



AMERICAN UNIVERSITY OF BEIRUT

PAIN CATASTROPHIZING AND ITS RELATIONSHIP WITH  
PAIN-RELATED OUTCOMES IN PATIENTS WITH  
RHEUMATOID ARTHRITIS

by  
MELISSA ANTOINE MAKHOUL

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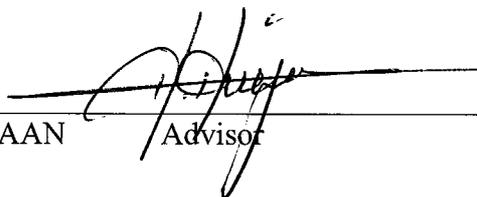
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# AN ABSTRACT OF THE THESIS OF

Melissa Makhoul for Master of Science in Nursing  
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Title: Pain catastrophizing and its relationship with pain-related outcomes in patients with rheumatoid arthritis.

Despite advancements in treatment, patients with rheumatoid arthritis still rate pain as one of their highest priority for seeking rheumatologic care. A critical psychological factor known as pain catastrophizing has been shown to influence and exacerbate the pain experience.

The study objectives include: 1) to examine the relationship between pain catastrophizing and pain-related outcomes including pain interference, physical functioning, social functioning, emotional functioning, and depression in patients with rheumatoid arthritis; 2) to explore whether pain intensity moderates the relationship between pain catastrophizing and study outcomes in patients with rheumatoid arthritis; 3) to develop recommendations for improvement in pain management in patients with rheumatoid arthritis based on the study findings.

The secondary analysis of research data study followed a cross-sectional correlational survey design. A convenience sample of 150 patients was recruited in the original study and 129 patients were included in this study. Inclusion criteria: rheumatoid arthritis patients aged 18 years or older suffering from chronic pain for at least 3 months'. Exclusion criteria: Individuals with chronic pain secondary to other chronic non-malignant pain than rheumatoid arthritis. The previously filled Chronic Pain Questionnaire-Arabic (CPQ-A) was used to meet the purpose of the study.

Pain catastrophizing was significantly correlated with all study outcomes. Pain intensity did not moderate the relationship between pain catastrophizing and all study outcomes. Study findings have important clinical and theoretical implications and further research is needed to explore the moderating effect of pain intensity.

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# CHAPTER I

## INTRODUCTION

### **A. Background**

The American College of Rheumatology Pain Management Task Force (2010) declared that pain is plausibly the most important patient-reported outcome in the practice of rheumatology. Pain is defined by the International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Cunningham & Kashikar-Zuck, 2013).

Rheumatoid Arthritis is the most common type of autoimmune arthritis (Murphy, 2017). Worldwide, its incidence is about 3 cases per 10,000 populations, and its prevalence rate is approximately 1%, more common in women, and increasing with age and peaking between 35 and 50 years of age (Smith & Brown, 2018). In Lebanon, the prevalence of rheumatic diseases is 15%, with rheumatoid arthritis (1%) and spondylarthropathies (0.3%) constituting most of inflammatory diseases (Chaaya et al., 2012).

According to the American College of Rheumatology (ACR) (2017), rheumatoid arthritis is a chronic autoimmune disease of unknown etiology in which the immune system mistakenly attacks the healthy joints; most commonly the joints of the hands, feet, wrists, elbows, knees and ankles (Murphy, 2017). This causes the tissue that

lines the inside of joint to thicken, resulting in pain, swelling, and decreased movement (Murphy, 2017).

Rheumatoid arthritis has a huge negative impact on the patient's quality of life, and pain is the most impairing symptom and most frequent reason for which individuals seek rheumatologic care (Lee, 2013; Hughes, 2016). Chronic pain is widely defined by the IASP as an ongoing or recurrent pain that persists more than 3 to 6 months or beyond the normal course of acute injury or illness, and that negatively impacts the person's health status (Chambers, 2014). Despite adequate antirheumatic strategies and early introduction of biologic agents, pain remains problematic in this patient population, with around 60 to 90% rating pain as one of their top three priorities (Walsh & McWilliams, 2014; Lee, 2013; Hammer, Uhlig, Kvien & Lampa, 2018).

