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Addition of a Scale of Thought Suppression to the West-Haven Yale Multidimensional Pain Inventory

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ADDITION OF A SCALE OF THOUGHT SUPPRESSION TO THE

WEST-HAVEN YALE MULTIDIMENSIONAL PAIN INVENTORY

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Psychology

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Title: Addition of a Scale of Thought Suppression to the West-Haven Yale Multidimensional Pain Inventory

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The purpose of the study was to extend the current research on the effect of thought suppression on chronic pain outcomes. Previous research recognizes that chronic pain is a complex experience with significant cognitive, emotional, and biological factors and that assessment of chronic pain should include evaluation of these factors for prognostic and treatment purposes. Additionally, previous research has identified a relationship between thought suppression and acute pain sensitivity and relationships between coping strategies and pain outcomes; however, little research has investigated the relationship between thought suppression and pain outcomes. It was hypothesized that higher scores of thought suppression would predict more severe symptoms of depression and anxiety, higher pain-related disability, and lower quality of life. The results of linear regression provided initial support for this hypothesis. Individuals who reported a higher tendency to engage in thought suppression were more likely to experience symptoms of depression, experience higher levels of pain-related disability, and experience a lower quality of life. More research is needed to establish the incremental validity of adding a scale of suppression to chronic pain assessment; however, treatment interventions to reduce thought suppression are indicated by these findings.

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CHAPTER 1

REVIEW OF RELATED LITERATURE

Chronic Pain and Demand for Assessment

Pain is widely considered the oldest and most universal affliction of mankind (Meldrum, 2003). Terman and Bonica (2001) describe pain as a "complex constellation of unpleasant sensory, emotional, and cognitive experiences provoked by real or perceived tissue damage and manifested by certain autonomic, psychological, and behavioral reactions" (p.73). Although pain is defined in various ways, it is often dichotomized into acute pain and chronic pain. Acute pain lessens as the tissue is gradually repaired and does not persist after an evident injury has healed (Williams & Craig, 2016). The adaptive utility of acute pain is widely recognized (Millan, 1999). Acute pain alerts us to extant tissue trauma and focuses our attention upon the injury to prevent further damage. It motivates us to rest and seek treatment to allow the injury to heal and our bodies to return to homeostasis. Even memories of past pain alert us to dangerous situations to help prevent future injury. While acute pain is an adaptive system within the body, it is debatable if chronic pain also has this adaptive function (Millan, 1999).

Chronic pain (CP) is a persistent, severe pain condition that continues well after the end of the healing phase of an injury (Merskey & Bogduk, 1994). Essentially, acute pain will remit, but CP will stubbornly persist long after any evident injury. Because it is often difficult to determine how long the healing phase for a particular injury ought to last, CP is not defined in terms of persistence after the expected healing phase (Apkarian, Baliki, & Geha, 2009). For this reason, most researchers tend to define CP in terms of months, typically as any pain conditions that last over three to six months (Apkarian, Baliki, & Geha, 2009). Chronic pain tends to be categorized by location (e.g. lower back) or type (e.g. neuropathic or myofascial) (Apkarian,

Baliki, & Geha, 2009). The most common location of CP is lower back pain comprising as high as 84% of cases of CP, with a national yearly prevalence of 23% (Balagué, Mannion, Pellisé, & Cedraschi, 2012).

Additionally, CP appears to be deleterious to overall health compared to the apparent adaptive utility of acute pain. As discussed in Millan (1999), CP does not provide new, useful information that acute pain does. Many patients think that their chronic pain suggests that their tissue is not yet healed and that pain flares suggest further injury; however, this is often not the case. The patient should instead move more to prevent atrophy. Thus, CP not only fails to provide positive effects, it is even detrimental to the individual by encouraging atrophy and negatively impacting quality of life and mood (Millan, 1999). In CP samples, negative outcomes (disability, poor quality of life) and mental health concerns (depression, anxiety) are significantly more prevalent than in the general population (Scott et al., 2007; Bair, Wu, Damush, Sutherland, & Kroenke, 2008).

Chronic Pain is as common as it is injurious. The World Health Organization estimates that worldwide yearly prevalence of CP is approximately 37% (Tsang et al., 2008). Estimates for the United States place yearly prevalence slightly lower at around 30% or approximately 100 million US adults (Institute of Medicine, 2011; Andersson, 1998). However, lifetime incidence appears to be over 70% (Andersson, 1998). It was found to be the second most common reason to see a physician (Hart et al., 1995). Because so many individuals suffer from severe, unremitting pain, it has a large impact on the economy. It is estimated that 11-12% of the US population reports disability due to low back pain (Balagué et al., 2012). Estimates of the national annual costs of chronic pain (lost work days, treatment, disability payments, and legal fees) range from $550 billion to $625 billion (Institute of Medicine, 2011).

Although there are multiple theories as to why CP exists, a prominent one defined by

Millian (1999), conjectures that CP is a by-product of the evolutionary system. That is, we

evolved pain for its adaptive function but failed to develop a perfect system. Irrespective of why

CP exists, the simple fact is that it does – pervasively. Given the prevalence and associated costs,

assessment and treatment of CP is a significant public health concern.

Multidimensionality of Pain

Exploration of the nature of chronic pain and its related factors is germane to the topic of

pain assessment; study of these factors has provided significant advancement in comprehension

of the problem and the ability to provide valid assessment. Pain was initially considered from a

unidimensional model in which biological injury was the only causal factor; however, today's

models of pain include many psychological and social causal factors in addition to biological. As

new psychosocial factors are identified by research, assessment of pain evolves by adding

corresponding scales to pain assessment batteries.

Unidimensional theories of pain began in ancient times, including Hippocrate's theory

that pain was an imbalance of vital fluids (Linton, 2005) and Aristotle's theory that pain was an

emotion (Perl, 2007). Later works of Herophilus and Aelius Galenus led to the discovery of the

peripheral nervous system and its role in pain sensation (see Ochs, 2004; Rey, 1995). Pain

research greatly advanced during the Renaissance when Descartes moved away from the

spiritualized theories of medieval theologians and built upon the work of Herophilus and Galen

by proposing a mechanical explanation (Moayedi & Davis, 2013). The core of his theory, that

pain is simply the brain receiving a message of peripheral injury through ascending nerves, has

since dominated the field of pain research. Additionally, unidimensional theories have persisted

into modern times with such theories as Specificity Theory. Specificity Theory proposes that

there are different types of sensory afferents, and some afferents must be used to specifically transmit pain signals to the brain (see Perl, 2007). These unidimensional theories have evolved into the more modern construct of nociception, or "noxious perception" (Perl, 2007). Nociception is essentially considered to be: 1) the activation of a nociceptor (transduction), 2) conduction of that signal through dedicated pathways in the peripheral nervous system to the spinal cord, 3) transmission of the information up the spinal cord to the thalamus, and 4) perception of sensory stimuli by the cortex (Ness, 1999; Kandel & Schwartz, 2000; Ringkamp, Raja, Campbell, & Meyer, 2013; Dubin, & Patapoutian, 2010; Sahlin, 1986; Dafny, 2012). This model of pain is highly accessible; and most theorists consider it generally accurate, if slightly simplified, in explaining acute pain (Millan, 1999; Turk & Wilson, 2012).

However, unidimensional theories such as nociception fail to explain several attributes of chronic pain. First, there is a lack of correspondence between tissue injury or pathology and subjective pain reports. If pain were determined by only nociceptive systems, then pain severity should correlate with extant tissue pathology; however, studies have found factors such as extant injury or inflammation to be non-significant predictors of subjective pain severity reports (Bogduk, 2012; Cheung et al., 2009; Guermazi et al., 2012; Register et al., 2012). In response to these clinical observations that the pain experience can vary almost irrespective of observable tissue damage, specificity theorists often argued that peripheral nociceptors had become hyper-sensitized by some unknown mechanism (Coderre, Katz, Vaccarino, & Melzack, 1993). While research has indicated that nociceptors do become sensitized under specific conditions (Dafny, 2012; Dubin, & Patapoutian, 2010; Ringkamp et al., 2013), peripheral sensitization has not been demonstrated to fully account for the desperate relationship between pain severity and

observable injury (Coderre, Katz, Vaccarino, & Melzack, 1993). Thus, there are likely central mechanisms involved in determining pain intensity.

Another clinical observation that contradicts unidimensional theories is that pain can occur without connection to nociceptors. Ablation of nerves, even with modern procedures, can attenuate but not completely alleviate pain (Leggett et al., 2014). Similarly, many individuals continue to experience pain in a limb after amputation or loss of the limb, known as phantom limb pain (Melzack, 1989). Because pain is believed to originate in nociceptors, unidimensional models would suggest that pain should cease if the activating nociceptor is removed (as in the case of amputation) or disconnected from the CNS (as when a nerve is severed). Because this does not occur, these observations strongly suggest that there must be significant factors in the central nervous system involved in determining the pain experience other than afferent nociceptive signals.

There is other evidence suggesting the existence of central mechanisms influencing chronic pain. It has been observed that most people with chronic pain have multiple, disconnected sites of pain (Croft et al., 2010). This is problematic for unidimensional models of nociception, as they suggest that individuals should have pain localized around a single point of injury rather than multiple, simultaneous pain locations that are isolated and detached from each other (unless the individual suffers from multiple injuries). Central sensitization has long appeared to be a far more effective theory in explaining the phenomenon of fibromyalgia and cases of multiple, discrete pain sites than only nociception (Coderre, Katz, Vaccarino, & Melzack, 1993; Donelson, Silva, & Murphy, 1990).

This research, among others, led to one of the most important paradigm shifting theories in pain literature. The Gate-Control Theory (Melzack & Wall, 1965) proposed a system of dorsal

horn mediation. Melzack, Stotler, and Livingston (1958) previously demonstrated the effect of cortical activity in perception. They hypothesized that a system existed in which descending information from the brain down through the spinal cord moderated the cellular activity of interneurons in the dorsal horn, which in turn alters the signals assending through secondary afferents (Melzack & Wall, 1965; Melzack, 1999). More specifically, interneurons could hyperpolarize the secondary afferents, inhibiting their activity and attenuating pain signals. Alternatively, these interneurons could themselves be inhibited, creating a net effect of hypersensitizing secondary afferents and increasing nociceptive transmission. The model included large and small diameter primary afferents enervating the secondary afferents. However, unlike in previous models, these primary afferents interacted with the inhibitory interneurons of the substantia gelatinosa. Large fiber afferents excited the inhibitory interneurons, inhibiting secondary nociceptive afferents. Small fiber afferents inhibited the inhibitory interneurons, which sensitized the secondary afferents. Crucially, the model also included an efferent input into this system in that descending fibers could enervate the inhibitory interneurons, thereby inhibiting the secondary afferents (Melzack & Wall, 1965).

