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Association Between Lifetime Adverse Events, Emotion Dysregulation, Posttraumatic Stress Symptoms, Acculturation, and Chronic Pain: A Moderated Mediation Model

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ASSOCIATION BETWEEN LIFETIME ADVERSE EVENTS, EMOTION DYSREGULATION, POSTTRAUMATIC STRESS SYMPTOMS, ACCULTURATION, AND CHRONIC PAIN: A MODERATED MEDIATION MODEL

A Thesis

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ABSTRACT

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The association between traumatic experiences and chronic pain is well established. Lesser is known about how acculturation might affect this relation, specifically with Hispanics. In the present study, self-report measures on traumatic experiences, posttraumatic stress symptoms, emotion dysregulation, chronic pain, and acculturation were administered to 140 participants (71.4% females) aged 18–65 years old (M = 35.06, SD = 11.55), to determine whether acculturation moderates the relation between adverse lifetime experiences and chronic pain as mediated by posttraumatic stress symptoms and emotion dysregulation.

Those who were highly acculturated to the U.S. Anglo culture were higher on chronic pain than those who were less acculturated; however, those who were less acculturated had a steeper incline in chronic pain as emotion dysregulation and posttraumatic symptoms of negative affect and hyperarousal increased, ultimately expressing more chronic pain overall. More research needs to be conducted on Hispanic populations to see how this plays out longitudinally.

DEDICATION

My masters' thesis is dedicated to all those who have believed in me and encouraged me throughout this journey. My family, my spouse, my dearest friends: my accomplishments are yours to share, as I would not have completed this without your motivation and support.

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CHAPTER I

INTRODUCTION

Chronic pain, as defined by pain lasting six months or longer (Treede et al., 2015), remains a costly medical condition that affects nearly one-third of the population in a given year (Edwards, Dworkin, Sullivan, Turk, & Wasan, 2016; Rosenquist, 2018), being considered one of the most prevalent health problems in the modern world (Bushnell, Čeko, & Low, 2013). With as many as 38% of children and adolescents (Edwards et al., 2016) and up to 40% of adults (Dahlhamerm et al., 2018) in community samples reporting chronic pain, it is an issue that affects people of all age groups rather than simply the geriatric population. Recently, chronic pain has grown as a focus of interest for medical and psychological research, mostly due to its significant idiopathic nature, which is defined as a disease or condition which has an unknown cause that arises spontaneously (Concise Medical Dictionary, 8th edition, 2010). The affective-cognitive state and association that an individual holds with their pain can also impact the severity, duration, and debilitation caused by the chronic pain, with some researchers speculating that "chronic pain is an emotional response arising from an alteration in the homeostasis of the interoceptive system" (p. S31, Bussone & Grazzi, 2013). The altered brain morphology has been seen in many pain conditions, including chronic back pain, fibromyalgia, complex regional pain syndrome, osteoarthritis, irritable bowel syndrome, chronic headaches, chronic vulvar pain due to menstrual cramps, and animal models of chronic pain, with different regions of the brain being impacted based on the type of chronic pain it is (Baliki, Schnitzer, Bauer, & Apkarian, 2011).

Although the prevalence of chronic pain has sparked a significant amount of research conducted on the topic, it remains an under-examined phenomenon that is highly misunderstood, difficult to quantify, and cannot be seen objectively, thus challenging constructs of validity when analyzing data regarding chronic pain. The subjectivity of pain "implies a conscious experience" (p. 474) that uses the "emotional brain" (p. 483) to manifest and take charge, and still research has not given this topic enough serious attention (Baliki & Apkarian, 2015). Research is beginning to see how chronic pain can affect many facets of an individual's life, including something as brain-altering as possibly reducing gray matter in certain areas of the brain (De Pauw et al., 2019) and a brain of chronic pain is "altered … in a manner reminiscent of other neurological conditions associated with cognitive impairments" (p. 1402, Baliki, Geha, Apkarian, & Chialvo, 2008).

Research has just started to examine the relation between mental health and chronic pain, with pain beliefs and coping mechanisms being looked at as important factors in determining whether the pain will transition from acute to chronic, and thus whether it will become a long-term problem (Lee, Chan, & Berven, 2007; Topcu, 2018). The pain experience has been determined to be influenced by emotional states and attentional direction, which is not difficult to imagine considering the brain regions involved in pain processing are also crucial for emotion and attention (Bushnell, Čeko & Low, 2013).

CHAPTER II

REVIEW OF THE LITERATURE

Trauma, emotion dysregulation, posttraumatic stress symptoms, and chronic pain

Although chronic pain is influenced by biological, psychological, and social factors, the effect of traumatic life events appears to be a particularly robust risk factor of chronic pain experiences (Afari et al, 2013; Brennstuhl, Tarquinio, & Montel, 2015; Carleton, Duranceau, McMillan, & Asmundson, 2017; McCall-Hosenfeld, Winter, Heeren, & Liebschütz, 2014; Wuest et al., 2008). Studies show that victimization during childhood leads to an increased likelihood of anxiety, depression, and PTSD in adulthood (Hartinger-Saunders et al., 2011). A study at the University of Texas Health Science Center at San Antonio surveyed 223 family medicine patients (Hispanic: $n = 77$) with chronic low back pain and found that depression, anxiety, substance abuse, adverse childhood experiences, comorbidities, and social stress exacerbated experiences of pain. They concluded that those patients with adverse childhood experiences (i.e., ACEs) expressed higher levels of pain and more mental disorder comorbidities than those who reported lower or no ACEs. Also, those with ACEs had significantly poorer general health and emotional role functioning (Felitti et al., 1998; Martinez, Bajorek, & Burge, n.d.). Another study performed by Nelson, Simons, and Logan (2018) showed that 80% of youth with chronic pain report at least one adverse childhood experience in their lifetime. They also revealed that ACEs exposure is significantly associated with increased symptoms of anxiety, depression, and fear of

pain when compared to non-ACE/control groups, with 3+ ACEs indicating the greatest impairment in functioning. This study further suggested that trauma and ACEs are a "significant risk factor for developing chronic pain conditions later in life" (p. 406). In all, there is an accumulating effect of exposure to different types of lifetime traumatic events that is associated with chronic pain.

Studies suggest that the association between exposure to traumatic events and chronic pain are mediated by mechanisms, such as emotion dysregulation and mental disorders, such as posttraumatic stress disorder (PTSD; McCall-Hosenfeld et al., 2014; Morasco et al., 2013). Approximately 90% of people experience a traumatic event in their lifetime, but only 9% of those, on average, will develop the criteria necessary for a diagnosis of PTSD (Carleton et al., 2017). PTSD is often found to be comorbid with physical and psychological disorders, including chronic pain. Studies indicate a high comorbidity between PTSD and chronic pain, with 34% of individuals expressing chronic pain also meeting criteria for PTSD (Carleton et al., 2017; Otis, Keane, & Kerns, 2003).

Theoretical framework for the association between PTSD and chronic pain

Studies suggest that the association between PTSD and chronic pain can be explained with the help of multiple theoretical frameworks, many of which attempt to describe the biopsychological processes involved in the association. First, the shared vulnerability model suggests that the common attentional bias towards threat in PTSD and chronic pain heightens the association between them (Carleton et al., 2017). The attention bias is the tendency for the individual's perception to be affected by any recurring thoughts they may have at the time, causing them to fail to consider alternative possibilities. Specifically, the shared vulnerability

model states that psychological and biological vulnerabilities "interact with a traumatic experience to produce an emotional response characterized by hypervigilance, cognitive biases, and avoidance" (p. 75, Carleton et al., 2017). This model suggests that attentional bias for threat serves as a shared cognitive vulnerability for both the trauma and the experience of pain. Thus, individuals will react quickly to "diagnosis-congruent stimuli" while, at the same time, avoiding these stimuli, which will maintain their symptoms of anxiety and pain. This was shown through the Stroop test suggesting that individuals with PTSD-like symptoms and chronic pain demonstrate a bias for pain-related words (Beck, Freeman, Shipherd, Hamblen, & Lackner, 2001; Roelofs, Peters, Zeegers, & Vlaeyen, 2002; Snider, Asmundson, & Wiese, 2000). Cross-sectional and longitudinal studies indicate an association between trauma exposure and chronic pain (Carleton et al., 2018; Castillo et al., 2013; McCall-Hosenfeld et al., 2014; Wuest et al., 2008), with the latter highlighting that exposure to traumatic event leads to and eventually exacerbates chronic pain (Castillo et al., 2013). For instance, in a longitudinal study conducted by Castillo and colleagues (2013), indicated that in the early phase following trauma, pain (associated with the trauma) predicted anxiety and depression. For the first year after a traumatic event, "increased pain intensity predicts increased negative mood, and increased negative mood also predicts increased pain intensity" (p. 2864), suggesting that the cyclic relationship can continue to cause an increase in both pain intensity and negative mood. However, in the late (or chronic) phase, anxiety nearly doubles, suggesting that negative mood has an important role in the persistence of acute pain leading to chronic pain. The data provided by this longitudinal study also signifies that "even mild symptoms have an important relationship with the long-term continuation of pain after trauma" (p. 2864) and "even mild or moderate pain can have a profound impact on recovery" (p. 2865).

Another theory states that the exposure and severity of posttraumatic distress and its role on the immune system leads to the likelihood of chronic pain (Defrin, Lahav, & Solomon, 2016). This study compared 59 torture survivors to 44 comparable veterans to determine the impact that cumulative trauma may have on an individual's perception of pain and level of dysfunction. Most of the torture survivors and more than half of the controls reported living with chronic pain, but levels of PTSD differed across the groups. The researchers concluded that the magnitude and duration of the PTSD and the distress caused by it, rather than exposure to trauma, implied the association between trauma and pain. Their research suggests that the stronger the magnitude and the longer the duration someone experiences distress, than the higher the risk for "chronic and perhaps irreversible changes in the pain system" (p. 8).

Other researchers investigate chronic pain and PTSD as similar reactive disorders when describing this association (Brennstuhl et al., 2014), suggesting that their relations are anxiety sensitivity and traumatic life events experienced during childhood. In a literature review by Brennstuhl, Tarquinio, and Montel (2014), 24 research articles and reviews were examined. They found that the comorbid symptomatology of PTSD and chronic pain (as a reaction to the trauma) is due to an interdependence of symptoms that can be observed in both the PTSD and chronic pain syndrome, with them occurring "at the same level" (p. 302). This suggests that even though pain can be a result of a traumatic event, which can then evolve into both PTSD and chronic pain, PTSD has been shown to be the aggravating, or even predictive, factor in the transition from acute pain to chronic pain. Brennstuhl and colleagues (2014) state that not many studies have looked at the effectiveness of therapy that is specifically formulated to treat both the PTSD and chronic pain. Since comorbidity between these two tends to be very high, they suggest that it is an important avenue for research to venture.