Undertreatment of pain can be considered as a medical error as per the definition of medical error by the Institute of Medicine (IOM) as, "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim" (McNeill, Sherwood & Starck, 2004). However, this error remains hidden because the consequences of pain are not directly observed but are rather far more insidious. Uncontrolled pain in rheumatoid arthritis patients is strongly associated with decreased quality of life (Neva, Hakkinen, Isomaki & Sokka, 2011). It is also an important predictor of psychosocial health including depression, sleep disturbance, and decreased social and emotional functioning (Butbul Aviel et al., 2011; Courvoisier et al., 2011; Husted, Tom, Farewell & Gladman, 2012). Besides, chronic pain associated with rheumatic diseases is a significant public health problem and its treatment and costs, related to lost productivity, accounted over \$635 billion dollars annually (Walsh & McWilliams, 2014; Cunningham & Kashikar-Zuck, 2013).

In addition to pain intensity, extensive research has included pain catastrophizing as a critical psychological factor that influences the course and experience of pain, affecting the overall prognosis among pain patients (Lee, 2013; Flink, Boersma & Linton, 2013; Zale & Ditre, 2015; Neblett, 2017). Pain catastrophizing has been constantly associated with a host of health-related outcomes, including pain interference, pain intensity, physical functioning, and mental health (Neblett, 2017; Craner, Sperry & Evans, 2016; Qian Lu, Uysal & Teo, 2011; Edwards, Haythornthwaite, Smith, Klick & Katz, 2009). Contrary to these findings, some authors have argued that the effect of pain intensity on the relationship between pain catastrophizing and pain-related disability has been undervalued for several years, suggesting that pain intensity might act as a moderator of this relationship (Leeuw et al., 2007; Seminowicz & Davis, 2006).

Therefore, in addition to examining the role of pain catastrophizing, it is crucial to explore whether pain intensity influences the relationship between pain catastrophizing and pain-related outcomes. This could have important clinical and theoretical implications.

## **B. Pain Catastrophizing: Historical Perspective**

### ***1. Origins of Catastrophizing***

The word “catastrophe”, borrowed from the Greek word *katastrophē*, first entered our language in the 16<sup>th</sup> century and was originally a dramatic term referring to the end of a play (Neblett, 2017). Because “catastrophe” was consistently part of a tragedy, the word was rapidly associated with any situation of unhappy ending (Neblett,

2017). Centuries later, the definition of ‘catastrophe’ developed into “terrible disaster”, and is recently used to describe less terrible events such as a ruined gathering (Neblett, 2017).

In 1952, the term “catastrophize” was formally established by Albert Ellis, one of the founders of cognitive psychology, and was subsequently adapted by Aaron Beck (Neblett, 2017; Gatchel & Neblett, 2017). Before the term “catastrophizing” was introduced in the pain field, it was commonly depicted as a cognitive concept that is the prime element for developing emotional disorders (Flink, Boersma & Linton, 2013; Gatchel & Neblett, 2017; Neblett, 2017).

Originally, Ellis’ approach to psychotherapy was based on the assumption that irrational or negative thinking are the major causes for psychosocial disorders (such as anxiety, depression) (Gatchel & Neblett, 2017; Neblett, 2017). This later came to be known as the Rational-Emotive Therapy (RET), which involved recognizing and challenging irrational thoughts that individuals say to themselves resulting in psychological distress (Gatchel & Neblett, 2017; Neblett, 2017).

From Ellis’ RET perspective, an A-B-C constructive model of thinking was established such as, when a stressful condition (Activating event) produces anxiety (Consequence), there is a often disturbed pattern of thoughts (Beliefs) that mediate the anxiety (Gatchel & Neblett, 2017). Distorted beliefs frequently involve catastrophic thoughts which were described in a number of ways including; exaggerating the situation far worse than it actually is, perceiving the worst outcomes of the situation, and exaggerating the threat of the unwanted situation (Gatchel & Neblett, 2017).

Subsequently, health psychologists identified catastrophizing as a common pattern of emotional beliefs or thoughts in chronic pain patients, in which patients tend

to magnify the degree of discomfort and excessively focus on their pain that was caused by a pathology or injury (Gatchel & Neblett, 2017).

## ***2. Catastrophizing to Pain Catastrophizing***

It is not precisely known when catastrophizing was entered into the pain field, but it was commonly recognized in the late 1970s and 1980s, when clinical research began to test the effect of cognitive behavioral therapy (CBT) interventions on pain. It is also stated that the popularity of pain catastrophizing came into view after the publication of the Pain Catastrophizing Scale (PCS) by Sullivan, Bishop, & Pivik (1995).

Pain catastrophizing is broadly described as a negative mindset of cognitive and emotional responses (Edwards, 2015; Neblett, 2017). Factor analysis of the PCS showed that pain catastrophizing can be characterized through three different domains, including: (1) feelings of helplessness when in pain (such as feeling like there is nothing to do to reduce the pain), (2) Rumination (such as not being able to stop thinking about how much it hurts), and (3) Magnification of the threat value of pain stimulus (such as having recurrent thoughts that something serious or dangerous might occur) (Edwards, 2015; Neblett, 2017).