Certainly, the proposed model of substantia gelatinosa circuitry was significant in itself; however, the truly revolutionary element of their theoretical model was the role of descending neurons (Moayedi & Davis, 2012). The implication of their model was that cortical activity – an individual's thoughts and feelings – can alter ascending pain signals. Although this was not completely novel in that psychological factors had been previously observed in pain, previous multidimensional theories had been only abstract. The gate-control theory, in contrast, provided a concrete mechanism connecting cortical activity and pain which explained how mood and

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cognitions could affect pain experience. Afferent nociception was no longer the only important factor determining pain, thoughts and feelings were important factors as well.

Not surprisingly, the neurological nuances of the gate-control theory are today considered outdated, or at least over-simplified, in comparison to our current understanding of neural architecture in the substantia gelatinosa (Davis & Moayedi, 2013). Melzack (1989, 1990, 1999, 2001) himself evolved the concepts of pain perception along with the general theory of somesthesis, the faculty of bodily perception, by publishing the neuromatrix model. Several regions of the central nervous system have been implicated in pain modulation including the prefrontal, anterior cingulate, and insular cortices; amygdala; periventricular and posterolateral hypothalamus; and dorsolateral pons (Kwon, Altin, Duenas, & Alev, 2014); however, one of the most research is the periaqueductal gray (PAG), an area of grey matter in the mid brain around the cerebral aqueduct, has been observed for some time to result in analgesic effects (Behbehani, 1995). This region may be especially significant in the context of cognitive and emotional factors in pain as this region appears to receive projects from regions of the cortex and limbic system (Behbehani, 1995). The PAG does not appear to directly project to the dorsal horn of the spinal column and instead appears to affect the rostral ventromedial medulla (RVM; Kwon, Altin, Duenas, & Alev, 2014). The RVM contains cells that are either faciliatory or inhibitory on ascending pain pathways which project to the dorsal horn. The inhibitory cells are enervated by opioids and signals from the PAG. The descending signals from the RVM form excitatory connections with inhibitory interneurons in the dorsal horn which release endogenous opioid neurotransmitters. Endorphins bind to mu opioid receptors on the axons of primary afferents and inhibits synaptic release of substance P and other excitatory neurotransmitters, reducing activation of the secondary afferents traversing the spinothalamic tract (Kwon, Altin, Duenas, &

Alev, 2014). This is a cursory review of the research exploring pain modulation, but establishing this chain of mechanisms from the cortex, to PAG, to RVM, and finally to the dorsal horn demonstrates that central mechanisms do appear to exist that can exert significant effects on the experience of both acute and chronic pain.

Biopsychosocial Factors of Pain

Melzack and Casey (1968) published a multidimensional model of pain in which they model pain in three broad dimensions: sensory-discriminative, affective-motivational, and cognitive-evaluative. The sensory dimension informs the pain experience of location, intensity, and duration. The affective-motivational dimension contributes aversion and emotion. The cognitive-evaluative dimension determines the salience of pain, pain appraisals, and contextual factors such as cultural beliefs and social influences. While research attempts to separate these dimensions to better understand each, it must also be recognized that these dimensions influence one another (Melzack & Casey, 1968).

The sensory-discriminative dimension of pain is subserved by the somatosensory cortex, spinal cord, brain stem, and thalamus (Bushnell et al.,1999; Flor, 2012; Haggard, Iannetti, & Longo, 2013). The spinothalamic tract and somatosensory cortex are interconnected regions of the central nervous system (CNS) that receive nociceptive information from the periphery (Flor, 2012). These appear to be the regions to process the intensity of the pain experienced, the location at which the pain is perceived, and the type of the pain sensation such as burning or stinging (Flor, 2012). A neural pathway (starting in the dorsolateral prefrontal cortex and anterior cingulate cortex) projects down into the brain stem and spinal cord, modulating ascending pain signals (Bingel & Tracey, 2008). This descending inhibition is part of an intrinsic antinociceptive

system previously proposed as in important mechanism underlying the interactions of pain dimensions (Fields & Basbaum, 1999).

The cognitive-evaluative dimension of pain is subserved by the anterior and mid cingulate cortex, insular cortex, prefrontal cortex (Apkerian, Bushnell, Treede, & Zubleta, 2005; Simons, Elman, & Borsook, 2014). This dimension of pain is affected by how much individuals think about their pain and the content of their pain-related thoughts (Melzack & Casey, 1968). Attentional processes, such as how much the individual is thinking about pain and the influence of the pain salience, appear to have small to medium effect sizes on pain intensity and mood (Bantick et al., 2002; Pincus & Morley, 2001; Van Damme, Legrain, Vogt, & Crombez, 2010). Neurologically, the anterior and mid cingulate cortex are heavily associated with attentional processes in pain (Torta & Cauda, 2011). Altered functioning in these regions is associated with increased salience of pain and pain severity (Downar et al., 2003). This has treatment implications, including the utility of the patient's distraction from their pain. However, this is often difficult for patients to carry out since CP appears to slowly develop attentional biases towards pain sensation content (Crombez, Van Ryckeghem, Eccleston, & Van Damme, 2013). Thus, pain salience and patients' ability to successfully distract themselves should be included in assessment of CP.

Pain catastrophizing is one of the most widely recognized pain factors subsumed in the cognitive-evaluation dimension of pain. Catastrophizing is a cognitive process of assuming the worst or interpreting problems as major calamities and ruminating on these assumptions (Quartana, Campbell, & Edwards, 2009). In chronic pain, the content of thoughts characterize pain as horrible and unbearable. A preponderance of research has evaluated the relationship between catastrophizing and many CP outcomes. Significant effects of small to medium (with

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some large) effect sizes have been found for pain severity, pain related disability, and affective distress (Forsythe, Thorn, Day, & Shelby, 2011; Gracely et al., 2004; Knussen & McParland, 2009; Sullivan et al., 2001; Turner, Jensen,& Romano, 2000). The fear-avoidance model proposed by Vlaeyen and Linton (2000, 2012) theorizes that pain catastrophizing mediates the relationship between pain experience and fear appraisals. Due to the clear effect of catastrophizing on the pain experience, it is widely considered essential to address catastrophizing in assessment and treatment of CP (Turk, Fillingim, Ohrbach, & Patel, 2016).

One of the most impactful processes in the cognitive-evaluative dimension is a patient's pain appraisal. Pain appraisal is the degree to which individuals perceive their pain as stressful or overwhelming (Jackson, Wang, & Fan, 2014). This construct is based on the transactional model of stress and coping published by Lazarus and Folkman (1984). The model postulates that stressors are evaluated through two parallel appraisal processes. The primary appraisal evaluates how much of a challenge the threat poses or how much damage the stressor can do. The secondary appraisal evaluates the available resources and ability to cope. If the primary appraisal surpasses the secondary appraisal such that the difficulty of the stressor exceeds our perceived capacity, then the individual experiences threat. However, if capacity exceeds difficulty, then the stressor is experienced as a challenge to overcome (Lazarus & Folkman, 1984). This model has received significant corroboration from stress and coping research due to its ability to explain the effects of various psychological factors upon stress (Brown & Vanable, 2008). Factors may include the role of self-efficacy in decreasing stress levels (Brown & Vanable, 2008). Self-efficacy is a process of self-evaluation of one's capacity to successfully reach desired outcomes (Bandura, 1977, 1993, 1994). Patients across pain types who report higher self-efficacy tend to experience less functional impairment and affective distress and lower pain severity (Abbott,

Tyni-Lenné, & Hedlund, 2010; Dobkin et al., 2010; Knittle et al., 2011). A recent meta-analysis found medium effect sizes between self-efficacy and pain disability, affective distress, and pain severity (Jackson, Wang, Wang, & Fan, 2014). Structural analysis has indicated that self-efficacy partially mediates the relationship between pain intensity and disability, as well as the relationship between pain appraisals and disability (Arnstein, Caudill, Mandle, Norris,& Beasley, 1999; Dehghani, Sharpe, & Nicholas, 2010).

There are several factors that may contribute to pain appraisals. Positive or challenge appraisals have been associated with better pain outcomes (DeGood & Cook, 2011; Jackson, Wang, & Fan, 2014; Unruh & Ritchie 1998). Additionally, pain appraisals and subsequent pain severity effects are influenced, in part, by prior pain experiences (Goubert, Vlaeyan, Crombez, & Craig, 2011; Wiech et al., 2014). Another factor that significantly contributes to pain appraisals is pain beliefs (Turk and Okifuji, 2002). These include notions about the causes of pain, beliefs that pain is a source of future damage or future harm, and beliefs about the ability to cope or self-efficacy. Another term used in CP literature is pain "expectations," but beliefs and expectations appear to synonymously refer to the same construct. This construct, however labelled, is characterized by convictions or predictions about the pain or factors related to pain such as treatments or coping mechanisms (Atlas & Wager, 2012; Turk & Okifuji, 2002).

The belief that pain emanating from residual injury encourages preoccupation with somatic symptoms makes it more likely that the sensations will be interpreted as noxious and having lower pain thresholds (Turk & Okifuji, 2002). Kinesiophobia is a fear-avoidance behavior in which pain patients will avoid movement for fear of re-injury (Kori, 1990; Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts, 1995). Patient beliefs may similarly include a worry that pain is a source of future damage or future harm. Such beliefs, often referred to as fear

appraisals, lend themselves to the primary appraisal and likely increase the net stress reaction (Crombez, Vlaeyen, Heuts, & Lysens, 1999; Unruh & Ritchie 1998). Meta analyses have indicated small to medium effect sizes between threat appraisals and pain intensity and lower pain tolerance; medium to large effect sizes between threat appraisals and pain related disability and passive coping (Jackson, Wang, & Fan, 2014; Zale et al., 2013). Assessment and subsequent treatment of maladaptive pain beliefs are positively associated with changes in pain severity and disability (Jensen, Turner, & Romano, 2007; Nieto, Raichle, Jensen, & Miró, 2012). In light of the clear role of beliefs in the pain experience, clinical assessment of CP should include evaluation of pain beliefs (Turk, Fillingim, Ohrbach, & Patel, 2016).