Increasing evidence is suggesting an association between psychological stress or trauma and persistent pain (Lumley et al., 2011), and the combination of childhood abuse and current PTSD greatly increase the risk of later pain (Raphael & Widom, 2011). Research shows that fear may inhibit pain and anxiety increases pain; however, repeated fear experiences can elicit anticipatory anxiety, such as in the case of PTSD, leading to persistent pain (Lumley et al., 2011). It is recognized that PTSD can lead to sleep disturbances, hyperarousal, physical tension and stress (Litz, Keane, Fisher, Marx, & Monaco, 1992), and it is also known that these behavioral issues can lead to somatic conditions, such as chronic pain (Graham & Streitel, 2010). Additionally, avoidance in posttraumatic stress symptoms and in symptoms of depression has been shown to increase somatization of mental health conditions, leading to chronic pain (Tull, Gratz, Salters, & Roemer, 2004). For that reason, to understand the association that PTSD has with chronic pain, it is also necessary to recognize the mechanism of emotion dysregulation and how that may lead to chronic pain.

Association between emotion (dys)regulation and chronic pain

The comparison between emotion regulation and chronic pain is a fairly new line of research, with a systematic literature review conducted in 2018 by Koechlin and colleagues finding 15 studies meeting their inclusion criteria, using search terms “chronic pain” and “emotion regulation.” Nine of these studies were completed in the last five years, with studies that measured “response-focused” emotion regulation finding associations between maladaptive emotion regulation and pain. They concluded that this maladaptive response, or emotion dysregulation, might be an important risk factor in the development and maintenance of chronic

pain, as well as other psychological comorbidities (Koechlin, Coakley, Schechter, Werner, & Kossowsky, 2018).

The biopsychosocial model of pain (Gatchel, Peng, Peters, Fuchs, & Turk, 2007) considers emotions to influence the perception of pain and the related level of functional impairment. Although depression and anxiety have been given tremendous amounts of attention in relation to pain, anger is now being considered an influencing factor as well. Gatchel and colleagues describe pain and emotions as interacting in a multitude of ways, in that emotional distress may predispose people to experience pain, be a precipitant of symptoms, be a modulating factor amplifying or inhibiting the severity of pain, be a consequence of persistent pain, or be a perpetuating factor (Gatchel et al., 2007). The researchers also describe pain as being a result of cognitive factors, such as appraisals, beliefs (catastrophizing and fear-avoidance beliefs), perceived control, self-efficacy, vulnerability, and resilience. Additionally, a study conducted by Connelly and colleagues (2011) used this theory to predict pain and functioning in children with emotion dysregulation and found that children who had greater variety of negative emotions presented with higher levels of pain and dysfunction. This study "provides initial support for the significance of emotion regulation processes in predicting pain and function outcomes in juvenile idiopathic arthritis" (p. 51, Connelly et al., 2011).

Association between emotion dysregulation, PTSD, and chronic pain

In a cross-sectional study looking at the relation between childhood trauma, dissociative experiences, and depression with pain in female patients, Karas and colleagues (2017) found that those who experienced dissociative and depressive symptoms experienced a higher expression of pain (somatoform symptoms), and those who were diagnosed with fibromyalgia (which is

described as a chronic pain condition in which the etiology is not clearly known) scored higher than control groups on childhood maltreatment types (measured via Childhood Trauma Questionnaire; Bernstein et al., 2003), somatic dissociation symptoms, and dissociative experiences. Dissociative symptoms and depression were associated with emotion dysregulation in this study. The participants also had a higher score in emotional abuse, physical neglect, and physical abuse, and the somatic dissociation symptoms still remained significant once controlling for depression. Researchers concluded that the way the individual deals with the traumatic experiences in regard to dissociative and depressive symptoms contribute to the development and exacerbation of pain in fibromyalgia. They state that taking these symptoms into account are an important tool in the treatment of people with chronic pain conditions and that the future of treatment involves this synthesis (Karas, Yildirim, Kucukgoncu, & Yakut, 2017).

Since PTSD results in some form of emotion dysregulation, often leading to the high comorbidity of anxiety and depression, and anxiety and depression has been shown in research to cause and aggravate chronic pain, a linear path of PTSD to chronic pain can be assumed. The mental health sequelae of trauma can be used as an explanation for this pathway, despite the lack of exploratory research. To this date, research suggesting the path from PTSD to chronic pain, rather than simply pointing out an association, has been limited. In a finding by McCall-Hosenfeld and colleagues (2014), a path from PTSD to chronic pain was not determined as statistically significant. However, this research looked at intimate forms of violence that resulted in PTSD, such as intimate partner violence, 3+ ACEs, and sexual trauma, and they were able to find a statistically significant path between interpersonal trauma and somatic symptom severity. In another study conducted by Morasco and colleagues (2013), they were able to develop a pathway from PTSD to pain interference and pain severity, with illness-focused pain coping and

depression, each as mediators to the pain and holding a relation with one another. Their research indicated that individuals with PTSD symptoms, especially those with avoidance symptoms, may be predisposed to analogous chronic pain coping strategies (e.g., guarding and resting), confirming what previous research has determined, finding that PTSD avoidance symptoms can predict pain disability.

In a study conducted by Powers and colleagues (2014), PTSD and emotion dysregulation were examined as mediators for pain levels and pain-related functional impairment in regard to childhood abuse and the experience of pain in adulthood. They found that PTSD symptoms predicted pain level and functional limitations due to pain, and even more so, emotion dysregulation was a significant predictor for functional limitations due to pain. The determined that PTSD symptoms fully mediated the relation between higher levels of childhood abuse and higher levels of pain and pain-related limitations, and adult symptoms of PTSD "may serve as a pathway through which the relationship between child abuse and adult pain manifests" (p. 6). They conclude that an association exists between childhood abuse, PTSD, emotion dysregulation, and reported pain and pain-related dysfunction (Powers et al., 2014).

Acculturation

Studies have documented that racial and ethnic minority populations are at increased risk of mental disorders, including PTSD (Alcantara, Casement, & Lewis-Fernandez, 2013; Ehlers et al., 2016; Ortega, Rosenheck, Alegria, & Desai, 2000), and experiences of chronic pain (Chan, Hamamura, & Janschewitz, 2012; Jimenez, Dansie, Buchwald, & Goldberg, 2013; Paulus et al., 2016). However, acculturation—a process that takes place when two cultural groups encounter one another and entails an assessment and potential adaptation of practices, values, and

identifications (Schwartz, Unger, Zamboanga, & Szapocznik, 2010)—is documented as a risk and as a protective factor of mental disorders. When examining the role of acculturation vis-à-vis chronic pain, some studies suggest that the process of acculturation leads to stress and more mental health problems (Chan et al., 2012; Ortega et al., 2000), while other studies indicate that the lesser acculturation with the host-culture can act as a protective factor among Hispanic individuals, a well-known phenomenon referred to as the *Hispanic paradox* (Weden et al., 2017). For example, Jimenez and colleagues (2013), found that after adjusting for socio-demographic and clinical factors, there was a significant association between acculturation and functional impairment due to pain symptoms. Specifically, Spanish-speaking Hispanics reported lower levels of functional impairment than non-Hispanic Whites, although the former experienced higher levels of pain (Jimenez et al., 2013).

In research conducted by Paulus and colleagues (2016), an interactive model of pain severity and emotion dysregulation was used in an attempt to understand the pain experience in relation to emotions among Latinx populations in medical settings. They examined 274 Latinx people, 96% of which indicated Spanish as their first language, using the following measures: the Positive and Negative Affect Scale (PANAS), Graded Chronic Pain Scale (GCPS), Difficulties in Emotion Regulation Scale (DERS), Inventory for Depression and Anxiety Symptoms (IDAS), and the MINI International Neuropsychiatric Interview 6.0. There findings suggested a clinically significant interaction between pain severity and emotion dysregulation in Latinx populations, where pain severity had statistically significant and positive association with emotion dysregulation and all six dependent variables, as well as emotion dysregulation having a statistically positive association with the variables (depressive and suicidal symptoms, social anxiety, anxious arousal symptoms, and depressive and anxiety disorders). Although not a

primary aim of the study, they also found that there were ethnic differences in levels of emotion dysregulation and anxious arousal, with Mexican-descent individuals reporting significantly lower issues on these domains, holding consistency with the "Hispanic paradox" (Paulus et al., 2016).

Since nearly 90% of the Rio Grande Valley population self-identify their ethnicity as Hispanic, making this an enclave region with many being immigrants or of immigrant backgrounds, acculturation is a factor that is assumed (based on prior literature) to play a role in how victimization, emotion dysregulation, posttraumatic stress, and chronic pain are related for patients receiving care in this region. In addition, healthcare lawmakers are now acknowledging the importance of preventative strategies (Ura, 2014), realizing that early interventions can prevent the onset of specific diseases and conditions. Despite this, preventive medicine still has not included chronic pain as a preventable condition.

The Current Study Hypotheses

Based on the above-mentioned studies, it was hypothesized that emotion dysregulation and posttraumatic stress symptoms would mediate the association between the cumulative exposure to lifetime traumatic events and chronic pain in treatment seeking patients, such that, higher scores on emotion dysregulation and posttraumatic stress symptoms would be lead to an increase in chronic pain.

Second, based on the Hispanic paradox hypothesis (Weden et al., 2017), in the present study it was hypothesized that the indirect effects (mediation) of emotion dysregulation and posttraumatic stress symptoms on chronic pain will be moderated by acculturation, such that, lesser-acculturated Hispanic individuals would score lower on chronic pain. The reason for this

hypothesis is because individuals who are in the process of acculturating will experience increased stress (Carvajal et al., 2012; Ehlers et al., 2016; Jang & Chiriboga, 2009; Jimenez et al., 2013; Torres, 2010) and studies have shown that cumulative stress affects development of chronic pain (Afari et al., 2013; Duric, Clayton, Leong, & Yuan, 2016; Meagher, 2004). Studies have also suggested that with more time spent in the United States, leading to more acculturation, there is an association with mental health problems (Torres, 2010; Vega, Sribney, Aguilar-Gaxiola, & Kolody, 2004), leading to the idea that acculturation holds a role in the development of PTSD and the presence of emotion dysregulation. Additionally, prior studies have found that the chronic stress of acculturation heightened pain response and may influence pain sensitivity (Chan et al., 2012), strengthening the possibility of the development and/or presence of chronic pain. Thus, the stress of being acculturated, specifically in a region such as the Rio Grande Valley that is a Hispanic enclave, will moderate the indirect effects associated with the development of chronic pain.

