne, F. (2019). Chronic pain in refugees with posttraumatic stress disorder (PTSD): A systematic review on patients' characteristics and specific interventions. *Journal of Psychosomatic Research*, 118, 83-97. https://doi.org/10.1016/j.jpsychores.2018.07.014

Roth, R. S., Geisser, M. E., & Bates, R. (2008). The relation of post-traumatic stress symptoms to depression and pain in patients with accident-related chronic pain. *The Journal of Pain, 9*(7), 588-596. https://doi.org/10.1016/j.jpain.2008.01.333

Santiago, P. N., Ursano, R. J., Gray, C. L., Pynoos, R. S., Spiegel, D., Lewis-Fernandez, R., . . . Fullerton, C. S. (2013). A Systematic Review of PTSD Prevalence and Trajectories in DSM-5 Defined Trauma Exposed Populations: Intentional and Non-Intentional Traumatic Events. *PLOS One, 8*(4). https://doi.org/10.1371/journal.pone.0059236

Sareen, J., Cox, B., Stein, M., Afifi, T., Fleet, C., & Asmundson, G. J. G. (2007). Physical and mental comorbidity, disability, and suicidal behavior associated with posttraumatic stress disorder in a large community sample. *Psychosomatic Medicine, 69*, 242-248. https://doi.org/10.1097/PSY.0b013e31803146d8

Sharp, T. J., & Harvey, A. (2001). Chronic pain and post-traumatic stress disorder: Mutual maintenance? *Clinical Psychology Review, 21*. https://doi.org/10.1016/s0272-7358(00)00071-4

Shipherd, J. C., Keyes, M., Jovanovic, T., Ready, D. J., Baltzell, D., Worley, V., . . . Duncan, E. (2007). Veterans seeking treatment for posttraumatic stress disorder: What about comorbid chronic pain? *Journal of Rehabilitation Research & Development, 44*(2), 153-166. https://doi.org/10.1682/jrrd.2006.06.0065

Silove, D., Ventevogel, P., & Rees, S. (2017). The contemporary refugee crisis: An overview of mental health challenges. *World Psychiatry, 16*(2), 130-139. https://doi.org/10.1002/wps.20438

Siqveland, J., Ruud, T., & Hauff, E. (2017). Post-traumatic stress disorder moderates the relationship between trauma exposure and chronic pain. *European Journal of Psychotraumatology, 8*(1). https://doi.org/10.1080/20008198.2017.1375337

Smith, E., Patel, N. & MacMillan, L. (2010). A remedy for torture survivors in international law: Interpreting rehabilitation. Discussion Paper. London: Medical Foundation for the Care of Victims of Torture. https://www.yumpu.com/en/document/read/38899857/a-remedy-for-torture-survivors-in-international-law-freedom-from-

Stam, R. (2007). PTSD and stress sensitisation: A tale of brain and body Part 1: Human studies. *Neuroscience and Biobehavioral Reviews, 31*(4), 530-557. https://doi.org/10.1016/j.neubiorev.2006.11.010

Strigo, I.A., Simmons, A.N., Matthews, S.C., Grimes, E.M., Allard, C.B., Reinhardt, L.E., . . . Stein, M.B., (2010). Neural correlates of altered pain response in women with posttraumatic stress disorder from intimate partner violence. *Biological Psychiatry, 68*(5), 442-450. https://doi.org10.1016/j.biopsych.2010.03.034

Sueki, D. G., Dunleavy, K., Puentedura, E. J., Spielholz, N. I., & Cheng, M. S. (2014). The role of associative learning and fear in the development of chronic pain – a comparison of chronic pain and post-traumatic stress disorder. *Physical Therapy Reviews, 19*(5), 352-366. https://doi.org/10.1179/1743288X14Y.0000000154

Sullivan, J. L. M., & Adams, H. (2010). Psychosocial

Treatment Techniques to Augment the Impact of Physiotherapy Interventions for Low Back Pain. *Physiotherapy Canada, 62*(3), 180-189. https://doi.org/10.3138/physio.62.3.180

Teodorescu, D. S., Heir, T., Siqveland, J., Hauff, E., Wentzel-Larsen, T,. & Lien, L. (2015). Chronic pain in multi-traumatized outpatients with a refugee background resettled in Norway: a cross-sectional study. *BMC Psychology, 3*(7). https://doi.org/10.1186/s40359-015-0064-5

Thomsen, A. B., Eriksen, J., & Smidt-Nielsen, K. (2000). Chronic pain in torture survivors. *Forensic Science International, 108*(3), 155-163. https://doi.org/10.1016/s0379-0738(99)00209-1

Treede, R.-D., Rief, W., Barke, A., Aziz, Q., Bennett, M. I., Benoliel, R., . . . Wangw, S.-J. (2015). A classification of chronic pain for ICD-11. *Pain, 156*(6), 1003-1007. https://doi.org/10.1097/j.pain.0000000000000160

UN General Assembly, *Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment*, 10 December 1984, United Nations, Treaty Series, vol. 1465, p. 85. https://www.refworld.org/docid/3ae6b3a94.html

Vlaeyen, J. W., & Linton, S. J. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain, 85*, 317-332. https://doi.org/10.1016/s0304-3959(99)00242-0

Wald, J. (2008). Interoceptive Exposure as a Prelude to Trauma-Related Exposure Therapy in a Case of Posttraumatic Stress Disorder With Substantial Comorbidity. *Journal of Cognitive Psychotherapy, 22*(4), 331-345. https://doi.org/10.1891/0889-8391.22.4.331

Wang, S-J., Bytyçi, A., Izeti, S., Kallaba, M., Rushiti, F., Montgomery, E., Modvig, J. (2017). A novel bio-psycho-social approach for rehabilitation of traumaticed victims of torture and war in the post-conflict context: A pilot randomized controlled trial in Kosovo. *BMC Conflict and Health, 10:* 34. https://doi.org/10.1186/s13031-016-0100-y

Weiss, W., Ugueto, A., Mahmooth, Z., Murray, L., Hall, B., Nadison, M., . . . Bolton, P. (2016). Mental health interventions and priorities for research for adult survivors of torture and systematic violence: A review of the literature. *Torture Journal, 26*(1), 17-44. https://doi.org/10.7146/torture.v26i1.108061