The effect of the cognitive-evaluative dimension of pain is perhaps best demonstrated by the effect of placebos. Placebo and nocebo medications have a significant effect on pain severity (Benedetti et al., 2003; Colloca, & Benedetti, 2006, 2009; Montgomery & Kirsch, 1997). Patients who undergo placebo "sham" medical operations report the same rate of pain reduction as those undergoing genuine medical operations (Bradley et al., 2002; Moseley et al., 2002; Kirkley et al., 2008; Sihvonen et al., 2013). Neuroimaging studies found reduced activity in nociceptive portions of the insular cortex, thalamus, and anterior cingulate cortex in response to placebo treatment of pain (Price, Craggs, Verne, Perlstein, & Robinson, 2007; Wager et al., 2004). These studies indicate that placebo analgesia reflects actual alterations in neurological function, not simply experimental effects (Atlas & Wager, 2012). Placebo analgesia has also been associated with reduced nociceptive activity in the spinal cord (Goffaux, Redmond, Rainville, & Marchand, 2007; Goffaux, de Souza, Potvin, & Marchand, 2009 ; Matre, Casey, & Knardahl, 2006).

The affective-motivational dimension of pain, including psychological factors such as mood and motivation, appear to heavily influence pain appraisals as well (Melzack & Casey, 1968). Neuroimaging studies have associated pain with activity in limbic structures including the hypothalamus, amygdala, hippocampus, anterior cingulate cortex, and insular cortex (Price, 2000; Rouwette, Vanelderen, Roubos, Kozicz, & Vissers, 2012; Segerdahl, Mezue, O'Kell, Farra, & Tracey, 2015; Uddin, 2015). Pain intensity appears to be heavily affected by mood state at the time of pain (Fernandez, 2002; Gatchel, Peng, Peters, Fuchs, & Turk, 2007; Villemure, & Bushnell, 2009; Wiech & Tracey, 2009). This seems reasonable given the role of the limbic system in descending analgesic systems (Bingel & Tracey, 2008; Fields & Basbaum, 1999). Clinically significant anxiety and depression has substantial effects on valuable outcome variables such as disability and quality of life (Bair, Wu, Damush, Sutherland, & Kroenke, 2008; Beesdo et al., 2010; McWilliams, Cox, & Enns, 2003; Scott et al., 2007;). Additonally, structural equation modeling has indicated that affective distress is a significant mediator between pain severity and subsequent disability and quality of life (Abbott, Tyni-Lenné, & Hedlund, 2010).

The social context in which pain occurs is another dimension of the pain experience. Social support affects acute pain severity and tolerance (Montoya, Larbig, Braun, Preissl, & Birbaumer, 2004), and even the presence of a supportive significant other can change pain processing (Eisenberger, Master, Inagaki, Taylor, & Shirinyan, 2011). The literature exploring the effect of social support on severity of pain, affective distress, quality of life, and pain-related disability is beyond the scope of the present study due to its extensiveness and complexity.

Suppression and Chronic Pain

Recent studies have indicated that there is likely at least one more significant factor in the pain experience than those previously discussed. Kerns, Rosenberg, and Jacob (1994) observed a

relationship between anger suppression and acute pain. While neither the experience of anger or the expression of anger were significant predictors of reported pain or disability, anger suppression was predictive. In fact, anger suppression was more predictive of reported pain than several other variables including depression and daily activities (Kerns, Rosenberg, & Jacob, 1994). This simple observation sparked an interest in the relationship between emotional suppression and pain.

Research on thought suppression has demonstrated that it has the ironic effect of increasing the availability and salience of suppressed thoughts. (Wegner & Erber, 1992; Wegner, Erber, & Zanakos, 1993). The ironic process theory proposes a model of suppression that attempts to explain this inverse effect (Wegner, 1994). It proposes that two parallel processes occur in the mind. The first, the conscious operating process, is an intentional process that searches and assembles content to create the desired mental state. The second, the ironic monitoring process, unconsciously and automatically monitors for content disparate to the desired mental state. It works in the background searching for occurrences of the unwanted content so that when the thought occurs, it can signal to the operating process to have the thought removed. Normally, both processes work together to preserve a desired state and thought suppression can be effective when the two processes are balanced. However, high cognitive load interrupts the harmonious balance between these processes. Cognitive load includes mental tasks requiring effort, such as counting in one's head, as well as everyday stressors. The conscious operating process has a finite capacity, and mental tasks that require cognitive effort consume the processing capacity of the conscious process. Thus, when the monitoring process interrupts the conscious processes to alert it that an unwanted thought is close to salience (during a period of high mental load), the conscious process will be at a reduced capacity to suppress the thought

and the thought may become salient (Wegner, 1994). Thus, the process of thought suppression ironically makes undesirable content more available or accessible when the mind is under high cognitive load.

Additional research has found that suppression appears to be an effortful task, consuming energy and taking a toll on the resources of the body and mind (Pennebaker, 1989). This has been corroborated by the observation that suppression of behavioral responses or impulses appears to create a state physiological arousal and stress (Gross, 2002). Furthermore, if suppression is effortful, then it stands to reason that more pressing or interesting content (such as pain) requires more effort or will be more difficult to suppress. For example, boring content could be suppressed easily even under relatively high cognitive load; however, noxious content such as pain catastrophizing would be difficult to suppress even under a modest cognitive load.

In considering why individuals suppress thoughts or emotions, Weinberger and Davidson (1994) proposed that individuals suppress content that is either aversive or inconsistent with their self-concept as a strategy for reducing cognitive dissonance or other distress. For example, if an individual does not consider him or herself as anxious or depressed, then the individual will suppress thoughts that they are worried or sad. Similarly, individuals may attempt to suppress intrusive thoughts related feared future events to reduce the anxiety induced by the thoughts.

The phenomena associated with emotion and thought suppression present a potential problem for psychological assessment in that individuals may deny symptoms of affective distress or maladaptive thoughts if they view themselves as mentally health or resilient and are suppressing content contrary to this self-concept. For this reason, self-report measures may be less sensitive in cases of individuals who tend to suppress aversive thoughts and emotions. Burns, Finch, Bruehl, and Harden (2001) found that individuals who tend to suppress thoughts

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and emotions also tend to present low scores on measures of affective distress, rendering them indistinguishable from adaptive groups. However, the scores of individuals who tend to suppress thoughts and emotions on pain severity scales were high, even comparable to dysfunctional groups. Burns and colleagues concluded that self-report measures may misclassify individuals who deny the affective distress, low sense of control, and pain interference that are associated with dysfunctional clusters (Burns, Finch, Bruehl, & Harden, 2001).

In addition to inciting concerns about the sensitivity of our measures, suppression poses an additional concern in that it appears to directly affect acute pain sensitivity. Several studies have looked at anger suppression in terms of its effect on acute pain severity. Studies have consistently demonstrated that participants instructed to suppress emotion during anger induction reported significantly greater pain intensity to subsequent acute pain than those who did not suppress (Burns et al., 2012; Burns, Quartana, & Bruehl, 2007; Burns, Quartana, & Bruehl, 2011; Elfant, Burns, & Zeichner, 2008; Gilliam et al., 2010; Quartana & Burns, 2007; Quartana, Yoon, & Burns, 2007). Anger suppression has been found to predict treatment outcomes of chronic pain patients (Burns, 2000). There may be a bi-directional relationship between pain and anger suppression as patients with chronic pain tend to suppress anger more than controls, making anger suppression an important factor to assess in pain patients (Hatch et al., 1991). Another study found that participants given an acceptance exercise before exposure to pain induction showed higher pain tolerance time and lower distress ratings than particpants instructed to suppress thoughts (Masedo & Esteve, 2007). A relationship between suppression and acute pain tolerance may be significant in that it raises the question regarding a relationship between suppression and chronic pain outcomes.

There is little research directly relating thought suppression and chronic pain outcomes. Research on coping styles and chronic pain outcomes appear to consistently find a strong relationship between these factors. In this body of literature, pain coping is frequently categorized as either active or passive coping (Brown & Nicassio, 1987). Active coping is defined as an attempt to control the pain and function in spite of the pain and includes the coping strategies of continuing activities despite pain, planned distraction, and using coping thoughts. Passive coping is relinquishing control of the pain to other external resources and includes the strategies of thought suppression depending on others, depending on medications, worrying, and restricting functioning (Brown & Nicassio, 1987). Studies investigating the relationship between coping styles and chronic pain distress have indicated that passive coping styles tend to result in higher long-term distress and disability when compared to active coping (Kraaimaat & Evers, 2003; Jensen, Turner, Romano, & Karoly, 1991; Smith, Wallston, Dwyer, & Dowdy, 1997). While active coping appears supperior to passive coping, the effect sizes of active coping have been found to be significantly smaller than the effect sizes of acceptance-based coping (Esteve, Ramírez-Maestre, & López-Martínez, 2007; McCracken & Eccleston, 2003). Acceptance and avoidance are theoretically two ends of a coping spectrum (Hayes, Strosahl, & Wilson, 2009). Coping strategies higher in acceptance are associated with higher adaptability and lower distress in response to most life stressors, while avoidant styles including suppression is associated with worse outcomes (Hayes, Strosahl, & Wilson, 2009). Acceptance-based interventions including Acceptance and Commitment Therapy are considered effective methods for reducing pain-related disability and mood symptoms and improving life satisfaction (Dahl, Luciano, & Wilson, 2005; Esteve et al., 2007; McCracken & Eccleston, 2003; Wetherell et al., 2011). Thus, thought

suppression as a maladaptive coping style will likely be associated with poorer chronic pain outcomes.

Purpose of the Present Study

Despite preliminary evidence that thought and emotional suppression appear to be important factors in pain, no research has validated a scale of thought suppression as a predictive measure of the relationship between chronic pain and pain outcomes. This research would aid in indicating or contraindicating the inclusion of scales of suppressive behavior in multidimensional pain assessment measures. The hypothesis was that higher scores of thought suppression would predict more severe symptoms of depression and anxiety, higher pain-related disability, and lower quality of life.