Research Questions and Hypotheses

The purpose of this study was to examine the relation between exposure to lifetime adverse events, emotion dysregulation, posttraumatic stress symptoms, and chronic pain, and to see if acculturation plays a significant role in moderation of the indirect effects. Specifically, we aimed to assess whether increased acculturation would lead to more pain, with exposure to adverse events serving as an accumulative factor in emotional dysregulation as well as with the presentation of posttraumatic stress symptoms.

Research Question 1: Do individuals who experience greater lifetime adverse experiences have a higher likelihood of developing and/or experiencing chronic pain?

Research Question 2: Do individuals who experience greater lifetime adverse experiences have increased emotional dysregulation when compared to those who do not?

Research Question 3: Do individuals who experience greater lifetime adverse experiences and increased emotional dysregulation have a higher likelihood of developing and/or experiencing chronic pain?

Research Question 4: Do individuals who experience greater lifetime adverse experience have a higher likelihood of presenting posttraumatic stress symptoms?

Research Question 5: Do individuals who experience greater posttraumatic stress symptoms have a higher likelihood of developing and/or experiencing chronic pain?

Research Question 6: Are individuals who are lesser acculturated experience less overall chronic pain and chronic pain dysfunction than those who are more acculturated, despite amount of lifetime experiences, levels of emotion dysregulation, and amount of posttraumatic stress symptoms?

Hypothesis 1: Individuals who experience greater lifetime adverse experiences will have a higher incidence of chronic pain than those who experience fewer lifetime adverse experiences.

Hypothesis 2: Individuals who experience greater lifetime adverse experiences will have more emotion dysregulation than individuals who experience fewer lifetime adverse experiences.

Hypothesis 3: Individuals who experience greater emotion dysregulation will have higher incidences of chronic pain than those who experience lesser emotion dysregulation.

Hypothesis 4: Individuals who experience greater adverse lifetime experiences will have greater posttraumatic stress symptoms.

Hypothesis 5: Individuals who experience greater posttraumatic stress symptoms will have a higher incidence of chronic pain than those who experience fewer posttraumatic stress symptoms.

Hypothesis 6: Hispanics who are lesser acculturated will have less chronic pain, despite lifetime adverse experiences, emotion dysregulation, and posttraumatic stress symptoms, when compared to Hispanics who are more acculturated and non-Hispanics.

CHAPTER III

METHODOLOGY & FINDINGS

Participants

One hundred and eighty-six patients were approached to participate in the present study between January 2019 and October 2019. It was required that they were able to read and write in either English or Spanish languages. Twenty-seven patients (14.52%) declined participation and nineteen patients (10.22%) did not meet requirements to participate (including not being able to read or not endorsing any form of trauma in their lifetime). Among 140 respondents which had index trauma identified by LEC, 71.4% were women, 25% were men, and 3.6% selected the "Other" option as their gender. Participants were recruited from healthcare or treatment facilities, such as, physician specialist's offices (pain management & internist), therapy centers, and durable medical equipment (DME)/pharmacy centers.

After data analysis and missing data removal, the effective sample comprised 136 participants (71.4% were female; 3.6% other). Although most of the participants were female, key demographic features did not differ significantly by gender when examining three separated categories as women, men, and those who responded "other" in gender.

The respondents' age ranged from 18 to 65 (M = 34.99, SD = 11.58). The majority (84.6%) of tests administered were in English language, with the remainder being administered in

Spanish language for those who weren't as comfortable reading questionnaires in the English language. Majority of the participants self-identified their ethnicity as Hispanic (n = 121; 89.0%). This is reflective of the population in the Rio Grande Valley (U.S. Census Bureau, 2010) in the state of Texas. In terms of education, 23.5% of participants reported their level of education as High school or less, 40.4% reported having received some College education (but not graduates), and 36% reported being College graduates. Many participants were either single or married (i.e., 43.4% and 42.6%, respectively), 5.9% were separated, 6.6% were divorced, and 1.5% were widowed. Only two participants (1.5%) were veterans. Just under a third of the participants (31.6%) reported a family income level of $25,000-$50,000, with 11.8% reporting an income below $12,000, 19.9% reporting between $12,000 and $25,000, 17.6% reporting between $50,000 and $75,000, and 18.5% reporting above $75,000. Table 1 depicts frequency of the demographic statistics.

Measures

Participants were given the survey that consisted of 92 questions among which 8 items measured demographic details, 17 items measured lifetime traumatic events, 20 items measured the PTSD symptoms as per DSM-5 (APA, 2013), 7-items gauged chronic pain, emotion dysregulation was measured via 18 items, 10 adverse childhood experiences items, and 12 acculturation items.

Demographics

A number of demographic variables were collected including age, gender, marital status, race and ethnicity, education level, family income, and veteran status.

Table 1.

Frequencies Across Demographics

Gender	*N*	Percent
Female	97	71.3
Male	34	25.0
Other	5	3.7
Age Range		
18-25	34	25.0
26-35	43	31.6
36-45	33	24.3
46-55	18	13.2
56-65	8	5.9
Language Administration		
English	115	84.6
Spanish	21	15.4
Hispanic		
Yes	121	89.0
No	15	11.0
Education Level		
High School or Less	32	23.5
Some College	55	40.4
College Graduate	49	36.0
Marital Status		
Single	59	43.4
Married	58	42.6
Separated	8	5.9
Divorced	9	6.6
Widowed	2	1.5
Veteran Status		
Yes	2	1.5
No	134	98.5
Family Income		
Less Than $12,000	16	11.8
$12,000 - $25,000	27	19.9
$25,001 - $50,000	43	31.6
$50,001 - $75,000	24	17.6
More Than $75,000	25	18.5

Exposure to Lifetime Adverse Events

Two separate questionnaires were used to examine exposure to lifetime adversities. The Life Events Checklist (LEC) was used to measure 17 lifetime adverse events, in which the participant responds whether it “happened to [them],” they “witnessed it,” “learned about it,” “part of [their] job,” “not sure,” or “doesn’t apply.” This scale has an internal consistency

(Cronbach's α) of .91 (Gray, Litz, Hsu, & Lombardo, 2004). The most recent edition has been modified to fit the criteria for the DSM-5. Whether a participant self-identified as Hispanic or not was not detailed in Gray & colleagues' study. Additionally, the Adverse Childhood Experiences Scale (ACES) was used, which is a 10-question survey determining an individual's "ACE level." This scale has an internal consistency (Cronbach's α) of .57 for the physical/emotional abuse subscale, .83 for the sexual abuse scale, and .71 for the total ACE-ASF scale (Meinck, Cosma, Mikton, & Baban, 2017). None of the participants in Meinck & colleagues' psychometric study were Hispanic or Latino.

For each endorsement of trauma, a point was given for each LEC (endorsement in the LEC would include "Happened to me"). The points from the LEC questions would determine the "total trauma score." ACE scores were collected to possibly compare childhood experiences to lifetime experiences if relevant. In the present study, the Cronbach's *a* for LEC was .867 and for ACES was .739.

Posttraumatic Stress Disorder

The Posttraumatic Stress Disorder (PTSD) Check List (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015; Weathers et al., 2013) was used to measure symptoms that were consistent with the DSM-5 diagnostic criteria for PTSD. This scale has a total of 20 items and it measures how "bothered" an individual is by specific PTSD symptoms on a scale of 0 ("not at all") to 4 ("extremely") through four facets. The first facet, intrusion symptoms (criterion B), is measured with five items. The second facet, avoidance (criterion C), is measured with two items. The third facet (criterion D), negative alterations in cognition and mood, is measured with seven

items. And, the final facet, alterations in arousal and activity (criterion E), is measured with six items. Criterion A is measured through positive responses in the LEC previously mentioned. This scale maps the criteria for the DSM-5 PTSD and has a good internal consistency (α = .96) and test-retest reliability (r = .84) with veterans (Bovin et al., 2016). In the study conducted by Bovin & colleagues, signal detection analyses using the CAPS-5 also revealed that PCL-5 scores of 31 to 33 were optimally efficient for diagnosing PTSD. These studies were conducted on majority White non-Hispanic samples, with no psychometric studies conducted on Hispanic populations. In the present study, the Cronbach's *a* for the full scale was .959, and the subscales had a Cronbach's α of .926 for criterion B, .888 for criterion C, .879 for criterion D, and .881 for criterion E.

Emotion Dysregulation

The Difficulties in Emotion Regulation Scale-Short form (DERS-SF; Kaufman et al., 2016) was used to measure emotion dysregulation. This modified version has 18-items rather than the 36-item present in the original scale (Gratz & Roemer, 2004). The authors of the scale found that the 18-item version demonstrated similar correlation patterns relative to the full measure, and the two versions shared 81-96% of the variance (Kaufman et al., 2016). It measures six facets of emotion dysregulation, namely, nonacceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity, with items rated on a scale of 1 ("almost never [0-10%]") to 5 ("almost always [91-100%]"). Each facet is measured with three items. Higher scores on this scale indicate more difficulty in emotion regulation. The

scale has high internal consistency across a sample of college students (α= .89-.91) and a clinical sample of adults (Charak et al., 2019), and it has comparable concurrent validity to the original DERS (Hallion, Steinman, Tolin, & Diefenbach, 2018; Kaufman et al., 2016). To the best of our knowledge, this scale has not been validated in a Hispanic sample although the original study comprised 8% Hispanic (Kaufman et al., 2016). In the present study, the Cronbach's *a* for the full scale for was .861, and the subscales: Awareness (.830), Clarity (.877), Goals (.897), Impulse (.924), Nonacceptance (.908), and Strategies (.661).