A neurophysiological model proposed that maladaptive cognitions are associated with several brain regions involved in chronic pain including both; (1) areas of anticipation and attention to pain, and (2) areas in the emotional aspects of pain and motor control (Gorczyca, Filip & Walczak, 2013).

### **C. Neurophysiologic Model Of Catastrophizing**

Several studies showed the correlation between pain catastrophizing and brain regions responsible for pain processing, emotions and affects. Gracely (2004) found a significant correlation between pain catastrophizing and increased functional magnetic resonance imaging (fMRI) activities in brain areas related to: (1) anticipation of pain (medial frontal cortex, cerebellum), (2) attention to pain (dorsal ACC, dorsolateral prefrontal cortex), (3) emotional aspects of pain (claustrum, closely connected to amygdala) and (4) motor control.

In another fMRI study, Strigo et al. (2008) found that individuals with major depression, rumination and helplessness had greater activity in the amygdala (a vital brain center for the emotional-affective dimension of pain and for pain modulation) during the anticipation and experience of pain. Moreover, pain catastrophizing was positively associated with gray matter volume (GMV) in the right middle frontal gyrus (MFG), which is involved in processing negative emotions including attentional, sensory and affective aspects of pain (Chehadi et al., 2017).

According to the anterior asymmetry and emotion (AAE) model, it is hypothesized that the activity of the front right part of the brain is involved with some negative feelings (such as catastrophic thoughts, anxiety and depression) and a tendency to withdraw (Jensen, Gianas, Sherlin & Howe, 2015). In contrast, the activity of the front left part of the brain is more involved with positive feelings (such as optimism) and a tendency to approach behaviors (Jensen, Gianas, Sherlin & Howe, 2015).

A recent study on 30 individuals with spinal cord injury examined the correlation between “alpha symmetry” (ratio of left to right frontal alpha activity) by means of electroencephalogram (EEG) and pain catastrophizing levels (Jensen, Gianas,

Sherlin & Howe, 2015). “Alpha” is a certain type of brain wave in an area of the brain that is associated with less activity in the brain area (Jensen, Gianas, Sherlin & Howe, 2015). Results showed that patients with greater alpha symmetry (greater left than right sided frontal alpha; that is reflecting suppression of left frontal activity) reported higher pain catastrophizing.

#### **D. Significance Of Study**

Despite recent advances in disease-modifying treatments and the wide availability of pharmacological analgesics, psychological interventions, and exercise; pain remains problematic in patients with rheumatoid arthritis (Lee, 2013; Hughes, 2016).

There is solid proof that the degree of tissue harm, radiological results, as well as disease variables, frequently does not explain the intensity of self-report pain and of pain related outcomes and/or disability (Cunningham & Kashikar-Zuck, 2013). As such, pain may be best conceptualized by the biopsychosocial model which holds that, pain is not only the result of biologic factors (such as physical injury) but also of complex interactions of biological, psychological as well as social factors (Cunningham & Kashikar-Zuck, 2013; Zale & Ditre, 2015; Asmundson, Gomez-Perez, Richter & Carleton, 2012). While a physical injury or pathology might initiate pain per say, the social and psychological factors play a significant role in the severity of pain, pain-related suffering and the extent of disability associated with pain (Zale & Ditre, 2015; Asmundson, Gomez-Perez, Richter & Carleton, 2012).

Extensive research has included pain catastrophizing as a critical psychological factor that plays a crucial role in the experience of pain, and is consistently associated

with a host of health outcomes among pain patients in general (Lee, 2013; Flink, Boersma & Linton, 2013; Zale & Ditre, 2015; Neblett, 2017). Pain catastrophizing undermines the effectiveness of pain treatment and helps in structural brain changes that function to preserve distress and pain (Darnall, 2017). In other words, catastrophizing makes pain more severe, more difficult to treat, and last longer (Darnall, 2017). Consequently, this would result in a number of negative biopsychosocial consequences including disability, depression, and physical deconditioning (Neblett, 2017; Craner, Sperry & Evans, 2016; Gatchel & Neblett, 2017).

Therefore, for successful pain management, it is essential for clinicians to understand that patients with chronic pain commonly experience catastrophic thoughts (Gatchel & Neblett, 2017). In fact, a survey revealed that 66% of clinicians were unfamiliar with the construct of pain catastrophizing (Gatchel & Neblett, 2017). Because pain catastrophizing is related to negative therapeutic and health outcomes, clinicians need to be aware of this critical psychological factor when treating pain (Gatchel & Neblett, 2017).