CHAPTER 2

METHODOLOGY

Participants

Participants included 29 adult males and females who endorsed persistent pain lasting

over 3 months. The sample was recruited by two methods. The first and intended method of

recruitment was to attract participants through word-of-mouth and flyers posted at a pain clinic

associated with Conemaugh Memorial Medical Center in Johnstown, PA. The second method of

recruitment was to post the flyer on the online Chronic Pain Subreddit and providing a link to the

survey. Fliers provided a brief description of the study, gave directions to access the surveys

online, included a notice that all subjects who complete the questionnaires would be entered into

a drawing for a $50 gift card, and reported that the questions should take approximately 30-45

minutes to complete. The recruitment method was changed due to a poor response rate from the

initial method. Every attempt was made to recruit a larger sample; however, requests to recruit

participants were rejected by 1 hospital and 12 other online forums. Because the WBSI was in

the final portion of the administered surveys, cases were excluded in which the participant did

not complete all of the surveys.

Participants were asked questions concerning their age, sex, relationship status, ethnicity,

level of education, severity and duration of chronic pain, if they were prescribed and taking

opioid pain medication, and if they had received medical operations for pain. Participants ranged

in age from 21 to 64, with an average age of 38.5. The majority of participants were female

(75.9%); participants reported being White/Non Hispanic (58.6%), White/Hispanic (34.5%),

working (48.3%), disabled (31%), never married (44.8%), or married (37.9%). There was

significant diversity in terms of education level with participants reporting a high school diploma

or GED (10.3%), some college but no degree (34.5%), associate degrees (6.9%), bachelor's degrees (20.7%), master's degrees (20.7%), and doctoral degrees (6.9%). Patients reported pain duration ranging from one year to 30 years, with an average of 11.72 years (SD = 8.04). Average pain severity on a 0-10 scale ranged from 3 to 10, with and average rating of 6.79 (SD = 1.72).

Instruments

This section details the self-report measures utilized to assess thought suppression, mental health functioning, quality of life, and pain-related disability.

West-Haven Yale Multidimensional Pain Inventory (WHYMPI)

The WHYMPI includes 52-items and provides 12-scales of several important factors in the chronic pain experience (Kerns, Turk, & Rudy, 1985). Each item is responded to on a 7-point Likert-like scale (0-6). The test is divided into three parts. Part 1 includes five scales. Scale 1, Perceived Interference, looks at the degree of impact of pain on vocational, social/recreational, and family/marital functioning. Scale 2, Support, surveys the subject's perception of the concern they receive from a spouse or significant other in regard to their pain. Scale 3, Pain Severity, inquires as to how severe the patient perceives their pain to be. Scale 4, Perceived Life Control, assess the individual's self-efficacy or their sense of control over their pain and life. Finally, scale 5 of Part 1, Affective Distress, inquires about how patients perceive their mood. Part 2 includes three scales assesses patients' perceptions of how their significant others behave or respond to the patients' pain behaviors or complaints. Scale 1 of Part 2, Negative Responses, asks to what degree their significant others respond with negative emotions or without empathy to patients' reports of pain. Scale 2, Solicitous Responses, inquires if the significant other will respond to patients' pain reports by helping them with activities or by providing emotional support. Scale 3 of Part 2, Distracting Responses, assesses if significant others attempt to help

distract the patients from their pain. Part three assesses patients' level of daily activity. Patients report the frequency with which they engage in household chores (scale 1 of Part 3), outdoor work (scale 2), activities out of the home (scale 3), and social activities (scale 4). Part 3 provides scores for individual scales as well as a General Activity scale score (taken from the average of all four activity scale scores; Kerns, Turk, & Rudy, 1985).

Internal consistency of the WHYMPI is estimated to be acceptable with Chronbach alpha values ranging from .70 to .90 and test-retest reliability over a 2-week interval with coefficients ranging from .62 to .91 (Kerns, Turk& Rudy, 1985). In support of validity, scores on WHYMPI have demonstrated to be strong predictors of improvements in pain and functioning following treatment (Kerns & Haythornthwaite, 1988; Kerns, Turk, Holzman & Rudy, 1986; Turk et al., 1993; Turk et al., 1998b). It has also been shown to be a strong predictor of level of depressive symptom severity (Kerns & Haythornthwaite, 1988). Regarding more fundamental qualities of the pain experience, the Pain Severity and General Activity subscales appear to be reliable measures of pain intensity and adaptive functioning (Holmes & Stevenson, 1990; Rudy, Turk, Kubinski, & Zaki, 1995; Turk & Rudy, 1990). In summary, the WHYMPI is widely considered to be a highly reliable and valid measure of important current pain factors as well as highly predictive of future pain and disability. Through public statement and personal correspondence with the primary author (Turk), it was confirmed that the WHYMPI was in the public domain and could be utilized in the study.

White Bear Suppression Inventory (WBSI)

The WBSI is a 15-item, self-report questionnaire designed by Wegner and Zanakos (1994) to detect the tendency to suppress unwanted thoughts. While Wegner and Zanakos' (1994) original study of the measure found that a single factor model provided a relatively good

fit, subsequent research supports two-factor or three-factor models (Blumberg, 2000; Höping, & de Jong-Meyer, 2003; Muris, Merckelbach, & Horselenberg, 1996; Rassin, 2003; Spinhoven & van der Does, 1999). Research on two-factor models indicates that not all items in this measure load to a suppression factor (a factor considered to be a tendency to suppress or a reliance on suppression as a primary coping skill), but some also appear to load to an intrusion factor (considered to be frequently experiencing intrusive thoughts, which is in a sense a failure to suppress rather than a tendency to suppress) (Schmidt et al., 2009). A third factor found by Blumberg (2000) is a tendency to use self-distraction, but further analysis has indicated that this factor has such significant overlap with the suppression factor that they are not meaningfully different (Luciano et al., 2006). Palm and Strong (2007) used item response theory methods and found that a scree test supported a one-factor model, but not all items were effective discriminators of suppression.

Roland Morris Disability Questionnaire (RMDQ)

The first pain outcome assessed is pain-related disability. The Oswestry Disability Index (ODI) and Roland Morris Disability Questionnaire (RMDQ) are two of the most widely recognized assessment measures of pain related disability (Millard, 1991). A recent meta-analysis reviewed studies comparing the psychometric properties of these two measures and concluded that the RMDQ generally demonstrated slightly higher construct validity (Chiarotto et al., 2016). Therefore, this measure was utilized to assess participants' pain-related disability. The RMDQ was originally published in 1983 by Roland and Morris, but was republished in 2000 (Roland & Fairbank, 2000). The measure contains 24-items in yes/no format that participants responded to by endorsing any items that they feel apply to them. Total scores are the sum of endorsed items.

The RMDQ appears to be a reliable and valid measure of pain-related disability. Test-retest reliability of the RMDQ produces Chronbach alpha values ranging from 0.42-0.91 for the 24 item version (Macedo et al., 2011). Scales for internal responsiveness or ability to detect change have been found to have Chronbach alpha coefficients ranging from 0.63-0.71 (Macedo et al., 2011). Convergent validity of the RMDQ has been demonstrated by moderate to large positive correlations with the ODI, Quebec Low Back Scale, and physical subscales of the Short Form Survey (Roland & Fairbank, 2000). This measure is in the public domain, and does not require permission from the authors for reproduction or administration in research.

World Health Organization Quality-of-Life Scale, Brief Version (WHOQOL-BREF)

Quality of life was the second pain outcome assessed. The World Health Organization developed a scale of quality of life (WHOQOL) which has a brief version (WHOQOL Group, 1998). The brief version is based on the WHOQOL-100, a 100-item measure comprised of six domains and 24 facets or subdomains. The WHOQOL-BREF was created by selecting an item from each of the 24 facets in the WHOQOL-100. The items selected were those with the strongest factor loading to the total score (WHOQOL Group, 1998). Due to fear that the length of the 100-item version would be too effortful and unnecessarily increase the burden placed upon research participants, the present study used the brief version. The WHOQOL-BREF is 26 items, divided into four scales: psychological health, environment, physical health, and social relationships (WHOQOL Group, 1998). Regarding the psychometric qualities of the measure, the WHOQOL-BREF demonstrates acceptable to good internal consistency with Chronbach alpha values for each of the domain scores ranging from .66 to .84 (WHOQOL Group, 1998). Confirmatory factor analysis indicated a strong comparative fit index (0.906) for the 4-domain

model (WHOQOL Group, 1998). Additionally, exploratory factor analysis did not indicate that any other model would be a better fit (Skevington, Lofty, & O'Connell, 2004).

Patient Health Questionnaire (PHQ)

The third pain outcome assessed was mental health. The Patient Health Questionnaire (PHQ) was developed from the clinician-administered PRIME-MD, which was used as a structured interview to diagnose common mental health disorders including depression, anxiety, somatoform, alcohol use, and eating disorders (Kroenke, Spitzer, Williams, & Löwe, 2010). The PRIME-MD and the original PHQ were considered cumbersome due to length, which led to the development of multiple shorter versions. The PHQ-9 is a brief screener for depression, the PHQ-15 screens for somatic symptoms associated with mental health problems, and the GAD-7 assesses anxiety. While these measures have been individually validated, they have also been combined into the PHQ-SAD, which includes these three measures as well as five items regarding panic attacks (Kroenke et al., 2000). The PHQ is a self-report measure of 11 multiple-choice questions regarding clinically significant mental health problems. It was validated with samples of 3,000 patients at an internal medicine clinic (Spitzer, Kroenke, Williams, & Patient Health Questionnaire Primary Care Study Group, 1999). It was further validated with a different 3,000 patients at a Obstetrics-Gynecology medical center (Spitzer et al., 2000). Responses on the PHQ were compared to diagnoses given through clinical interview of the participants. Results indicate that the PHQ demonstrates approximate sensitivity of 75%, specificity of 90%, and overall accuracy of 85% for the diagnosis of any single mental health disorder (Spitzer et al., 1999). PHQ results were significant predictors of functional disability and health care use (Spitzer et al., 1999). This measure is in the public domain.