Acculturation

The Short Acculturation Scale for Hispanics (SASH; Marin, Sabogal, VanOss Marin, Otero-Sabogal, & Perez-Stable, 1987) is a 12-question measure that determines an individual's level of acculturation in the mainstream society with two subscales that consist of language preference and friends preference. The language subscale consists of eight questions using a 5-point Likert scale to determine their language preference for language use and media ranging from "Only Spanish" to "Only English." The friends subscale consists of four questions using a 5-point Likert scale to determine their ethnic social relations, ranging from "All Latinos/Hispanics" to "All Americans." This questionnaire has very high inter-item correlations (all > .94). It correlated highly with the respondents' generation, length of residence in the U.S., age at arrival, ethnic self-identification, and with an acculturation index. Research done on this scale found: respondents whose scores were 2 or less (strongly preferring Spanish) reported the lowest levels of education, being US born, and having either parent born in the USA; whereas respondents with scores above 3 (strongly preferring English) reported much higher levels of

education, being US born, and having one or more parents born in the USA (Marin et al., 1987). The Cronbach's α for SASH in the present study was .929. In the present study, acculturation was split into two groups for analysis: low-moderate acculturation versus high acculturation. According to a study conducted by Serrano (2013), a value of 12 to 29 in the acculturation scale indicates a low level of acculturation, 30 to 44 indicates a moderate level of acculturation, and 45+ indicates a high level of acculturation. In the present study, low and moderate were combined, and high was its own category as a variable in analysis. 63.6% of the total respondents were in the low and moderate acculturation category, and the remaining 36.4% of the total respondents were in the high acculturation category. This determination was due to both the differences in standard deviation for each category (*SD* = 26.39 – low, 26.17 – moderate, 29.36 – high) and the focus specifically on highly acculturated individuals.

Chronic Pain

The Graded Chronic Pain Scale (GCPS; Hawker, Mian, Kendzerska, & French, 2011; Von Korff, Ormel, Keefe, & Dworkin, 1992) consists of six questions using a 10-point Likert scale where the respondent was to rate their level of pain and how much change their pain had on their ability to take part in activity in the last six months, with the seventh question asking how many days in the last six months have they been kept from their usual activities due to physical pain. This scale has hierarchical categories: Grade 0 (no pain), Grade I (low disability, low intensity), Grade II (low disability, high intensity), Grade III (high disability, moderately limiting), and Grade IV (high disability, severely limiting). These categories were determined based on their responses towards three domains: characteristic pain intensity, disability score,

and disability points (determined through disability score and disability days). In a review conducted by Hawker and colleagues (2011), the GCPS showed high internal consistency, demonstrating a Cronbach's *a* between .74, with the Italian version ranging from .81 to .89. This assessment is multidimensional and measures pain intensity and pain-related disability and is suitable for all chronic pain conditions. In another study conducted by Smith and colleagues (1997) specifically used to determine validation and reliability, the GCPS demonstrated good internal consistency, with a Cronbach's α of .91, and high item-total correlations (ranging from .8285 for question 5, a measure of pain interference to .69 for question 2, a measure of pain intensity).

In the present study, characteristic pain intensity and level of interference were determined and used as measurement criteria for determining level of chronic pain due to their high correlation and reliability (.56 through .86 for characteristic pain intensity; .79 through .899 for interference; .47 through .74 for combined; $p<.001$ for all variables). Additionally, the first six items in the scale used a Likert scale for measuring levels of pain and interference, providing continuous values for the pain variable, rather than the original scoring method of categorical variables. The Cronbach's α for GCPS for the present study was .93, and for the domains: characteristic pain intensity (.861), disability score (.947), and disability points (.767). The first six questions of the GCPS measure level of pain intensity and pain interference in a continuous variable that has high internal reliability; the final question was not necessary for the data analysis, and although it was collected, it was not used when data analysis was conducted. Additionally, the final variable had lower internal consistency that was due to the lack of consistent responding from individuals relative to the other questions. This final question also

looked for days of disability from the pain, whereas the previous six determine at how intense and interfering the pain is, making them relevant to the study wherein the final question wasn't.

Procedures

All questionnaires were translated from English to Spanish language and then back-translated into the English language. The reason for this was because participants had a choice to take the survey either in the English or in Spanish language. For this, the demographics section, DERS-18, and GCPS were translated by two individuals who were bilingual in English and Spanish with an undergraduate degree in psychology and Spanish. For the remaining questionnaires (ACEs, LEC, PCL-5, and SASH), Spanish language versions for the scales were already established and validated. After translation was received in Spanish, another two individuals who were bilingual in English and Spanish, with a graduate degree, and had no prior knowledge of the original versions, were given the questionnaires and asked to translate the items into English. All four translators had Spanish as their first language and were equally proficient in English as a second language. After back-translation, if any discrepancies were found, they were discussed and resolved. The only discrepancy requiring discussion was with the meaning of the word "upset" in the DERS questionnaire throughout the course of translation. A final consensus was agreed on for the translation of the word in a group meeting. Next, clinics were approached across the upper Rio Grande Valley in search of those who would allow research to be conducted at their locations. They were given two weeks to respond regarding approval for their site for data collection. Out of the 33 locations that were contacted, four agreed in allowing data collection to be conducted at their clinics. The clinics were notified about how

data would be collected and who would collect the data, that is, a female graduate-level researcher and a trained female undergraduate research assistant. Both individuals had limited working proficiency level of Spanish and rehearsed the script and practiced anticipated questions any participants may have if they spoke Spanish as a primary language.

Research was conducted at four locations across the upper Rio Grande Valley of Mission and McAllen. Appointments were established with participating clinics so they were aware of when the researcher would be present handing out questionnaires; this was so that the staff was aware of the data collection and if the physician or the specialist had any specific client they felt would be willing to participate in the study, they could refer them to the research assistants.

Recruitment Procedure

The researcher approached patients (henceforth referred to participants) waiting in the lobby of healthcare facilities and asked them whether they were interested in participating in a graduate research study comprising a survey. Individuals were told that the survey was about "lifetime experiences, emotional processes, and physical symptoms." A total of 186 people were approached during the data collection phase, and 167 agreed to participate. However, six potential participants did not qualify due to not being able to read and write in English or Spanish, and thirteen potential participants did not qualify due to not endorsing a trauma in the LEC questionnaire. Additionally, once data analysis was performed, four participant responses were removed due to missing over 5% of data in questionnaires (these participants did not answer the PCL-5 page). If an affirmative response was received, the participants were given the informed consent and explained the basic expectations for participation. The informed consent

was read to them in their preferred language (i.e., English or Spanish) if they needed assistance and they were asked if they had any questions or queries. Informed consent was obtained from the participants before the questionnaire was administered, and within the informed consent, participants were made aware of potentially triggering questions being presented to them. Individuals completing the questionnaire were able to decide to opt out their participation at any time and this was mentioned in the consent form. The consent specified that the data regarding exposure to lifetime adverse events (including childhood victimization), physical pain experiences, emotion regulation skills, and the preferred language and social relations would be gathered through the survey. Confidentiality was ensured in the informed consent as described by lack of identifying information being answered in the questionnaire, and questionnaire responses and informed consent signatures being stored in separate folders in a locked cabinet at UTRGV – Edinburg campus. After obtaining consent, participants were then provided with the questionnaire in the form of paper-pencil versions, which they were to complete themselves. Questions in the questionnaire were not randomized, and every participant received the questions in the same order.

Survey Administration

All questionnaires were administered by the researcher or a trained undergraduate research assistant. Only the researcher scored the questionnaires. The questionnaire was given double-sided on paper and participants were asked to fill out the questionnaire on their own. They were encouraged to ask questions if they feel had questions or queries. Specialists and management for the locations where survey was given out have seen and approved the

questionnaires before recruitment procedures began but had no access to the responses of the participants at any point in the research and data collection process. Participants were given the questionnaires in the following order starting with the demographic questions, LEC, PCL-5, ACE, DERS, SASH, and GCPS.

Questionnaires were provided at the clinics to participants while they were waiting for their turn. The questionnaire took an average of 10-15 minutes to complete depending on their reading level and whether they had questions to ask the researcher. There was no incentive for participation, and participants were notified of this via the informed consent form. After completing the questionnaire, they were given a debriefing form explaining the purpose of the research, what type of data are attempted at being collected, and to provide any information about who they can contact if they were interested in the results once the data collection was complete. The debriefing form also included a list of references for the participants to access if they were interested in further reading. Participants were able to discuss concerns with the researcher at this point, wherein the researcher was able to determine if the participant is distressed and may need additional, potentially psychiatric services, in which case office staff would be notified to obtain appropriate permissions. Although this event is rare, however still possible (Jaffe, DiLillo, Hoffman, Haikalis, & Dykstra, 2015), all researchers involved were notified of the procedures to handle a similar situation and the debriefing form contained specific hotlines and phone numbers to local mental health service providers listed in the event that a participant may need to utilize the services. However, throughout the course of the data collection period, this problem did not arise.

Statistical Analyses

Descriptive statistics were computed for all study variables. Gender differences across all study variables were examined through a one-way ANOVA test. Pearson's *r* correlations were used to investigate the association between lifetime traumatic events, emotion dysregulation, posttraumatic symptomatology, chronic pain, and acculturation. Mediation analysis and subsequent moderated-mediation analysis were conducted in PROCESS Macro for SPSS by Hayes (2013), applying models 4, and 14, respectively. As recommended by Preacher and Hayes (2008), bias-corrected bootstrapping procedures for confidence intervals with a total of 5,000 bootstrapped samples were used to corroborate findings from the product-of-coefficient tests. Use of bootstrapping method is recommended over the traditional causal steps approach, as the former has higher power while maintaining reasonable control over the Type I error rate (Mackinnon et al., 2004). In the present study, a 95% confidence interval not containing a zero was considered statistically significant. Additionally, post hoc analyses for the moderated-mediation models were determined using univariate general linear model.

Data Analysis

Many participants (29.3%) reported only one traumatic event during their lifetime, with 2.1% of participants reporting 10 adverse experiences (the most present for any individual). As expected, interpersonal trauma frequencies and types differed between men and women; women (and those who selected "other" on gender) were more likely than men to report a history of sexual trauma or unwanted sexual contact. However, men were more likely to report to report adverse experiences in general when compared to women, and those who selected "other" as

gender were the most likely to experience adverse experiences relative to their group. Even though those who selected “other” as gender were reporting the lowest amount of most adverse experiences when compared to women and men (8, 10, and 10 respectively), they also started at the highest amount of least adverse experiences (4 compared to 1 for both other groups). Men (and “other”) were more likely to report physical assault and assault with a weapon when compared to women, with natural disasters, physical assault, and assault with a weapon being the three most reported adverse experiences for men. Women had transportation accidents, unwanted sexual contact, and sexual assault as the three most reported adverse experiences, and those who selected “other” as their gender had unwanted sexual contact and physical assault tied for their most reported adverse experience and sexual assault being their third most reported experience.

When looking at how participants responded in the PCL, the only question that showed significance in the difference between the groups was that regarding having trouble remembering important parts of an event. Women and those who selected “other” as their gender indicated more trouble remembering than men did, and the *p* value of the difference was .01.For emotion dysregulation as measured in the DERS questionnaire, there were no significance between groups in responses with the exception of, “When I am upset, I have difficulty getting work done” Those who responded “other” on gender responded the highest dysregulation in this question, with males following second. The significance between groups was a difference *p* value of .001.