In reality, limited studies targeted pain catastrophizing specifically in patients with rheumatoid arthritis. Therefore, studying the relationship between pain catastrophizing and important health outcomes in this population would enlighten clinicians on the importance of identifying high catastrophizers for improving pain management.

Furthermore, examining whether pain intensity acts as moderator of the association between pain catastrophizing and pain-related outcomes might have important implications for the development of future targeted interventions aimed at reducing pain catastrophizing. For example, it would help evaluate whether a reduction

of pain catastrophizing as well as pain intensity is a recommendable practice for improving pain-related outcomes, thereby maximizing the beneficial effect of reducing pain catastrophizing. Besides the clinical implications, examining the moderating effect of pain intensity would help determine whether this variable should be reconsidered in relation to pain-related outcomes in existing psychological models of pain that tend to ignore pain intensity as a factor influencing outcomes.

Of note, only one recent study conducted by Suso-Ribera et. al (2017) examined the role of pain intensity as a moderator in the relationship between pain catastrophizing and pain-related outcomes in heterogeneous chronic pain patients. A replication of this study on rheumatoid arthritis population would help determine certainty of results and generalizability.

Accordingly, the purpose of this secondary analysis of research data, provided by Dr. Huda Abu-Saad Huijjer, is to examine the relationship between pain catastrophizing and pain-related outcomes; including pain interference, physical functioning, social functioning, emotional functioning, and depression among patients with rheumatoid arthritis. Specifically, the proposed study aims to explore whether pain intensity moderates the relationship between pain catastrophizing and study outcomes, adjusting for potential confounders (such as age, gender and marital status).

## **E. Study Aim And Research Questions**

The study objectives include: 1) to examine the relationship between pain catastrophizing and pain-related outcomes including, pain interference, physical functioning, social functioning, emotional functioning, and depression in patients with rheumatoid arthritis; 2) to explore whether pain intensity moderates the relationship

between pain catastrophizing and study outcomes in patients with rheumatoid arthritis, adjusting for potential confounders (such as age, gender and marital status); 3) to develop recommendations for improvement in pain management in patients with rheumatoid arthritis based on the study findings.

#### Research questions

- 1- What is the relationship between pain catastrophizing and pain-related outcomes including pain interference, physical functioning, social functioning, emotional functioning, and depression in patients with rheumatoid arthritis?
- 2- Does pain intensity moderate the relationship between pain catastrophizing and pain-related outcomes including pain interference, physical functioning, social and emotional functioning, and depression, while adjusting for potential confounders (such as age, gender and marital status) in patients with rheumatoid arthritis?

## CHAPTER II

### THEORETICAL FRAMEWORK

#### **A. Pain-Related Disability**

From the biopsychosocial model's perspective, pain-related disability encompasses a host of health outcomes including physical, occupational, recreational, and social functioning (Zale & Ditre, 2015). Pain intensity, pain-related interference and mood (such as depression) may also be considered when assessing pain-related disability (Zale & Ditre, 2015). Therefore, this study outcomes considered numerous pain-related outcomes as described below.

##### ***1. Physical Functioning Defined***

As per the Patient-Reported Outcomes Measurement Information System (PROMIS), physical functioning is a measure of the capacity to perform activities that demand physical actions. These activities can range from self-care (such as walking, getting out of bed) to complex ones that often require a combination of skills (such as occupational tasks) (Karayannis, Sturgeon, Chih-Kao, Cooley & Mackey, 2017).

##### ***2. Social And Emotional Functioning Defined***

Social and emotional functioning are both defined as the interpersonal performance and the influence of emotions on functioning, including the ability of individuals to perform their role within such environments such as occupation, social

activities, and relationships with others (Bosc, 2000; Suso-Ribera, García-Palacios, Botella & Ribera-Canudas, 2017).

### ***3. Pain intensity defined***

As per the PROMIS (2015), pain intensity is the measure of the extent to how much a person is experiencing pain.

### ***4. Pain interference defined***

Pain interference is defined by the PROMIS as a measure of the degree to which pain serves as an obstacle for performing and participating in physical, cognitive, emotional, and recreational activities, in addition to sleep and overall satisfaction in life (Karayannis, Sturgeon, Chih-Kao, Cooley & Mackey, 2017).

### ***5. Depression defined***

According to the American Psychiatric Association (2018), depression is a medical disease that affects negatively how a person feels and acts, and the way he or she thinks. It generates feelings of unhappiness and/or a loss of interest in activities usually enjoyed.