Procedures

The study was approved by the Institutional Review Boards at Indiana University of Pennsylvania and Conemaugh Memorial Medical Center. After providing informed consent, participants completed the self-report measures. Informed consent and assessment measures (demographics and pain questionnaires, WHYMPI, WBSI, RMDQ, WHOQOL-BREF, and PHQ) were administered through Qualtrics, an online survey system. Participants provided an email address or mailing address at the end of the survey if they chose to enter the drawing for a gift card.

Statistical Analysis

Total scores were derived for the WBSI and RMDQ and by summing item scores. Total scores were obtained for the WHOQOL through summation of subscale scores. Subscale scores for depression, anxiety, and panic were obtained from the PHQ by summing item scores. Composite scores have not been validated for the PHQ or WHYMPI. Subscale scores were derived for the WHYMPI by averaging the item scores that load to the subscale following the scoring protocol recommended by Kerns, Turk, and Rudy (1985). Reliability of scales were assessed using Cronbach's alpha test to understand whether the questions in the questionnaires all reliably measured the same latent variable.

To detect if a relationship existed between the WBSI and pain outcome variables, Pearson correlation coefficients were calculated between total scores for the WBSI, scores on the RMDQ, WHOQOL-BREF, and PHQ subscales (depression, anxiety, and panic). Upon verification of a correlational relationship, the relationship between the WBSI and pain outcomes was further assessed using simple linear regression. This analysis determined whether the linear regression between these two variables was statistically significant, how much of the variation in

the dependent variable was explained by the independent variable, the direction and magnitude of any relationship, and values of the dependent variables based on different values of the independent variable.

CHAPTER 3

RESULTS

Descriptive statistics for the total sample and sample separated by sex were calculated for average pain intensity, years of pain duration, PHQ scales, WHOQOL, RMDQ, and WBSI (Table 1). Independent-sample t-tests were attempted to explore sex differences within the sample, but results were not significant or did not meet assumptions for any of the dependent variables. Table 2 lists the reliability coefficients of PHQ scales, WHOQOL, RMDQ, and WBSI. Pain severity scores were normally distributed, as assessed by Shapiro-Wilk's test (p > .05).

The sample's mean WBSI score was 46.14 (SD = 17.19), which is similar to previously reported means (Murris et al., 1996; Vincken et al., 2012). Scores ranged from 17 to 75 (minimum possible score = 15, maximum possible score = 75). Reliability of the WBSI was estimated to be high (a = 0.95). WBSI scores were normally distributed, as assessed by Shapiro-Wilk's test (p > .05). Females reported higher degrees of thought suppression (M = 46.18, SD = 17.21) than males (M = 41.83, SD = 16.32), but an independent-sample t-test did not indicate that theses differences were statistically significant.

The sample's mean depression score was 14.38 (SD = 17.19), which falls within the range of Moderate depression (Kroenke & Spitzer, 2002). The scale presented with low reliability (a = 0.33). Depression symptoms were not significantly different between males (M = 14.36, SD = 4.42) and females (M = 14.38, SD = 4.06).

The sample presented with significantly low rates of anxiety and panic symptoms. The sample's mean anxiety score (M = 7.38, SD = 4.6) fell within the Mild range (Kroenke & Spitzer, 2002). This scale presented with high reliability (a = 0.89). Mean panic score was 4 (SD = 4.6), which falls within the None to Minimal range (Kroenke & Spitzer, 2002). This scale also presented with high reliability (a = 0.92).

Mean quality of life score was 71.93 (SD = 14.19), and the scale demonstrated high internal validty (a = 0.83). WBSI scores of total sample and samples seperated by gender were normally distributed, as assessed by Shapiro-Wilk's test (p > .05). Qaulity of life means were not significantly different between males (M =70.5, SD = 11.95) and females (M = 73.32, SD = 14.45).

Mean disability score was 17.34 (SD = 4.36), and the scale demonstrated high internal validty (a = 0.82). Disabilitiy scores in the total sample were not normally distributed, as assessed by Shapiro-Wilk's test (p < .05). A t-test could not be used to study sex differences due to negative skew in the sample.

Table 1

Descriptive Statistics of Scales

	Male	Female	Total	
	Mean (SD)	Mean (SD)	Mean (SD)	*t*-test
Pain Intensity	7.5 (2.17)	6.68 (1.59)	6.79 (1.72)	
Pain Duration	7.67 (7.61)	12.68 (8.14)	11.72 (8.04)	
Depression	14.83 (2.93)	14.36 (4.42)	14.38 (4.06)	*n.s. (p = 0.81)*
Panic	3.33 (5.05)	3.77 (4.25)	4 (4.60)	
Anxiety	7.67 (4.46)	7.18 (4.49)	7.38 (4.35)	
WHOQOL	70.5 (11.95)	73.32 (14.45)	71.93 (14.19)	*n.s. (p = 0.67)*
RMDQ	17.83 (4.17)	17.14 (4.58)	17.34 (4.36)	
WBSI	41.83 (16.32)	46.18 (17.21)	46.14 (17.19)	*n.s. (p = 0.58)*

Table 2

Reliability of Scales

	WBSI	WHOQOL	RMDQ	Depression	Panic	Anxiety
Cronbach's *a*	0.95	0.83	0.82	0.33	0.92	0.89

Average completion time of the online surveys was 16.6 minutes (SD = 11.48), with a range of 6.6 to 52.1 minutes. Correlation coefficients were calculated between completion time and the survey scores, but all coefficients were small and not statistically significant (Table 2).

These findings indicate that completion time does not appear to have had a significant effect on the survey results.

Table 3

Correlations Between Completion Time and Survey Scores

	WBSI	RMDQ	WHOQOL	Anxiety	Panic	Depression
Completion Time	-0.19	-0.21	0.20	-0.03	0.11	0.07

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 4 lists the correlations between the PHQ scales, WHOQOL, RMDQ, WBSI and pain intensity. Pain intensity had small and statistically insignificant correlations with all scales. There were medium to large positive correlations between thought suppression and pain-related disability (.403, $p < 0.05$) and mood (0.504, $p < 0.01$). There was also a medium negative correlation between thought suppression and quality of life (-0.474, $p < 0.01$). The correlations between thought suppression and anxiety and panic symptoms were small and not statistically significant. Additionally, average pain intensity had small and statistically insignificant correlations to all scales. The strongest correlation between any variables was between the WHOQOL and RMDQ (-0.620, $p < 0.01$).

Table 4

Correlations Between Scales

	RMDQ	WHOQOL	Anxiety	Panic	Depression	Pain Intensity
WBSI	0.40*	-0.50**	0.18	0.23	.50**	-0.08
RMDQ		-0.65**	0.19	-0.05	-0.02	-0.04
WHOQOL			-0.21	-0.17	-0.04	0.06
Anxiety				0.42*	0.04	-0.36
Panic					0.08	-0.01
Depression						0.14

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Independent-samples t-tests were conducted to determine if there were differences between a low thought supression group and high thought suppresion group divided by median split. There were 14 participants in the low thought suppresion group and 15 in the high thought suppression group. Tests of the variables disability and pain severity did not meet the assumptions of the analysis, but tests of the variables depression symptoms and quality of life did meet all assumptions.

For depression there were no outliers in the data, as assessed by inspection of a boxplot. Engagement scores for each level of gender were normally distributed, as assessed by Shapiro-Wilk's test (p > .05). There was homogeneity of variances, as assessed by Levene's test for equality of variances (p = 0.74). Depression symptoms were higher in the high suppression group (M = 15.8, SD = 3.78) than the low suppresion group (M = 12.86, SD = 3.9), a statistically significant difference, M = 2.94, 95% CI [0.02, 5.87], t(27) = 2.06, p = .049.

For quality of life there were no outliers in the data, as assessed by inspection of a boxplot. Engagement scores for each level of gender were normally distributed, as assessed by Shapiro-Wilk's test (p > .05). There was homogeneity of variances, as assessed by Levene's test for equality of variances (p = 0.95). Quality of life was lower in the high suppression group (M = 65.27, SD = 13.24) than the low suppresion group (M = 79.07, SD = 11.77), a statistically significant difference, M = -13.81, 95% CI [-23.38, -4.23], t(27) = -2.96, p = .006.

A linear regression was conducted to understand the effect of thought suppression on depression symptoms. To assess linearity, a scatterplot of WBSI scores against depression symptoms on the PHQ with superimposed regression line was plotted. Scatterplots indicated a linear relationship between the variables. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.02. There was homoscedasticity, as assessed by visual inspection of

a plot of standardized residuals versus standardized predicted values. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. There were no outliers beyond ±3 standard deviations from expected values. These findings indicate that the assumptions of linear regression were met, which allows interpretation of the analysis.

The prediction equation was: depression symptoms = 8.90 + 0.119*thought suppression. Thought suppression statistically significantly predicted depression symptoms, $F(1, 27) =$ 9.172, $p < .01$, accounting for 25.4% of the variation in depression symptoms with adjusted $R^2 =$ 22.6%, a medium size effect according to Cohen (1988). An increase of one point score on the WBSI leads to a 0.119 (95% CI, 0.038, 0.199] increase in depression symptom scores. Predictions were made to determine mean depression symptoms for those people who reported WBSI scores of 29, 46, and 63. For a WBSI score of 29, mean depression symptom score was predicted as 12.34 (95% CI, 10.00, 18.11); for a WBSI score of 46, mean depression score was predicted as 14.37 (95% CI, 10.65, 21.49); and for a WBSI score of 63, mean depression score was predicted as 16.39 (95% CI, 11.29, 24.88).

Another linear regression was run to understand the effect of thought suppression on quality of life. To assess linearity, a scatterplot was plotted of WBSI scores against WHOPOL scores with superimposed regression line. Scatterplots indicated a linear relationship between the variables. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.247. There was homoscedasticity, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. There were no outliers beyond ±3 standard deviations from expected values. These findings indicate that the assumptions of linear regression were met, which allows interpretation of the analysis.

The prediction equation was: quality of life = 91.11 + -0.42*thought suppression. Thought suppression statistically significantly predicted quality of life, $F(1, 27) = 9.19$, $p < .005$, accounting for 25.4% of the variation in quality of life with adjusted $R^2 = 22.6\%$, a medium size effect according to Cohen (1988). An increase of one point score on the WBSI leads to a -0.42 (95% CI, -0.70, -0.13) decrease in quality of life scores. Predictions were made to determine mean quality of life for those people who reported WBSI scores of 29, 46, and 63. For a WBSI score of 29, mean quality of life was predicted as 78.93 (95% CI, 70.81, 87.34); for a WBSI score of 46, mean quality of life was predicted as 71.79 (95% CI, 58.91, 85.13); and for a WBSI score of 63, mean quality of life was predicted as 64.65 (95% CI, 47.01, 82.92).