When being compared to history of trauma, women and “other” groups were more likely to report more severe somatic symptoms than men. Somatic symptoms were gauged on how they scored on the GCPS, considering the first 6 questions and excluding question 7 for data analysis due to reduced reliability for this question. Additionally, questions 1 through 6 use a continuous

Likert scale for responses, have high reliability within each other, and are questions used to determine intensity and interference that chronic pain has on participant's life in the last 6 months. Although women and those who selected "other" had higher levels of pain than men, the differences between the groups was not seen as significant (p=.23), which is why for further analysis they will be grouped together rather than separated on the basis of gender. However, it is important to note that when pain is separated into two categories of mild and severe, men had more mild pain and women and those who selected "other" had more severe pain. These differences were significant (mild, between groups p<.05; severe, between groups p<.05). This indicated that women, on average, faced higher levels of pain than men.

In research conducted by Kulka et al. (1990), they suggested that Hispanics were more likely to have PTSD (27.9%) when compared to non-Hispanic whites (13.7%), suggesting a skew in the presence of PTSD regardless of how it somatically presents itself. PTSD is not frequently studied in Hispanic populations, although they are the fastest growing demographic group in this country (Day, 2011). This research suggests a need for an exploration in how PTSD may differ in Hispanic groups, and further research is needed to understand the process in PTSD becoming chronic pain when comparing Hispanic groups to non-Hispanic groups.

To further understand the role that PTSD has with chronic pain in Hispanics, the criteria groups were separated for analysis. Criterion A for PTSD is experiencing a stressor, which is outlined by LEC, where all participants in the study have experienced at least one stressor. Criterion B is described as intrusion symptoms, experienced as the re-experiencing of the trauma through unwanted upsetting memories, nightmares, flashbacks, emotional distress after exposure to traumatic events, and physical reactivity after exposure to traumatic events. Criterion C is described as avoidance symptoms, and it is experienced as the avoidance of trauma-related

thoughts or feelings and trauma-related external reminders. Criterion D is described as negative alterations in cognition and mood and is experienced as negative thoughts or feeling that began or worsened after the trauma such as the inability to recall key features of the trauma, overly negative thoughts and assumptions about oneself or the world, exaggerated blame of self or others for causing the trauma, negative affect, decreased interest in activities, feeling isolated, and difficulty experiencing positive affect. The final criterion in the PCL is criterion E, which is described as alterations in arousal and reactivity, which is experienced as trauma-related arousal and reactivity that began or worsened after the trauma, such as irritability or aggression, risky or destructive behavior, hypervigilance, heightened startle reactions, difficulty concentrating, and difficulty sleeping.

When examining how each criterion is related to chronic pain, a significant relationship between LEC and criteria B, C, D, E, and DERS is seen. However, when also seeing how this relation plays out with chronic pain and acculturation, a significant relation is only seen between criterion E and DERS. A moderated mediation model is used to explain this relation. We see that as acculturation goes up, chronic pain goes up as well. Prior to adding acculturation as a moderator, the mediation model showed that there was only a significant relation with criterion E and chronic pain, showing an indirect effect between LEC, leading to criterion E, leading to chronic pain.

There was less than 1% of missing data (.006%; n =18) in the 84-items (excluding demographics) of the questionnaire administered to participants when considering each individual variable for each participant. There was a range of 0% to 2.1% of data missing from the variables used in the study (highest n = 4). 87.14% (n = 122) participant reports had no missing data present in the analysis. Of the participants that qualified for the study, four data sets

were removed due to having >5% missing data (5.5%, 13.7%, 27.4%, & 27.4%). No outliers were present when data was examined prior to and after removing data. All missing data that remained was data considered missing at random due to lack of patterns. The data that was removed was not considered missing at random since it was entire forms missing (e.g. PCL-5) which could not be controlled for due to questionnaires being administered in paper format. In the final analysis, a total of 136 participant responses were analyzed.

CHAPTER IV

RESULTS

Participants

The present sample comprised 136 participants (34 men, 97 women, 5 selected “other” as their gender). Although most of the participants were female, key demographic features did not differ significantly by gender when examining three separated categories as women, men and those who responded “other” in gender. The respondents' age ranged from 18 to 65 (M = 34.99, SD = 11.58). The majority (84.6%) of tests administered were in English language, with the remainder being administered in Spanish language for those who weren’t as comfortable reading questionnaires in the English language. Majority of the participants self-identified their ethnicity as Hispanic (n = 121; 89.0%). This is reflective of the population in the Rio Grande Valley (U.S. Census Bureau, 2010) in the state of Texas. In terms of education, 23.5% of participants reported their level of education as High school or less, 40.4% reported having received some College education (but not graduates), and 36% reported being College graduates. Many participants were either single or married (i.e., 43.4% and 42.6%, respectively), 5.9% were separated, 6.6% were divorced, and 1.5% were widowed. Only two participants (1.5%) were veterans. Just under a third of the participants (31.6%) reported a family income level of $25,000-$50,000, with 11.8% reporting an income below $12,000, 19.9% reporting between $12,000 and $25,000, 17.6% reporting between $50,000 and $75,000, and 18.5% reporting above $75,000. Table 1 depicts frequency of the demographic statistics.

Differences in traumatic events, emotion dysregulation and posttraumatic stress symptoms

On average, men reported similar number of lifetime traumatic events (M = 3.41, SD = 2.24) as women (M = 3.05, SD = 2.28). Those who identified their gender as other reported the higher average on adverse lifetime events (M = 5.6, SD = 1.67) than women and men. Notably, only 5 participants identified as other. Men reported the least amount of emotion dysregulation (M = 36.15, SD = 10.08), with women following closely (M = 36.92, SD = 13.01), and those who selected "other" as having the largest amount of emotion dysregulation (M = 45.20, SD = 11.52). Those who selected "other" reported the highest level of posttraumatic stress symptoms (M = 35.20, SD = 18.43), with women also scoring higher (M = 21.82, SD = 21.21) than men (M = 19.64, SD = 19.86). Notably, the cut off score for PTSD (measured via PCL-5) is 33 (Weathers et al., 2013). There was a significant difference across genders for lifetime adverse events (p = .05), however, data analyzed combined all three gender groups. Future data analysis should continue to explore these gender differences and what contributes to them.

Correlations

As depicted in Table 2, analyses of the bivariate correlations between the study variables were significant, with the exception of acculturation that was significant only with criterion D of PTSD).

Table 2.
Correlation Coefficients Between Emotion Dysregulation, Posttraumatic Symptomatology, Chronic Pain, and Acculturation

Variable	DERS	CritB	CritC	CritD	CritE	PTSD	CP
DERS							
CritB	.560**						
CritC	.531**	.791**					
CritD	.651**	.746**	.757**				
CritE	.667**	.771**	.762**	.849**			
PTSD	.669**	.893**	.866**	.942**	.939**		
CP	.332**	.343**	.332**	.293**	.409**	.365**	
SASH	.112	.065	.041	.197*	.095	.131	.057

Note. DERS = emotion dysregulation; CritB = criterion B (PCL); CritC = criterion C (PCL); CritD = criterion D (PCL); CritE = criterion E (PCL), PTSD = posttraumatic symptoms as measured in PCL; CP = chronic pain; and SASH = acculturation.
N = 136.
* $p < .05$, ** $p < .01$.

Lifetime adverse events, emotion dysregulation, and PTSD on chronic pain

In a mediation analysis of the effect of emotion dysregulation on chronic pain, the present study found significant associations between lifetime adverse events (LEC) and emotion dysregulation (DERS) (*path a*: $B = 1.91$, $p<.001$), and chronic pain (path c: $B = 2.747$, $p = .016$). There was a significant association between emotion dysregulation and chronic pain (*path b*: $B = .57$, $p = .003$). Findings also indicated that the indirect effect of emotion dysregulation from the bootstrap analysis was positive and significant ($B = 1.08$, $SE = .489$) and the direct effect between lifetime adverse events and chronic pain was also positive and significant (*path c:* $B = 2.47$, $SE = 1.009$, $p = .016$).

When total posttraumatic stress symptoms were applied to the same simple mediation analysis (with one mediator), the effect of posttraumatic stress on chronic pain is also found to be significant (*path b:* $B = .37$, $p = .004$); however, when lifetime adverse events is mediated by posttraumatic stress, the pathway to chronic pain is not significant (*path c':* $B = 1.94$, $p = .085$). Lifetime adverse events had a significant association with PTSD (*path a:* $B = 4.65$, $p<.001$), and the indirect effects of PTSD ($B = 1.70$, $SE = .749$) was significant; however, the direct effect ($B = 1.94$, $SE = 1.12$, $p = .09$) of posttraumatic stress on chronic pain was not significant.

A multiple mediation analysis was performed to see if the significant effects remain when emotion dysregulation and posttraumatic stress are both mediators for chronic pain. Lifetime adverse events remained significant to emotion dysregulation (*path* a_1*: B* = 1.94, *p*<.001) and lifetime adverse events remained significant to posttraumatic stress (*path* a_2*: B* = 4.65, *p*<.001), but lifetime adverse events (*path c: B* = 1.90, *p* = .09), emotion dysregulation (*path* b_1*: B* = 0.32, *p* = .24), and PTSD (*path* b_2*: B* = 0.24, *p* = .16) did not have significant pathways to chronic pain. This model shown in Figure 1.

A simple mediation analysis, as shown in Figure 2, was also performed for the different criteria of PTSD (i.e., B, C, D, and E) on chronic pain with emotion dysregulation. When analyzed separately in the same model, using model 4 from the PROCESS macro, a significant pathway was only obtained for criterion E (*B* = 1.43, *p*<.001) to chronic pain. Lifetime adverse events had significant pathways for emotion dysregulation (*B* = 1.94, *p*<.001) and all four criteria (criterion B: *B* = 1.06, *p*<.001; criterion C: *B* = .52, *p*<.001; criterion D: *B* = 1.61, *p*<.001; criterion E: *B* = 1.63, *p*<.001), but did not have a significant pathway predictive of chronic pain (*B* = .33, *p* = .177).

Acculturation's role on chronic pain

The mediation analysis was followed with a moderated mediation analysis. Using model 14 of the PROCESS macro, we included acculturation as a moderator in the association between emotion dysregulation, the four criteria of PTSD, and chronic pain. The significant pathways from LEC to each criterion of PTSD, and emotion dysregulation, as well as from criterion E to chronic pain, remained. Additionally, a significant pathway from criterion D to chronic pain (*B* = -1.52, *p*=.04) and emotion dysregulation to chronic pain (*B* = .72, *p*<.01) surfaced when

acculturation moderated the pathways. The moderation of acculturation was also significant (B = 60.44, p<.001), as well as the interaction between acculturation and emotion dysregulation (B = -1.54, p = .004). We used Figure 3 to illustrate this process.