## **B. Fear-avoidance Model**

### ***1. Pain-Related Fear: A Brief Introduction***

As commonly described, fear is the emotional reaction to a certain stimulus that is perceived as an immediate threat, such as an injury (Leeuw et al., 2007). Because of its defensive behavior known as the fight or flight response, fear may possibly protect

the individual from an imminent danger (Leeuw et al., 2007). The escape defensive behaviors reduce fear over a short period of time, but might also reinforce fear over a prolonged period (Leeuw et al., 2007). Building upon previous research of fear, the contribution of fear in the chronic pain area has been progressively acknowledged (Leeuw et al., 2007; Vlaeyen & Linton, 2000; Asmundson, Gomez-Perez, Richter & Carleton, 2012; Neblett, 2017). In fact, the very well-known Aristotle was the first philosopher to associate pain with fear; he wrote ‘let fear, then, be a kind of pain or disturbance resulting from the imagination of impending danger, either destructive or painful’ (Vlaeyen & Linton, 2000; Asmundson, Gomez-Perez, Richter & Carleton, 2012).

Pain-related fear can best be described as a response to an existing painful stimulus that is perceived as threat, and that drives avoidance or escape behaviors (Asmundson, Gomez-Perez, Richter & Carleton, 2012). Based upon previous work, Vlaeyen and Linton (2000) proposed a cognitive behavioral model of pain-related fear that has become widely known as the fear avoidance model (Flink, Boersma & Linton, 2013, Asmundson, Gomez-Perez, Richter & Carleton, 2012).

## ***2. Pain Catastrophizing and the Fear avoidance model of Chronic Pain***

A common model that provided a deeper understanding of pain catastrophizing and its association with pain-related disability is the fear-avoidance model of chronic pain proposed by Vlaeyen and Linton (2000) (Leeuw et al., 2007, Zale & Ditre, 2015). This model was primarily developed to explain the change from acute to chronic low back pain, and has by then become the foremost exemplar for understanding the

relationship between disability and musculoskeletal conditions (Neblett, 2017; Flink, Boersma & Linton, 2013; Zale & Ditre, 2015).

The fear avoidance model focuses on the biopsychosocial approach of pain, where pain catastrophizing and pain-related fear play a crucial role in the development and maintenance of disabling chronic pain (Asmundson, Gomez-Perez, Richter & Carleton, 2012). The basic tenet of the model is that the way in which pain is interpreted may lead to two different pathways having two opposing behavioral responses: (1) confrontation and (2) avoidance behavior (Asmundson, Gomez-Perez, Richter & Carleton, 2012; Vlaeyen & Linton, 2000; Leeuw et al., 2007).

Once perceived, most people appraise pain to be an unpleasant and uncomfortable experience but not an indicative of serious threat to their general health (no fear). These individuals will be able to participate in behavioral restriction and gradually increase their activity (confrontation) through which functional recovery is finally achieved (Asmundson, Gomez-Perez, Richter & Carleton, 2012; Vlaeyen & Linton, 2000). On the contrary, other people have negative appraisals about pain and begin to catastrophize through interpreting their pain experience as an indicative of serious threat to their well-being and picturing the worst possible outcomes (Asmundson, Gomez-Perez, Richter & Carleton, 2012; Vlaeyen & Linton, 2000).

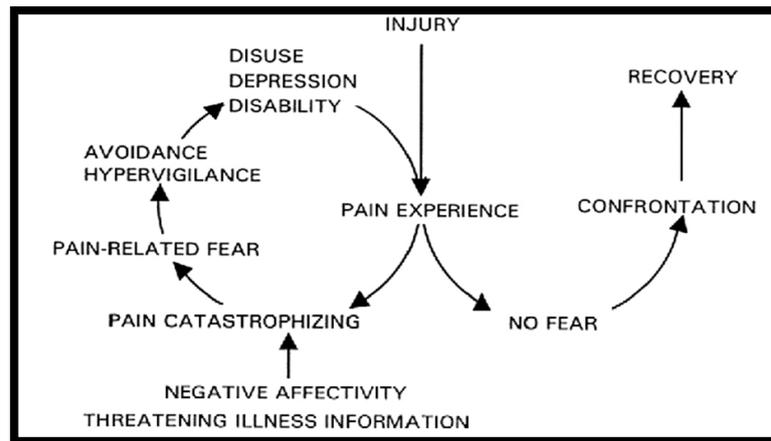
This potential pathway predisposes injured individuals to get caught in a viscous cycle, so called the fear-avoidance cycle as described below (Vlaeyen & Linton, 2000; Neblett, 2017; Flink, Boersma & Linton, 2013; Leeuw et al., 2007):