A final linear regression was run to understand the effect of thought suppression on pain-related disability. To assess linearity, a scatterplot was plotted of WBSI scores against RMDQ scores with superimposed regression line. Scatterplots indicated a linear relationship between the variables. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.711. There was homoscedasticity, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. There were no outliers beyond ±3 standard deviations from expected values. These findings indicate that the assumptions of linear regression were met, which allows interpretation of the analysis.

The prediction equation was: pain-related disability = 12.63 + 0.10*thought suppression. Thought suppression statistically significantly predicted pain-related disability, $F(1, 27) = 5.228$, $p < .05$, accounting for 16.2% of the variation in pain-related disability with adjusted $R^2 = 13.1\%$, a medium size effect according to Cohen (1988). An increase of one point score on the WBSI leads to a 0.10 (95% CI, 0.01, 0.19) increase in pain-related disability. Predictions were

made to determine mean pain-related disability for those people who reported WBSI scores of 29, 46, and 63. For a WBSI score of 29, mean pain-related disability was predicted as 15.59 (95% CI, 12.92, 18.14); for a WBSI score of 46, mean pain-related disability was predicted as 17.32 (95% CI, 13.09, 12.37); and for a WBSI score of 63, mean pain-related disability was predicted as 19.06 (95% CI, 13.26, 26.4).

CHAPTER 4

DISCUSSION

The purpose of this study was to evaluate the relationship between thought suppression and pain outcomes and indicate if adding a scale of suppression would provide incremental validity to a chronic pain assessment battery. Pain severity did not correlate with pain outcomes or thought suppression; however, the results of t-tests and linear regressions indicate that there is a strong relationship between thought suppression and chronic pain outcomes. Individuals who reported a higher tendency to engage in thought suppression were significantly more likely to experience symptoms of depression, more likely to experience higher levels of pain-related disability, and tended to experience a lower quality of life.

The validity of these findings should be considered within context of the methodology used in this study as well as the relatively small sample. The large variability in completion time may indicate that effort varied significant across our sample as well. This variance in effort may pose a significant threat to validity. Additionally, the online recruitment and administration methods could have created a sampling bias in that populations low in technology proficiency and utilization may have been under sampled. Finally, smaller the sample sizes are a concern for any research assessing multiple latent variables as was the case in the present study. These factors suggest that the results of the study should not be generalized to a general pain population without corroboration from further research.

Previous research has found that thought, emotion, and sensation suppression decreases acute pain tolerance (Burns et al., 2012; Burns, Quartana, & Bruehl, 2007; Burns, Quartana, & Bruehl, 2011; Elfant, Burns, & Zeichner, 2008; Gilliam et al., 2010; Quartana & Burns, 2007; Quartana, Yoon, & Burns, 2007). Germane to chronic pain is the implication that thought

suppression sustained over time would increase the pain experienced by patients during that time span, and may in turn worsen pain outcomes by increasing pain severity experience. However, this previous research explored only the effect of suppression on acute pain in a general population and did not sample from chronic pain populations or assess for pain outcomes. This study provides some initial evidence for the long-term effect of thought suppression on pain outcomes from a sample of chronic pain patients. The results of this study also diverge from results of previous research in that it found the relationship between average pain severity and thought suppression to be very small ($r = 0.08$) and not statistically significant. This may be due in part to the difference in type of pain measured, with previous research measuring acute pain severity as opposed to chronic. This observation could also be attributed to the relatively low heterogeneity in pain severity within the sample, or could be a result of the method of measurement of average pain severity in that a self-report measure of average pain severity may not be a sufficiently valid method of assessing the true pain severity experienced by patients.

Research on coping styles has indicated that passive and avoidant coping styles tend to result in worse pain outcomes compared with active coping strategies and acceptance-based coping (Esteve, Ramírez-Maestre, & López-Martínez, 2007; Jensen, Turner, Romano, & Karoly, 1991; Kraaimaat & Evers, 2003; McCracken & Eccleston, 2003; Smith, Wallston, Dwyer, & Dowdy, 1997). Esteve, Ramírez-Maestre, and López-Martínez, (2007) found a relationship between scores on the Vanderbilt Pain Management Inventory (VPMI) and functional status and affective distress. The VPMI includes 1 item out of 18 that specific addresses thought suppression and another 4 that address distraction, but the rest of the scale are items addressing other coping strategies (Esteve, Ramírez-Maestre, & López-Martínez, 2007). Kraaimaat and Evers (2003) found that scores on the Pain Coping Inventory (PCI) predicted disability outcomes

out to 3 year follow-ups. However, the PCI does not assess thought suppression or even distraction (Kraaimaat & Evers, 2003). These studies on coping styles and chronic pain outcomes do not specifically evaluate thought suppression. The results of this study provide initial evidence that thought suppression as a discrete coping strategy has an effect on higher levels of distress and pain-related disability.

Symptoms of anxiety and panic were not found to have statistically significant relationships with thought suppression or any other outcome variables. This may be due to the restricted ranges of anxiety and panic in the sample. The sample's average anxiety was in the mild range with small variability and the sample's average panic symptoms were in the none to minimal range. Homogeneity in a sample does not provide a sufficient degree of variance for a correlational relationship to be validly assessed, and a larger sample with more cases of moderate to severe levels of anxiety and panic would likely provide a more accurate understanding of the true relationship between thought suppression and symptoms of anxiety or panic. Additionally, beliefs about the acceptability of various emotions has been indicated as variable affecting emotional suppression in chronic pain (Bowers, Wroe, & Pincus, 2017). It is possible that a difference exists in chronic pain populations such that depressive symptoms and thoughts are more socially acceptable during pain than anxious thoughts. This may further explain the differences found between anxiety and depression symptoms' relationship to thought suppression in the sample.

There are several clinical implications suggested by the predictive relationship between thought suppression and pain outcomes. First, these results add to the extensive body of literature indicating acceptance-based therapies or Cognitive Behavioral Therapy (Dahl et al.,, 2005; Ehde et al.,, 2014; Esteve et al., 2007; McCracken & Eccleston, 2003; McCracken, 2005; Wetherell et

al., 2011 Morley et al.,, 1999) for chronic pain management. Interventions focusing on acceptance or active coping strategies may provide patients with more effective coping skills, thereby reducing patients' dependence on thought suppression. These therapies may also directly address thought suppression and cultivate patients' awareness and disengagement with this coping strategy. Additionally, the predictive relationship between thought suppression and pain outcome indicates that measures of thought suppression should be included in assessment of chronic pain patients. By identifying patients endorsing relatively high thought suppression, clinicians can include this factor in determining prognosis. In addition to prognosis, identifying patients with high suppression could inform providers as to which patients may benefit more from interventions to reduce thought suppression and increase acceptance. A final implication is that it may be helpful for clinicians to work with friends, family, and other providers to provide patients with an empathetic, compassionate social-support network. Social support that encourages patients to express their thoughts and emotions may reduce suppression and thereby have a positive effect on pain outcomes.

Limitations and Areas for Future Research

Originally, the present study was intended to evaluate the additive validity of combining the WBSI with the WHYMPI in predicting pain outcomes and if thought suppression is a moderating variable to the relationship between chronic pain severity and pain outcomes. These research questions could not be investigated in the present study due to small sample size precluding hierarchical multiple regression, and important questions remain about the additive validity of combining a scale of thought suppression with the WHYMPI. Future research could use step-wise hierarchical multiple regression with a larger sample. If R^2 values were larger for

regression equations including WBSI scores with WHYMPI scores, then this would support the assertion that validity increases with the addition of a scale of thought suppression.

In order to investigate if thought suppression had a moderation effect on the relationship between chronic pain severity and chronic pain outcomes, researchers would utilize a step-wise hierarchical multiple regression analysis. Moderation would be indicated if R^2 increased with the addition of an interaction term (suppression*pain severity) to the predictors and if the interaction term itself were a statistically significant predictor. Evidence of moderation would aid in explication of the relationship between chronic pain and subsequent outcomes and would provide further indication that a scale of thought suppression would increase incremental validity in chronic pain assessment. It would also indicate emphasis of measurement and intervention of thought suppression at higher levels of pain severity.

An additional analysis that would improve the utility of the WBSI in chronic pain assessment would be to conduct an item analysis with the purpose of shortening the scale from 15 items. By identifying individual items that are more predictive of chronic pain outcomes, items that do not add significantly to the measure's reliability and validity could be removed. A shortened version of the WBSI scale would reduce the time and effort burdens placed upon patients and reduce the clinical time consumed by the assessment.

A significant shortcoming of the current design is that it only assessed the concurrent relationship of thought suppression and pain outcomes, rather than the relationship between thought suppression and future pain outcomes. The purpose of chronic pain assessment is often to predict both current and future functioning (Turk, Fillingim, Ohrbach, & Patel, 2016). Future studies would provide valuable predictive information through an alternative design in which chronic pain outcome variables were re-evaluated at six-month and one-year follow-up. would

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provide evidence of a predictive relationship between thought suppression and future functioning.

Another limitation of the current study is that all variables were assessed through self-report measures. Previous research has questioned the validity of self-report measures of affective distress due to results indicating that thought and emotional suppression may cause patients to under report symptoms (Burns et al., 2001). Future studies may benefit from utilizing outcome measures other than self-reports such as significant other reports.

There are many opportunities for future research to collect data on more chronic pain predictor and outcome variables to study the interactions between these variables and thought suppression. Firstly, pain catastrophizing, frequently assessed through the Pain Catastrophizing Scale, is already widely considered an important predictor variable of chronic pain outcomes (Forsythe, Thorn, Day, & Shelby, 2011; Gracely et al., 2004; Knussen & McParland, 2009; Sullivan et al., 2001; Turner, Jensen,& Romano, 2000). Studying the relationship between thought suppression and catastrophizing is likely important, as there could be an interaction effect between tendency to think catastrophizing thoughts and tendency to suppress. Given that suppression of thoughts increases the salience of the thoughts under high stress (Wegner & Erber, 1992; Wegner, Erber, & Zanakos, 1993), thought suppression would likely act as a mediator of the effect of catastrophizing on pain in that higher thought suppression would increase the salience of catastrophizing thoughts.