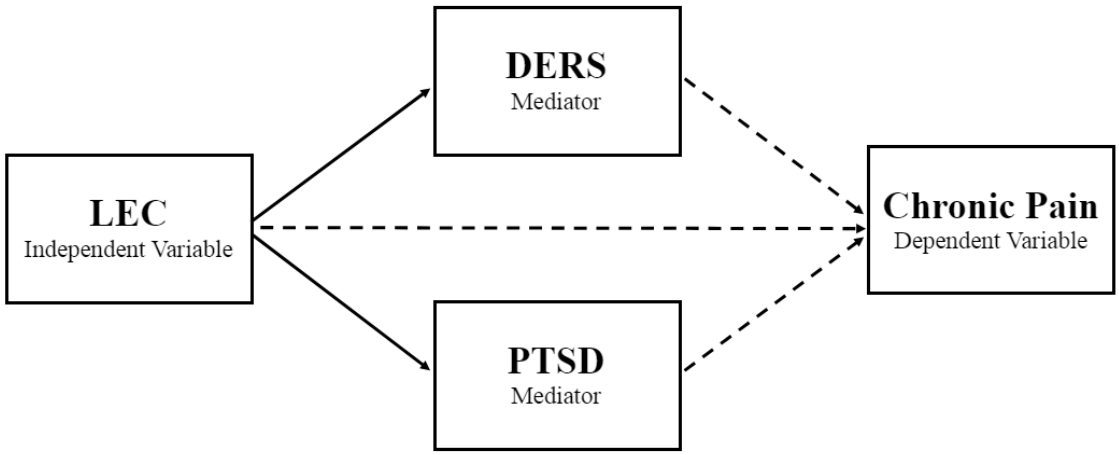

Figure 1. *Mediation analysis of lifetime adverse events on chronic pain with emotion dysregulation and posttraumatic stress symptomology as mediators.*

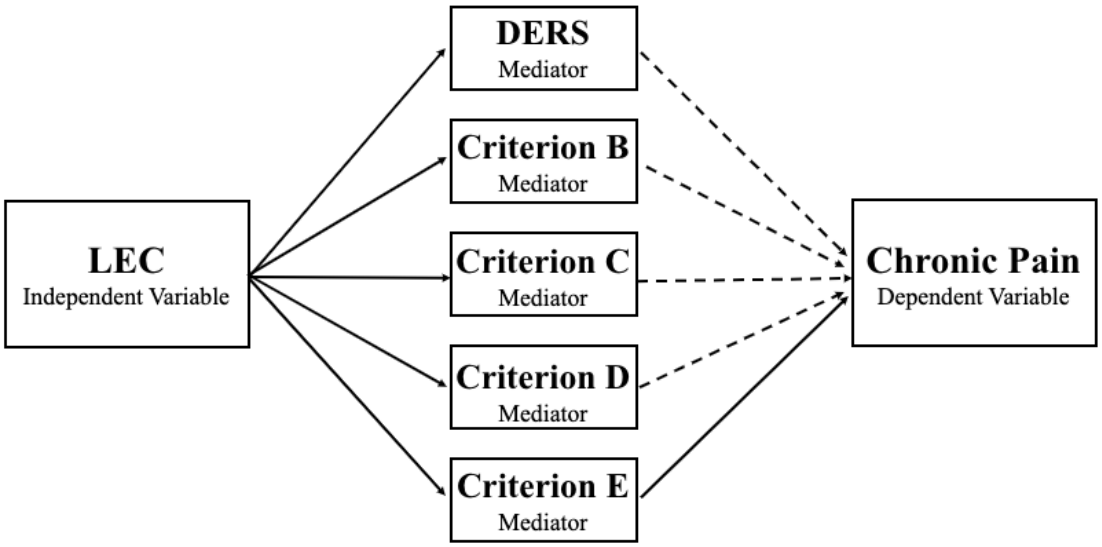

Figure 2. *Mediation analysis of lifetime adverse events on chronic pain with emotion dysregulation and each of the criteria for PTSD (B, C D, & E) as mediators.*

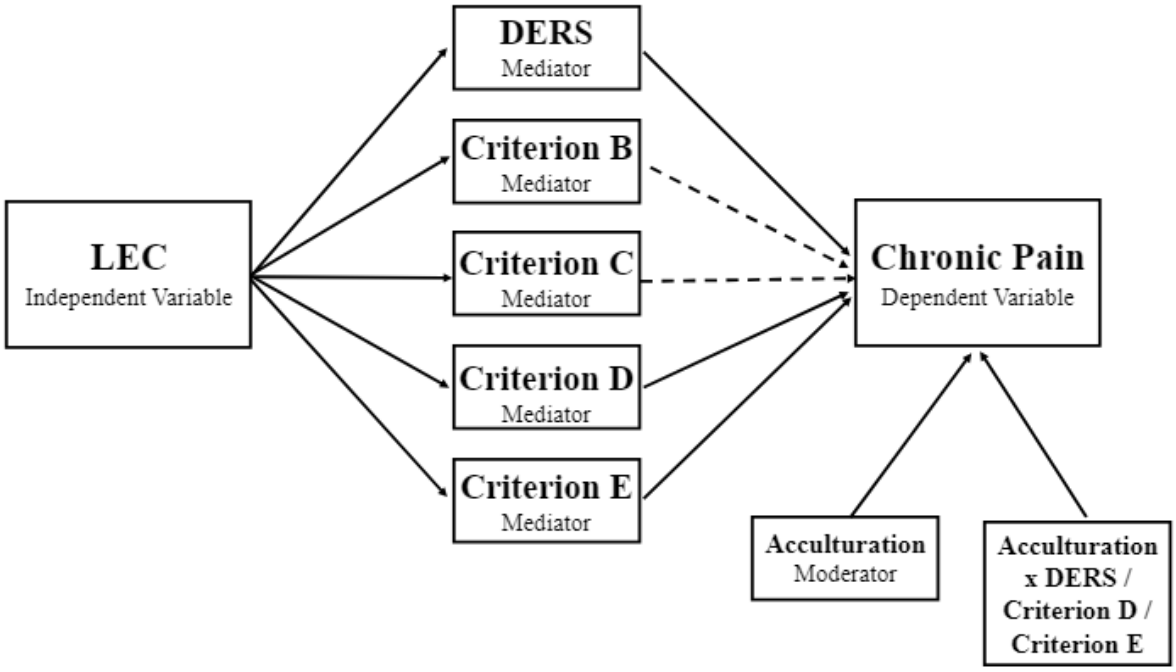

Figure 3. *Moderation mediation analysis of lifetime adverse events on chronic pain with emotion dysregulation and each of the four PTSD criteria as mediators, and acculturation as a moderator*.

Further investigation into the moderating effect of acculturation was carried out (see Figures 4, 5, 6). Findings indicated that those who were low and moderate in acculturation (i.e., those who were less acculturated with the U.S. culture) started off lower on chronic pain compared to those who were higher on acculturation (i.e., those who were more acculturated with the U.S. Anglo culture; Figure 4). Additionally, those who were lower and moderately acculturated had a greater increase in pain as their emotion dysregulation increased, whereas those who were highly acculturated had a slight decrease in their chronic pain as they increased in emotion dysregulation. The same pattern was evident for criteria D and E as shown in the Figures 5 and 6, respectively.

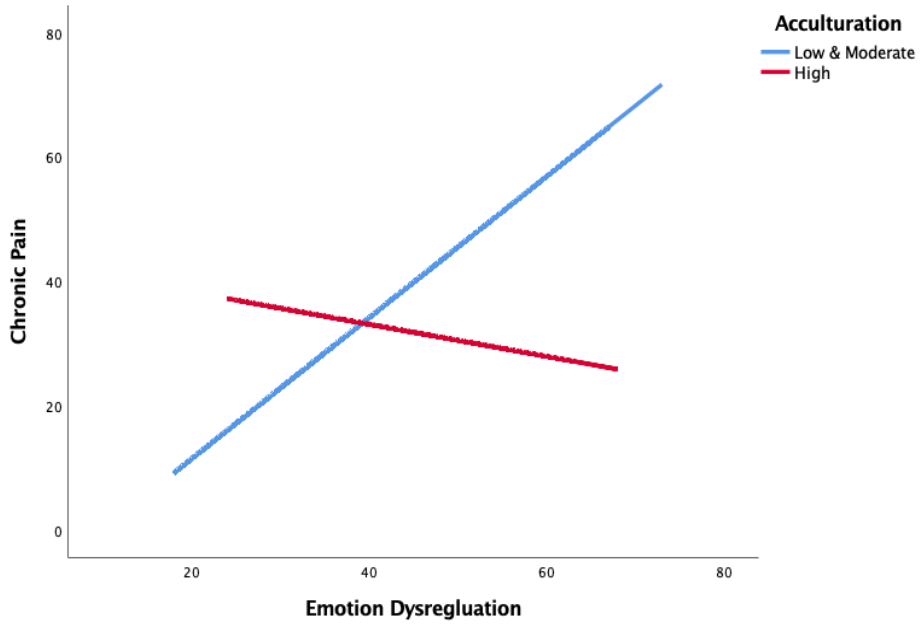

Figure 4. *Moderating effect of acculturation on the association between emotion dysregulation and chronic pain.*

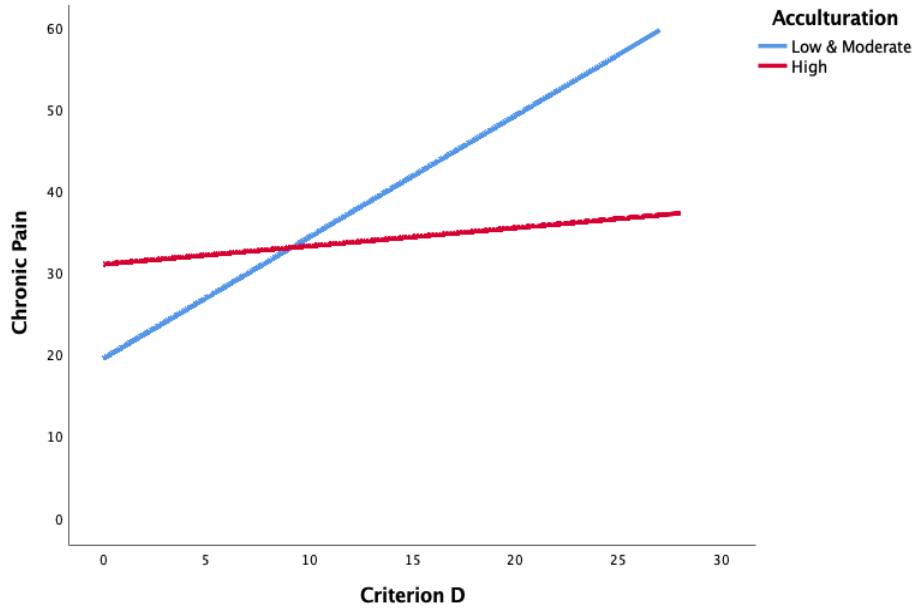

Figure 5. *Moderating effect of acculturation on the association between criterion D of PTSD (negative alterations in cognition and mood) and chronic pain.*