Pain catastrophizing is considered to be a primary precursor of pain-related fear. A typical protective behavior of pain is to withdraw from the noxious stimulus, as a reflex, or to avoid certain activities in order to allow time for healing (Asmundson,

Gomez-Perez, Richter & Carleton, 2012). However, when fear drives avoidance, this once protective behavior becomes maladaptive (Asmundson, Gomez-Perez, Richter & Carleton, 2012). It is undoubtedly acknowledged that in chronic pain, an individual cannot avoid the pain but can avoid the perceived threat, which is avoiding activities that are believed to exacerbate pain (Leeuw et al., 2007). As demonstrated, Vlaeyen and Linton (2000) pointed that fearful pain patients avoid behavioral performance tasks, resulting in functioning disability (such as decreased engagement in recreational or occupational activities).

In acute pain, avoidance behavior may be adaptive in order to allow time for healing the injury; however, long-term avoidance of daily activities contributes to greater level of disability leading to the ‘disuse syndrome’ which may further exacerbate the pain experience.

Just like any other fear, pain-related fear also interferes with cognitive functioning by making fearful individuals increase their attention to pain (hypervigilance) and not being able to distract themselves from pain-related information. This continuous detection of pain-related information can significantly exacerbate the pain experience (Herbert et al., 2014). Eventually, both (1) the long-term avoidance behavior and (2) hypervigilance are a logical consequence for further deterioration referred to as the “disuse syndrome” and escalation of mood disturbances such as depression.



**Figure 2.1:** Graphical display of Vlaeyen and Linton’s (2000) fear-avoidance model of pain<sup>a</sup>

<sup>a</sup>Adapted from Simons & Kaczynski, 2012

### C. Why The Fear-Avoidance Model?

A number of theoretical models of catastrophizing have been introduced in order to increase our understanding in which catastrophic thinking might influence pain experience and pain-related outcomes (Flink, Boersma & Linton, 2013). For example, the communal model of pain emphasized on the importance of the social context in the understanding of pain catastrophizing (Flink, Boersma & Linton, 2013). It describes that people use catastrophizing as a way to maximize social support from people around them (Flink, Boersma & Linton, 2013). This model focuses on social support seeking as the only function of catastrophizing, which is considered to be a narrow and distinct scope for this proposed research study (Flink, Boersma & Linton, 2013).

The appraisal model is another framework which described catastrophizing as a result of two appraisals including: (1) primary appraisal (which is the evaluation of the situation), and (2) secondary appraisal (which is the evaluation of the ability to cope with the situation) (Flink, Boersma & Linton, 2013). This model denotes that if an individual evaluates the situation as threatening, and believes that he/she will not be

able to cope with it, this person will have catastrophic thoughts (Flink, Boersma & Linton, 2013). Hence, this model primarily focuses on the origin of pain catastrophizing rather than its effects, which does not meet the objectives of the proposed study (Flink, Boersma & Linton, 2013).

A recent model around catastrophizing is the misdirected problem-solving model, where catastrophizing is considered to be a part of a process of worry that functions as a motive to solve problem (Flink, Boersma & Linton, 2013). It states that in patients with persistent pain, total pain relief is not a viable option, describing catastrophizing as a part of an unsuccessful problem-solving strategy that involves repeated futile efforts at finding a cure for pain (Flink, Boersma & Linton, 2013). This model illustrates a viscous cycle of pain catastrophizing; however it does not tackle the long-term consequences on the patient's life.

After exploring different frameworks that conceptualized pain catastrophizing, the fear avoidance model by Vlaeyen and Linton (2000) is plausible to use as a guiding process for this research study. First, this framework has been thoroughly validated with abundant researches that largely focused on the interrelationships between its diverse components (Leeuw et al., 2007; Vlaeyen & Linton, 2000). Second, this model provides a deeper understanding and conceptualizations of chronic pain with emphasis on cognitive (pain catastrophizing) and behavioral (avoidance) constructs. It explains how a patient with pain can move from catastrophic thoughts to eventually disability, disuse and depression.

Undoubtedly, some of the study variables are not included in this model (such as pain intensity, pain interference, and social and emotional functioning), while others are missing (such as pain-related fear, avoidance and hypervigilance).

Regarding the first missing variable “pain-related fear” in this research study, there is evidence that shows pain catastrophizing to be considered as a precursor of pain-related fear. A recent study conducted on 360 patients with rheumatic diseases revealed that those who had higher levels of pain catastrophizing had stronger fear-avoidance beliefs which had a direct association with physical disability and depression (Shim et al., 2017). Therefore, this serves as a theory to support that pain catastrophizing leads to physical disability and depression. Further research could explore the mediating role of pain-related fear in this relationship.