Another set of factors in chronic pain that were not included in the present study are pain and emotional beliefs. Research on beliefs about emotional expression found that negative beliefs increased emotional suppression and were correlated with worse pain outcomes (Bowers, Wroe, & Pincus, 2017). If negative beliefs about emotions increase emotional suppression, then

it is possible that negative pain beliefs would similarly increase thought suppression. If such results are found, then it could provide illumination on a mechanism underlying the relationship between pain beliefs and pain outcomes.

Future research could also include measures of general pain-coping strategies such as the Vanderbilt Pain Management Inventory or Pain Coping Inventory. It would be insightful to explore if this relationship is unique to thought suppression, or if thought suppression is no more predictive of outcomes than general passive coping. Hierarchical multiple regression could be utilized to explore the relative predictive values of thought suppression and passive coping. Significant change in R^2 after thought suppression was added to the regression equation and a relatively large coefficient for thought suppression would help indicate that thought suppression may have an effect on outcomes discrete from general coping style.

A final limitation of the present study is that data was collected through online surveying. This presents two concerns. Firstly, the high variability in completion time observed by this study raises the question of if subjects were responding to items with significant variation in effort. Future studies may benefit from inclusion of items or scales that assess for effort. A second concern that is raised by online surveying is a possible issue of sampling. Potential research participants with lower technology literacy or inclination may decline or have difficulty in participation, thus creating a sampling bias.

Conclusions

  In summary, the study results support the hypothesis that a strong relationship exists between thought suppression and pain outcomes. Thought suppression was found to predict more severe symptoms of depression, higher pain-related disability, and lower quality of life. Due to concerns of validity stemming from a small sample size and likely high variance in effort, these results should not be generalized to a general chronic pain population without corroboration of further research. Additionally, more research is needed to establish the predictive validity of including a scale of suppression to chronic pain assessment; however, treatment interventions to reduce thought suppression are indicated by these findings.

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Appendix A

Demographic and Pain Severity Questions

1) Please enter your age in number of years.
2) What is the highest level of school you have completed or the highest degree you have received?
   a) Less than high school degree
   b) High school graduate (high school diploma or equivalent including GED)
   c) Some college but no degree
   d) Associate degree in college (2-year)
   e) Bachelor's degree in college (4-year)
   f) Master's degree
   g) Doctoral degree
   h) Professional degree (JD, MD)
3) Choose one or more races that you consider yourself to be:
   a) White/Hispanic or Latino
   b) White/Not Hispanic or Latino
   c) Black or African American
   d) Native American or Alaska Native
   e) Asian
   f) Native Hawaiian or Pacific Islander
   g) Other _____
4) What is your sex?
   a) Male
   b) Female
   c) Transgender
   d) Other _____
5) Are you now married, widowed, divorced, separated or never married?
   a) Married
   b) Widowed
   c) Divorced
   d) Separated
   e) Never Married
6) Which statement best describes your current employment status?
   a) Working (paid employee)
   b) Working (self-employed)
   c) Not working (temporary layoff from a job)
   d) Not working (looking for work)
   e) Not working (retired)
   f) Not working (disabled)
   g) Not working (other) _____
   h) Prefer not to answer
7) Please rate your pain from 0-10 at its WORST in the last 24 hours.
8) Please rate your pain from 0-10 at its LEAST in the last 24 hours.
9) Please rate your pain from 0-10 that best describes your pain on the AVERAGE.

10) Please rate your pain from 0-10 that describes how much pain you have RIGHT NOW.
11) Approximately how many years have you had chronic pain?
12) Are you prescribed and taking pain medication?
    a) Yes
    b) No
13) Have you received injections or surgical operations for pain?
    a) Yes
    b) No

Appendix B

White Bear Suppression Inventory

Please indicate to how much you agree to each of the following statements on a scale from 1-5 with 1 being strongly disagree and 5 being strongly agree.

1. There are things I prefer not to think about. (1-5)

2. Sometimes I wonder why I have the thoughts I do. (1-5)

3. I have thoughts that I cannot stop. (1-5)

4. There are images that come to mind that I cannot erase. (1-5)

5. My thoughts frequently return to one idea. (1-5)

6. I wish I could stop thinking of certain things. (1-5)

7. Sometimes my mind races so fast I wish I could stop it. (1-5)

8. I always try to put problems out of mind. (1-5)

9. There are thoughts that keep jumping into my head. (1-5)

10. Sometimes I stay busy just to keep thoughts from intruding on my mind. (1-5)

11. There are things that I try not to think about. (1-5)

12. Sometimes I really wish I could stop thinking. (1-5)

13. I often do things to distract myself from my thoughts. (1-5)

14. I have thoughts that I try to avoid. (1-5)

15. There are many thoughts that I have that I don't tell anyone. (1-5)

Reprinted from "Chronic thought suppression," by D. Wegner & S. Zanakos, *Journal of Personality, 62*(4), pp. 615-640.

Patient Health Questionnaire

PATIENT HEALTH QUESTIONNAIRE (PHQ)

This questionnaire is an important part of providing you with the best health care possible. Your answers will help in understanding problems that you may have. Please answer every question to the best of your ability unless you are requested to skip over a question.

Name_____ Age_____ Sex: Female

1) **During the last 4 weeks, how much have you been bothered by any of the following problems?**
   a) **Stomach pain**
   b) **Back pain**
   c) **Pain in your arms, legs, or joints (knees, hips, etc.)**
   d) **Menstrual cramps or other problems with your periods**
   e) **Pain or problems during sexual intercourse**
   f) **Headaches**
   g) **Chest pain**
   h) **Dizziness**
   i) **Fainting spells**
   j) **Feeling your heart pound or race**
   k) **Shortness of breath**
   l) **Constipation, loose bowels, or diarrhea**
   m) **Nausea, gas, or indigestion**

2) **Over the last 2 weeks, how often have you been bothered by any of the following problems?**
   a) **Little interest or pleasure in doing things**
   b) **Feeling down, depressed, or hopeless**
   c) **Trouble falling or staying asleep, or sleeping too much**
   d) **Feeling tired or having little energy**
   e) **Poor appetite or overeating**
   f) **Feeling bad about yourself — or that you are a failure or have let yourself or your family down**
   g) **Trouble concentrating on things, such as reading the newspaper or watching television**
   h) **Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual**
   i) **Thoughts that you would be better off dead or of hurting yourself in some way**

3) **Questions about anxiety.**
   a) In the last 4 weeks, have you had an anxiety attack — suddenly feeling fear or panic? **If you checked "NO", go to question #5.**
   b) **Has this ever happened before?**
   c) **Do some of these attacks come suddenly out of the blue — that is, in situations where you don't expect to be nervous or uncomfortable?**
   d) **Do these attacks bother you a lot or are you worried about having another attack?**

4) **Think about your last bad anxiety attack.**
   a) **Were you short of breath?**
   b) **Did your heart race, pound, or skip?**
   c) **Did you have chest pain or pressure?**
   d) **Did you sweat?**
   e) **Did you feel as if you were choking?**
   f) **Did you have hot flashes or chills?**
   g) **Did you have nausea or an upset stomach, or the feeling that you were going to have diarrhea?**
   h) **Did you feel dizzy, unsteady, or faint?**
   i) **Did you have tingling or numbness in parts of your body?...**
   j) **Did you tremble or shake?**
   k) **Were you afraid you were dying?**

5) **Over the last 4 weeks, how often have you been bothered by any of the following problems?**
   a) **Feeling nervous, anxious, on edge, or worrying a lot about different things.**

    b) **Feeling restless so that it is hard to sit still.**
    c) **Getting tired very easily.**
    d) **Muscle tension, aches, or soreness.**
    e) **Trouble falling asleep or staying asleep.**
    f) **Trouble concentrating on things, such as reading a book or watching TV.**
    g) **Becoming easily annoyed or irritable.**

6) **In the last 3 months have you often done any of the following in order to avoid gaining weight?**
    a) **Made yourself vomit?**
    b) **Took more than twice the recommended dose of laxatives?**
    c) **Fasted — not eaten anything at all for at least 24 hours?**
    d) **Exercised for more than an hour specifically to avoid gaining weight after binge eating?**

7) **If you checked "YES" to any of these ways of avoiding gaining weight, were any as often, on average, as twice a week?**

8) **Do you ever drink alcohol (including beer or wine)?**

9)

10) **10. Have any of the following happened to you more than once in the last 6 months?**
    a) **You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health.**
    b) **You drank alcohol, were high from alcohol, or hung over while you were working, going to school, or taking care of children or other c.** You missed or were late for work, school, or other activities because you were drinking or hung over.
    c) **You had a problem getting along with other people while you were drinking.**
    d) **You drove a car after having several drinks or after drinking too much.**

11) **11) If you checked off any problems on this questionnaire, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?**
    a) **Not difficult**
    b) **Somewhat difficult**
    c) **Very difficult**
    d) **Extremely difficult**

Reprinted from "Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study," R. Spitzer, K. Kroenke, J. Williams, & Patient Health Questionnaire Primary Care Study Group. (1999). *Journal of the American Medical Association, 282*(18), pp. 1737-1744.

Appendix D

Roland-Morris Disability Questionnaire

When your back hurts, you may find it difficult to do some of the things you normally do. This list contains some sentences that people have used to describe themselves when they have back pain. When you read them, you may find that some stand out because they describe you today. As you read the list, think of yourself today. When you read a sentence that describes you today, mark the box next to it. If the sentence does not describe you, then leave the space blank and go on to the next one. Remember, only mark the sentence if you are sure that it describes you today.