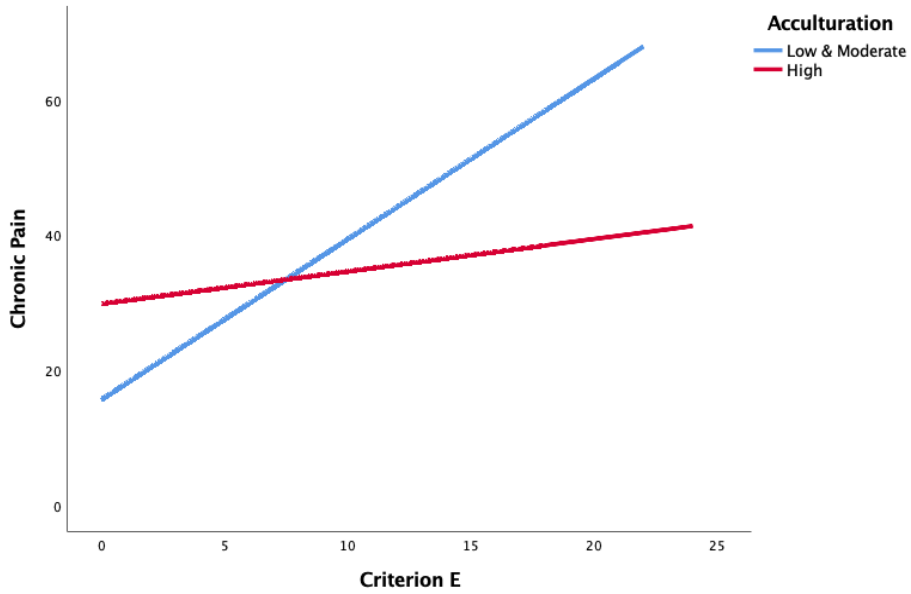

Figure 6. *Moderating effect of acculturation on the association between criterion E of PTSD (alterations in arousal and activity) and chronic pain.*

CHAPTER V

DISCUSSION

Previous research established a relation between lifetime adverse events and chronic pain, with several studies stating a relation that is mediated by mechanisms, such as emotion dysregulation and PTSD (Carleton et al., 2017; McCall-Hosenfeld et al., 2014; Morasco et al., 2013; Otis, Keane, & Kerns, 2003). Although some research also looked at how acculturation with the U.S. Anglo culture and acculturative stress might have played a role in the development of chronic pain following trauma (Campbell et al., 2009; Edwards et al., 2005; Jimenez, et al. 2013; Riley et al., 2008), research to date has mixed finding with some supporting the *Hispanic paradox,* wherein lesser acculturated individuals are higher in chronic pain than their U.S.-born counterparts, and other studies indicating that lesser acculturated individuals are at risk of physical and mental health problems, including chronic pain and traumatic stress reactions (Paulus et al. 2016; Salinas et al. 2013; Torres, 2010; Weden et al., 2017). Thus, the purpose of the present study was to examine the effect that acculturation has as a moderator on the association between lifetime adverse events and chronic pain as mediated by emotion dysregulation and posttraumatic stress symptoms in a predominantly Hispanic adult sample from the Rio Grande Valley, Texas. For this, the present study sequentially utilized correlational, mediation, and moderated-mediation designs for describing these analyses, and overall was able to confirm that acculturation has a significant direct effect as a moderator on chronic pain, and

on the indirect effects of emotion dysregulation and specific criteria of the DSM-5 PTSD diagnostic criteria (i.e., criteria D and E) that mediated the association between lifetime adverse events and chronic pain.

In the present study, we were able to confirm what previous studies have stated, wherein traumatic events exposure has an association with chronic pain. In a meta-analysis conducted by Afari and colleagues (2013), they looked at 71 studies and were able to confirm that traumatic events are associated with an increased prevalence of "functional somatic syndromes" (chronic pain). Additionally, in our research, we determined that there was a cumulative effect in which individuals who experienced increased amounts of traumatic events tended to have increased amounts of chronic pain, thus confirming our first hypothesis that states that individuals who experience greater lifetime adverse experiences will have a higher incidence of chronic pain than those who experience fewer lifetime adverse experiences. Additionally, our research was able to confirm our second hypothesis as well, that stated that individuals who experience greater lifetime adverse experiences will have more emotion dysregulation than individuals who experience fewer lifetime adverse experiences. This can be mirrored through prior research conducted by Duric, Clayton, Leong and Yuan (2016) that finds that physiological and psychological stress both lead to the development of emotion dysregulation issues and potentially chronic pain, which leads to our third hypothesis: individuals who experience greater emotion dysregulation will have a higher incidence of chronic pain than those who experience lesser emotion dysregulation. We were able to confirm this hypothesis in our research, as well as confirm already existing theories that emotion dysregulation has an effect on chronic pain, such as explained by the research of Connelly and colleagues (2011) where children expressed more chronic pain if they presented with more emotion dysregulation, as well as the research by

Paulus and colleagues (2016) that suggests an association between emotion dysregulation and pain severity in adult Latino populations. This leads to our fourth hypothesis, individuals who experience greater adverse lifetime experience will have greater posttraumatic stress symptoms, which we were able to confirm in our study as well. Although only one traumatic event is necessary to produce posttraumatic stress symptoms in an individual, we were able to find that there seems to be a cumulative effect with traumatic events where it increases the likelihood of experiencing more posttraumatic stress symptoms and an increased likelihood of scoring above the cutoff score for PTSD. This is relevant to what some research of PTSD has stated, where both specific traumatic event exposures as well as "cumulative exposure to potentially traumatic events" (p. 260, Bryant, 2019) results in "substantially higher PTSD prevalence estimates than those surveys recording lower exposure" (Steel et al. 2009). Our study also showed an increase in chronic pain scores as posttraumatic symptoms increased. For this reason, we were able to confirm our fifth hypothesis: individuals who experience greater posttraumatic stress symptoms will have a higher incidence of chronic pain than those who experience fewer posttraumatic stress symptoms. This can also be seen in a study conducted by Defrin, Lahav, and Solomon (2016) where they concluded that the magnitude and duration of PTSD, rather than the exposure to trauma, implied the association between trauma and pain, making PTSD a determining factor. Other researchers further stated that PTSD and chronic pain are "at the same level" (p. 302) and are similar reactive disorders (Brennstuhl et al., 2014).

All the four criteria for PTSD were significantly correlated with emotion dysregulation and chronic pain, however, only criterion E mediated the relation between adverse life events and chronic pain. Criterion E comprises the alterations in arousal and reactivity symptoms, which is described by the shared vulnerability model as outlined by Carleton and colleagues

(2017), wherein individuals who present with posttraumatic symptoms have an attention bias for pain-related experiences and stimuli, leading them to anticipate word stimuli as potentially threatening (when referring to trauma and pain) or not. These individuals who had the attention bias towards pain related stimuli also presented with higher levels of chronic pain, and thus increased arousal and reactivity were present for study groups. Similarly, in a study by Litz and colleagues (1992), PTSD leads to hyperarousal (symptoms included under criterion E), physical tension, and stress. Additionally, Graham and Streitel (2010) used their study to describe the behavioral issues related to hyperarousal that lead to somatic symptoms, such as chronic pain. These theories suggest that people presenting with higher levels of hyperarousal will more likely be experiencing higher levels of chronic pain. Our study did find that as hyperarousal symptoms increased, so did chronic pain, but what differed was the rate at which the increase occurred due to the moderation effects of acculturation. The research implies that acculturation served as a protective factor, wherein more acculturated individuals had less chronic pain when compared to less acculturated individuals with similar levels of hyperarousal symptoms. These findings reflect the Hispanic paradox as described by Paulus and colleagues (2016), where "acculturated Mexican-Americans demonstrate better health outcomes than…European Americans despite barriers to care and other health inequities" (p. 45).

When the effect of acculturation on the indirect effect due to emotion dyregulation and criteria E and D of PTSD were accounted for in the moderated mediation, the relation changed in that criterion D and emotion dysregulation were now significant predictors (direct effects) of chronic pain, with the main effect of acculturation, and the interaction effects of acculturation with emotion dysregulation, criteria D and E (i.e., moderation) having a significant effect on chronic pain. Criterion D and emotion dysregulation being significant reinforces the idea that,

when acculturation is accounted for, negative affect and cognitive symptoms of PTSD play a role in the relation that adverse experiences has with chronic pain, in that it mediates the association between the two. This can be seen with the biopsychosocial model of pain as described by Gatchel and colleagues (2007), which considers emotions to influence the perception of pain and the related level of functional impairment. Furthermore, in the study, negative cognitions included having trouble remembering stressful experiences, self-blame, and strong negative feelings towards self, loss of interest, and feeling distant from others. Gatchel and colleagues (2017) further stated that the relation between emotion and pain is complex, and is possibly interacting in a multitude of ways, including emotional distress potentially predisposing people to experience pain or being a perpetuating factor. Similar patterns were present for criterion D as were for criterion E, where those who were higher in acculturation experienced less of an increase in chronic pain as negative affect was present, once again serving as a protective factor. Using the Hispanic paradox as outlined by Salinas and colleagues (2013) can help explain this, where they stated that the paradox is often explained as "factors stemming from culture, behaviors, immigrant selection or protective 'enclaves' that somehow provide protection from the known causal effects of poverty on disease and mortality outcomes" (p. 262) and a study by Cuellar & Roberts (1997) explains that acculturation may not be the ultimate factor that significantly influences these results, but instead the experiences that are frequently associated with acculturation, or lack thereof, do.