As per the World Health Organization (WHO) (2019), disability is a complex phenomenon and an umbrella term that involves cognitive impairment, limitations in activity, and restrictions in participation in life situations. Therefore, this reflects on the variables of the research study including “physical functioning, pain interference, social and emotional functioning”, which are considered as sub-outcomes of the disability outcome in the model.

Lastly, the fear-avoidance model did not include the importance of pain intensity in disability. In fact, Vlaeyen and Linton (2000) stated that pain intensity is not the major factor to drive the avoidance behavior and disability, but instead, pain-related fear is more disabling than pain itself (Leeuw et al., 2007). Therefore, if this research study supported the moderating role of pain intensity in the relationship between pain catastrophizing and study outcomes, it would have important implications on this conceptual model of pain.

## CHAPTER III

### RELATED LITERATURE

#### **A. Environmental And Genetic Influences On Pain Catastrophizing**

##### ***1. Gender***

Several studies revealed that women tend to catastrophize more than men. The exact mechanisms are still unknown, but Goodin et.al (2009) suggested that women may acquire a lower diffuse noxious inhibitory control (DNIC) neural circuitry, which is an endogenous pain modulatory pathway that inhibits pain caused by a noxious stimuli. This in turns predisposes them to pain catastrophizing more than men (Goodin et.al, 2009). In addition, differences in emotional responses to pain tend to be a contributing factor for greater catastrophizing in women as compared to men (Naseem & Ahmed, 2016). When exposed to heat pain, women experienced more anxiety and showed higher emotional frustration as compared to men (Naseem & Ahmed, 2016). In line with this idea, catastrophizing was thought to be a more feminine characteristic of pain (Naseem & Ahmed, 2016).

##### ***2. Age***

Data on the impact of age on pain catastrophizing is still lacking; however, after extensive research, some indicated slightly higher rates of pain catastrophizing and depression in individuals with chronic pain aged less than 60 years old relative to those aged more than 60 years old (Wood, Nicholas, Blyth, Asghari & Gibson, 2010; Nicholas, Asghari & Blyth, 2008). Ruscheweyh et al. (2011) showed that in younger adults, pain catastrophizing was associated with emotional responses to pain, whereas in

older adults it was associated with the actual pain intensity rating. In their discussion, Gopinath et al. (2015) suggested that these findings might be related to the tendency of older adults to be more stoical than younger adults when in pain.

### ***3. Culture, Race and Ethnicity***

There is abundant data regarding race, cultural, and ethnic differences in the study of pain (Pillay, Zyl & Blackbeard, 2014). In the context of pain catastrophizing, a higher score has been reported upon inducing pain (via cold pressor machine) in Chinese-Canadians as compared to European-Canadians (Forsythe, Thorn, Day & Shelby, 2011; Hsieh, Tripp, Ji & Sullivan, 2010), and also in African-Americans as compared to White-Americans (George et al., 2008).

Research suggested that black individuals tend to catastrophize in response to pain more than white individuals, and are more likely to catastrophize than any other ethnic groups (Tait & Chibnall, 2014; Fabian, McGuire, Goodin, & Edwards, 2011). The mechanisms underlying these differences remain elusive; however some interpretations are portrayed in the literature (Tait & Chibnall, 2014; Meints, Miller & Hirsh, 2016).

First, black people use passive pain coping strategies more frequently than white people (Campbell & Edwards, 2012; Meints, Miller & Hirsh, 2016; Tait & Chibnall, 2014). These passive strategies include hoping and praying, catastrophizing, diverting attention and reinterpreting pain sensations (Campbell & Edwards, 2012; Meints, Miller & Hirsh, 2016; Tait & Chibnall, 2014). In contrast, white people are more likely to use task persistence which has been associated with decreased pain, disability, and depression (Meints, Miller & Hirsh, 2016). Task persistence involves

continuing on with a task by ignoring painful sensations rather than allowing the pain to interfere with the task at hand (Meints, Miller & Hirsh, 2016).

Second, results from the meta-analysis study by Meints, Miller & Hirsh (2016), suggested that black individuals are at risk for disparate pain treatment. Due to this supposed clinical discrimination, black people believe that their pain will not be controlled no matter what they do, thus leading to catastrophic thoughts about pain. In contrast, it is believed that white people, who tend not to have such discrimination, keep on seeking treatment and participating in actions to decrease their pain and improve their physical functioning.