1.   I stay at home most of the time because of the pain in my back. (T/F)
2.   I change position frequently to try and make my back comfortable. (T/F)
3.   I walk more slowly than usual because of the pain in my back. (T/F)
4.   Because of the pain in my back, I am not doing any of the jobs that I usually do around the house. (T/F)
5.   Because of the pain in my back, I use a handrail to get upstairs. (T/F)
6.   Because of the pain in my back, I lie down to rest more often. (T/F)
7.   Because of the pain in my back, I have to hold on to something to get out of a reclining chair. (T/F)
8.   Because of the pain in my back, I ask other people to do things for me. (T/F)
9.   I get dressed more slowly than usual because of the pain in my back. (T/F)
10.   I only stand up for short periods of time because of the pain in my back. (T/F)
11.   Because of the pain in my back, I try not to bend or kneel down. (T/F)
12.   I find it difficult to get out of a chair because of the pain in my back. (T/F)
13.   My back hurts most of the time. (T/F)
14.   I find it difficult to turn over in bed because of the pain in my back. (T/F)
15.   My appetite is not very good because of the pain in my back. (T/F)
16.   I have trouble putting on my socks (or stockings) because of the pain in my back.
17.   I only walk short distances because of the pain in my back. (T/F)
18.   I sleep less because of the pain in my back. (T/F)
19.   Because of the pain in my back, I get dressed with help from someone else. (T/F)
20.   I sit down for most of the day because of the pain in my back. (T/F)
21.   I avoid heavy jobs around the house because of the pain in my back. (T/F)
22.   Because of the pain in my back, I am more irritable and bad tempered with people. (T/F)
23.   Because of the pain in my back, I go upstairs more slowly than usual. (T/F)
24.   I stay in bed most of the time because of the pain in my back. (T/F)

Appendix E

WHO Quality-of-Life Scale, Brief Version

Instructions

This questionnaire asks how you feel about your quality of life, health, or other areas of your life. Please answer all the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response. Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the last two weeks. You should circle the number that best fits how much support you got from others over the last two weeks.

Please read each question, assess your feelings, and circle the number on the scale that gives the best answer for you for each question.

1. How would you rate your quality of life?
   a. Very Poor
   b. Poor
   c. Neither Poor nor good
   d. Good
   e. Very Good
2. How satisfied are you with your health?
   a. Very dissatisfied
   b. Dissatisfied
   c. Neither satisfied nor dissatisfied
   d. Satisfied
   e. Very satisfied

The following questions ask about how much you have experienced certain things in the last two weeks.

3. To what extent do you feel that physical pain prevents you from doing what you need to do?
   a. Not at all
   b. A little
   c. A moderate amount
   d. Very Much
   e. Extremely
4. How much do you need any medical treatment to function in your daily life?
   a. Not at all
   b. A little
   c. A moderate amount
   d. Very Much
   e. Extremely
5. How much do you enjoy life?
   a. Not at all
   b. A little

      c. A moderate amount
      d. Very Much
      e. Extremely

6. To what extent do you feel your life to be meaningful?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Very Much
      e. Extremely

7. How well are you able to concentrate?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Very Much
      e. Extremely

8. How safe do you feel in your daily life?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Very Much
      e. Extremely

9. How healthy is your physical environment?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Very Much
      e. Extremely

The following questions ask about how completely you experience or were able to do certain things in the last two weeks.

10. Do you have enough energy for everyday life?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Well
      e. Completely

11. Are you able to accept your bodily appearance?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Well
      e. Completely

12. Have you enough money to meet your needs?
      a. Not at all
      b. A little
      c. A moderate amount
      d. Well

e. Completely
13. How available to you is the information that you need in your day-to-day life?
   a. Not at all
   b. A little
   c. A moderate amount
   d. Well
   e. Completely
14. To what extent do you have the opportunity for leisure activities?
   a. Not at all
   b. A little
   c. A moderate amount
   d. Well
   e. Completely
15. How well are you able to get around?
   a. Not at all
   b. A little
   c. A moderate amount
   d. Well
   e. Completely

The following questions ask about how completely you experience or were able to do certain things in the last two weeks.
16. How satisfied are you with your sleep?
   a. Very Dissatisfied
   b. Dissatisfied
   c. Neither satisfied not dissatisfied
   d. Satisfied
   e. Very Satisfied
17. How satisfied are you with your ability to perform your daily living activities?
   a. Very Dissatisfied
   b. Dissatisfied
   c. Neither satisfied not dissatisfied
   d. Satisfied
   e. Very Satisfied
18. How satisfied are you with your capacity for work?
   a. Very Dissatisfied
   b. Dissatisfied
   c. Neither satisfied not dissatisfied
   d. Satisfied
   e. Very Satisfied
19. How satisfied are you with your abilities?
   a. Very Dissatisfied
   b. Dissatisfied
   c. Neither satisfied not dissatisfied
   d. Satisfied
   e. Very Satisfied
20. How satisfied are you with your personal relationships?

a. Very Dissatisfied
b. Dissatisfied
c. Neither satisfied not dissatisfied
d. Satisfied
e. Very Satisfied
21. How satisfied are you with your sex life?
    a. Very Dissatisfied
    b. Dissatisfied
    c. Neither satisfied not dissatisfied
    d. Satisfied
    e. Very Satisfied
22. How satisfied are you with the support you get from your friends?
    a. Very Dissatisfied
    b. Dissatisfied
    c. Neither satisfied not dissatisfied
    d. Satisfied
    e. Very Satisfied
23. How satisfied are you with the conditions of your living place?
    a. Very Dissatisfied
    b. Dissatisfied
    c. Neither satisfied not dissatisfied
    d. Satisfied
    e. Very Satisfied
24. How satisfied are you with your access to health services?
    a. Very Dissatisfied
    b. Dissatisfied
    c. Neither satisfied not dissatisfied
    d. Satisfied
    e. Very Satisfied
25. How satisfied are you with your mode of transportation?
    a. Very Dissatisfied
    b. Dissatisfied
    c. Neither satisfied not dissatisfied
    d. Satisfied
    e. Very Satisfied
26. How often do you have negative feelings, such as blue mood, despair, anxiety, depression?
    a. Never
    b. Seldom
    c. Quite often
    d. Very often
    e. Always

For user agreement, see APPENDIX G.

Appendix F

West Haven-Yale Multidimensional Pain Inventory

In the following 20 questions, you will be asked to describe your pain and how it affects your life. each question is a scale to record your answer. Read each question carefully and then circle a number on the scale under that question to indicate how that specific question applies to you.
1. Rate the level of your pain at the present moment. (0-6)
2. In general, how much does your pain problem interfere with your day to day activities? (0-6)
3. Since the time you developed a pain problem, how much has your pain changed your ability to work? (0-6)
      ___ Check here, if you have retired for reasons other than your pain problem
4. How much has your pain changed the amount of satisfaction or enjoyment you get from participating in social and recreational activities? (0-6)
5. How supportive or helpful is your spouse (significant other) to you in relation to your pain? (0-6)
6. Rate your overall mood during the past week. (0-6)
7. On the average, how severe has your pain been during the last week? (0-6)
8. How much has your pain changed your ability to participate in recreational and other social activities? (0-6)
9. How much has your pain changed the amount of satisfaction you get from family-related activities? (0-6)
10. How worried is your spouse (significant other) about you in relation to your pain problem? (0-6)
11. During the past week, how much control do you feel that you have had over your life? (0-6)
12. How much suffering do you experience because of your pain? (0-6)
13. How much has your pain changed your marriage and other family relationships? (0-6)
14. How much has your pain changed the amount of satisfaction or enjoyment you get from work? (0-6)
__ Check here, if you are not presently working.
15. How attentive is your spouse (significant other) to your pain problem? (0-6)
16. During the past week, how much do you feel that you've been able to deal with your problems? (0-6)
17. How much has your pain changed your ability to do household chores? (0-6)
18. During the past week, how irritable have you been? (0-6)
19. How much has your pain changed your friendships with people other than your family? (0-6)
20. During the past week, how tense or anxious have you been? (0-6)

In this section, we are interested in knowing how your significant other (this refers to the person you indicated above) responds to you when he or she knows that you are in pain. On the scale listed below each question, **circle a number** to indicate how often your significant other generally responds to you in that particular way when you are in pain.
1. Ignores me. (0-6)
2. Asks me what he/she can do to help. (0-6)
3. Reads to me. (0-6)
4. Expresses irritation at me. (0-6)
5. Takes over my jobs or duties. (0-6)
6. Talks to me about something else to take my mind off the pain. (0-6)
7. Expresses frustration at me. (0-6)
8. Tries to get me to rest. (0-6)
9. Tries to involve me in some activity. (0-6)
10. Expresses anger at me. (0-6)
11. Gets me some pain medications. (0-6)
12. Encourages me to work on a hobby. (0-6)

13. Gets me something to eat or drink. (0-6)
14. Turns on the T.V. to take my mind off my pain. (0-6)

Listed below are 18 common daily activities. Please indicate how often you do each of these activities by circling a number on the scale listed below each activity. Please complete all 18 questions.
1. Wash dishes. (0-6)
2. Mow the lawn. (0-6)
3. Go out to eat. (0-6)
4. Play cards or other games. (0-6)
5. Go grocery shopping. (0-6)
6. Work in the garden. (0-6)
7. Go to a movie. (0-6)
8. Visit friends. (0-6)
9. Help with the house cleaning. (0-6)
10. Work on the car. (0-6)
11. Take a ride in a car. (0-6)
12. Visit relatives. (0-6)
13. Prepare a meal. (0-6)
14. Wash the car. (0-6)
15. Take a trip. (0-6)
16. Go to a park or beach. (0-6)
17. Do a load of laundry. (0-6)
18. Work on a needed house repair. (0-6)

Reprinted from "The west haven-yale multidimensional pain inventory (WHYMPI)," R. Kerns, D. Turk, & T. Rudy, 1985, *Pain, 23*(4), 345-356.

Appendix G

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(date) 10/6/2017   .

The approved study for this User Agreement is:

Study Title	ADDITION OF A SCALE OF SUP-PRESSION TO THE WEST-HAVEN YALE MULTIDI-MENSIONAL PAIN INVENTORY
Principal Investigator	John Paul Wunderlich, M.A.
Sample characteristics	Chronic pain patients from a pain clinical in Johnstown, PA.
Sample size	Exact number unknown, but ideally 100 to 200 participants.
Treatment Intervention	No intervention
Total number of assessments	4
Assessment time points	Single administration
"WHOQOL-100" or WHOQOL-BREF version – *Please specify language version(s) you would like to receive.*	WHOQOL-BREF (English – US)
Other measures	West-Haven Yale Multidimensional Inventory, Patient Health Questionnaire, Roland Morris Disability Questionnaire

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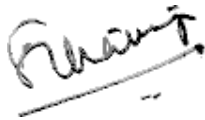
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