The Hispanic paradox as described by Jimenez and colleagues (2013) suggests that individuals of Hispanic ethnicity who are less acculturated with the dominant Anglo-culture in the United States, are likely to be healthier than their White Non-Hispanic counterparts. Additionally, the lower starting point for those who were less acculturated can best be explained

as an individual retaining their cultural roots and connections that help maintain social relationships necessary in serving as protective factors (Campbell et al., 2009). The Hispanic paradox insinuates that despite the likelihood carrying a higher burden of disease and rates of poverty, specifically for Mexican-descent individuals living along the US-Mexico border, they have lower rates of disability (Salinas, Su, & Snih, 2013; Jimenez et al. 2013). These results suggest that acculturation plays a potential protective role for these groups when dealing with high disease burden and lower socioeconomic status, specifically in the potential development of chronic pain in the absence of PTSD symptoms and emotion dysregulation. It also suggests that, when comparing to the findings of the study by Jimenez and colleagues (2013), less acculturated Hispanics may present with higher levels of pain than more acculturated Hispanics, but their level of functional impairment is not as profound. However, replication of current findings is warranted by future studies in order to validate the present findings, as well as to determine whether functional impairment remained comparatively the same with higher levels of pain for less acculturated Hispanics.

The moderated mediation analyses indicated that as factors such as emotion dysregulation, alterations in arousal and activity (criterion E), and negative alterations in cognition and mood (criterion D) increased, those with low to moderate acculturation had a steeper increase in chronic pain, than those who were highly acculturated. We believe that this steep increase may in-part be due to access to healthcare and treatment from less language barriers and more resources available. As stress may increase (which can be present due to multiple factors, such as lack of access to resources, or language and cultural barriers), emotion dysregulation increases, leading to an increase in chronic pain presentations. However, the increase in pain is present for those who were less acculturated as well as those who were highly

acculturated as posttraumatic symptoms increased. Only as emotion dysregulation increased was there a decline in chronic pain expression for those who were highly acculturated. This needs further examination to determine the cause.

As previously stated in other studies explaining the Hispanic paradox, it is suggested that those who are less acculturated may experience higher levels of pain than those who are more acculturated, but the pain will impact their functioning to a lesser degree (Jimenez et al. 2013; Salinas, Su, & Snih, 2013). Thus, with these findings, we find that our original hypothesis (hypothesis #6) was not supported, where we stated that individuals who are less acculturated will experience lower levels of chronic pain. We believed that would be due to the region having residents who predominantly identify as Hispanic and Spanish language barriers being less of a problem, hence acculturation may not impact Hispanic individuals as it would in other studies conducted outside of predominantly Hispanic regions (as presumed by 'enclaves' described by Salinas, Su, & Snih in 2013). However, the present findings indicate that, regardless of language barriers being less present, acculturation still serves as a protective role with Hispanic individuals living along the U.S.-Mexico border in much the same way that it does in other parts of the United States (Campbell et al., 2009) when emotion dysregulation and posttraumatic stress symptoms are low. It is also important to note that chronic pain increased for both low and high acculturated individuals as criterion D and criterion E symptomology increased. The only exception in the increase was for highly acculturated individuals, who showed a decrease in chronic pain as emotion dysregulation increased. This may be due to factors out of the control of the study and require replication to see if similar patterns emerge.

The findings regarding acculturation contradict our original hypothesis, in part, due to contradictions that exist about what the Hispanic paradox is, as well as due to assumptions made

based on regional expectations. It can be presumed that more acculturated individuals, even in 'enclave' regions such as the Rio Grande Valley, still have the resources necessary to present with lower levels of chronic pain as stress situations increase. This leads us to recognize the importance of early intervention treatments that utilize these protective factors in the prevention of developing chronic pain, specifically targeting individuals who might be less acculturated, generally living in 'enclaves' where the dominant language and culture are at odds with the mainstream language and culture. We also need to continue to recognize the importance of treating specific stress symptoms of those who are highly acculturated that tend to develop more chronic pain as posttraumatic stress symptoms increase.

Limitations

The present study has several limitations, and thus the findings should be interpreted with caution. First, participants who took part in the present study were surveyed at one particular point in time, making it difficult to draw definitive conclusions about cause and effect. Longitudinal data were not collected, and the true relation between adverse life experiences leading to chronic pain as mediated by emotion dysregulation and posttraumatic symptoms, and the indirect effect being moderated by acculturation cannot be confidently declared. In order to fully examine this aspect, a longitudinal study-design would need to be conducted at multiple points in an individual's lifetime to determine if consecutive adverse experiences have an accumulative effect as shown by prior studies (Charak, Ford, Modrowski, & Kerig, 2019), as well as if the increase in emotion dysregulation follows this accumulation (Charak, DiLillo, Messman-Moore, & Gratz, 2019), leading to an increase in chronic pain.

Second, this study was conducted in a small area of the upper Rio Grande Valley, and does not account for the other regions that represent the Rio Grande Valley. In the facilities accessed, majority of participants spoke English, leading us to assume that acculturation scores were higher than would be expected for the entirety of the Rio Grande Valley. Mission and McAllen has a greater number of English-speaking population than other areas of the Rio Grande Valley, specifically regions with lower socioeconomic status. Additionally, since poverty is a barrier and all of the data were collected in healthcare facilities with individuals who were able to read and write, several potential participants were excluded from simply the luck of the draw, as well as due to these specific barriers (e.g., lack of access to healthcare facilities due to lack of transportation or distance, lower socioeconomic status and lack of health insurance, and lack of culturally competent care (AHRQ, 2018). The Rio Grande Valley has lower-than-national-average income, so those attending healthcare facilities may not accurately reflect the population in this region. Our sample size was also considerably smaller than other studies of this nature, and a larger sample size might have reflected different results, possibly representing more of the region. Our sample had majority women and relatively young participants, due to the nature of who attends healthcare facilities more frequently (i.e., women; Brett & Burt, 2001; CDC, 2018) and who was more likely to agree to participate in our research study (younger individuals).Third, cultural barriers are present with specific conditions, such as trauma or pain, being taboo to discuss, and many individuals in the region treating these conditions spiritually or homeopathically. Finally, in regard to the testing procedures used, measures are subject to bias due to the nature of being self-report.

Implications

With acculturation being a protective factor for developing chronic pain following a traumatic event, early recognition of risk factors, such as traumatic experiences, emotion dysregulation, and language and cultural barriers, may be valuable methods of determining the type of treatment that might benefit specific populations, such as multicultural regions like the Rio Grande Valley. Recognizing that higher stress in less acculturated individuals can potentially lead to an increase in chronic pain presentations may alter the types of resources that are made available for hybrid communities, where large amounts of the population may be non-English speaking (up to 86.82% in some cities of the Rio Grande Valley; USCB, 2010) and of lower socioeconomic status (Semega, Kollar, Creamer, & Mohanty, 2018; USCB, 2011). Research like the present study can also provide information to the public about the importance of seeking treatment early to prevent later onset of specific conditions unique to experiences, such as chronic pain.

Conclusion

Further research must be done to determine the relation that acculturation and the Hispanic paradox has on chronic pain, specifically through a longitudinal study that can assess a variety of Hispanic populations nationwide, rather than simply in 'enclave' regions such as the Rio Grande Valley. Research in the Rio Grande Valley and on Hispanic populations is limited and beginning this endeavor is important in recognizing the relation that exist and acknowledging the importance of further study. Hispanic populations are diverse and heterogeneous, thus ethnic clumping should be avoided. Recognizing these differences can help further studies in understanding the vast variances that exist within these communities. Much

like non-Hispanic populations, as shown by the literature review, Hispanic populations also show an increase in chronic pain relative to cumulative effects of adverse life experiences, increase in emotion dysregulation, and specific posttraumatic symptoms. Expanding on this would help in understanding treatment options that are best suited for Hispanic populations, as well as uncovering why acculturation, contrary to what was hypothesized, may serve as a protective factor.

Clinical interventions that may best serve Hispanic populations are ones that understand the complex variations culture may play a role in mental health, and clinicians should remain culturally sensitive and aware of clients' backgrounds and needs. Even within communities where Hispanic cultures are dominant, it is important for clinicians to make the effort to recognize the cultural needs of a client when performing care. Part of this effort would include the inquiring about lifetime adverse events, and what importance they play in the client's overall perspective. Clinicians must be cognizant of the association between these events and development of posttraumatic stress symptoms, emotion dysregulation, and current and potential future chronic pain. Based on the study at hand, clinicians must recognize specific risk factors for the development of chronic pain, such as those symptoms present in the different criteria for PTSD. On a case-by-case basis, different interventions may be appropriate to tackling these symptoms, including individual-tailored culturally-competent interventions that focus on regulating emotions (Dialectical Behavior Therapy; Skills Training in Affective and Interpersonal Regulation (STAIR) Therapy; Jackson, Weiss, & Cloitre, 2019; Panos, Jackson, Hasan, & Panos, 2013), decreasing negative cognitions (Cognitive Processing Therapy; Cognitive Behavioral Therapy; Macdonald et al. 2016; Wharton, Whitworth, Macauley, & Malone, 2019), and combatting arousal symptoms (Cognitive Behavior Therapy and Stimulus

Control Therapy for insomnia; Anger Management techniques; Kalkstein, Scott, Smith, & Cruz, 2017; Turner & Ascher, 1979). The importance of being culturally competent is highlighted by this and similar studies about mental health for Hispanic populations, specifically due to most studies on interventions not being performed on non-White participants (Bryant, 2019). The development and testing of interventions that work comparatively well on Hispanic populations is the next step towards equitable mental healthcare for diverse populations.

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BIOGRAPHICAL SKETCH

Mariam El-Haj was born on April 13, 1992 in Washington, D.C. to two immigrant parents from Palestine and Argentina. In 1997, she moved to the Rio Grande Valley with her two younger sisters and parents. Living along the US-Mexico border for over 20 years, she had a strong interest in the culture of the region and understanding how it differs from other parts of the country.

She graduated from the Science Academy of South Texas in 2010 and continued to pursue a Bachelor of Science in Psychology with a minor in Sociology. After graduating in 2015, she was accepted into the Masters' of Arts Clinical Psychology program at the University of Texas Rio Grande Valley, where she started to recognize her interest in stress, trauma, and health psychology. Coupled with her experiences of living at the border, she was interested in how acculturation might play a role. She completed her masters' thesis and earned her Master of Arts in Clinical Psychology in 2019, focusing her research on these specific topics of interest.

She has worked professionally in mental health since 2016 and in healthcare since 2012, recognizing the vital role it holds in hybrid communities such as her own. She is also a local activist, centering much of the work she does on her community and with her own experiences with trauma and health. She has also done several local presentations on trauma and mental health.

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