Lastly, as per the communal model of coping, catastrophizing is also used to secure interpersonal, social resources as well as manage interpersonal conflict (Meints, Miller & Hirsh, 2016). This model interpretation might also be consistent with findings that black people tend to seek more social support than white people, making them more likely to catastrophize about their pain (Meints, Miller & Hirsh, 2016).

#### ***4. Genetics and heritability***

An association between catechol-o-methyltransferase (COMT) diplotype (high versus low activity) and pain catastrophizing has been found, where low COMT activity is associated with higher pain ratings and higher tendency for pain catastrophizing (George et al., 2008; George et al., 2008). Moreover, Trost et.al (2015) found a higher correlation between the PCS scores of monozygotic twin pairs as compared to dizygotic twin pairs; which indeed emphasizes on the evidence of heritability and genetics in pain catastrophizing.

## ***5. Psychosocial factors***

Besides genetic influences, psychosocial factors may have an impact on the experience of pain. For example, Tremblay & Sullivan (2010) examined the relationships between attachment styles, pain severity and depression in 382 high-school students. In regards to pain catastrophizing, results revealed that secure attachment was associated with lower levels of pain catastrophizing, whereas fearful attachment was associated with higher catastrophizing, thereby increasing the vulnerability for problematic pain outcomes.

### **B. Pain Catastrophizing And Adverse Outcomes**

#### ***1. Pain Severity***

Pain catastrophizing has been widely associated with increased pain severity in a varied patient population. A correlational study on the association between pain catastrophizing and headache-related disability in 178 migraine patients, revealed pain catastrophizing to be a positive predictor of pain intensity, indicating that higher levels of catastrophizing contribute to higher levels of perceived pain (Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017). Pain catastrophizing was also shown to be a mediator of the relationship between chronic low back pain and increased pain sensitization, with higher levels of pain catastrophizing contributing to greater pain intensity in patients with chronic low back pain (CLBP) (Meints et al., 2018).

Moreover, a recent prospective observational study examined whether pain catastrophizing is a predictor for severe acute pain and persistent pain following breast cancer surgery in 124 women (Habib, Kertai, Cooter, Greenup & Hwang, 2019). Participants filled the PCS questionnaire pre-operatively, pain scores were

collected at 24 and 72 hours in the post-anesthesia care unit (PACU), and then patients were contacted at 1,3,6 and 12 months to assess for persistent pain. Results revealed higher pain catastrophizing to be associated with increased severity of acute pain, which in turn increased the likelihood of persistent pain (Habib, Kertai, Cooter, Greenup & Hwang, 2019).

According to some research findings, catastrophic thoughts seemed to increase pain severity in healthy individuals as well. In their study, Kristiansen et al. (2014) induced experimental pain by means of cold and thermal heat stimulation of skin, mechanical stimulation of bone and muscle, mechanical, electrical, and thermal stimulation of the gastrointestinal tract in 41 healthy subjects. Before the intervention, each participant filled the PCS questionnaire, and then participants were separated into two groups; (1) non-catastrophizers and (2) low-catastrophizers. Results of the study showed that low-catastrophizers experienced more pain than non-catastrophizers. This puts forward that even a slight increase in pain catastrophizing can make patients feel greater pain.

These results were also supported in a study among 44 healthy university students in Canada, where those with higher pain catastrophizing scores had higher levels of experimental cold pressor, as evidenced by higher ratings of pain intensity, lower pain thresholds and decreased pain tolerance (Huijjer, Fares & French, 2017).

## ***2. Physical Disability***

The majority of studies have consistently focused on pain catastrophizing as a risk factor for physical disability in both acute injury and chronic pain conditions. A study on the prognostic factors of 297 patients with acute/subacute musculoskeletal pain

showed that high pain catastrophizing predicts persistent disability and lack of improvement after various physical therapy interventions (Bergbom, Boersma, Overmeer & Linton, 2011).

Another population-based cross-sectional study was conducted on fibromyalgia patients with an aim to explore the discordance between subjectively and objectively measured physical function, and examine whether pain catastrophizing is associated with this discordance (Estévez-López et al., 2016). Results of the study revealed that in fibromyalgia, subjective physical function is more impaired than the objective physical function, and that pain catastrophizing is correlated with this discordance. Specifically, high levels of pain catastrophizing was associated with a decreased ability to carry out major activities of daily living that people with fibromyalgia are generally able to perform.

Similarly, a longitudinal cohort study on 282 patients with nonspecific low back pain showed high catastrophizing to be associated with longer periods of bed rest, subsequently contributing to greater physical disability (Verbunt, Sieben, Vlaeyen, Portegijs & Knottnerus, 2008).

### ***3. Pain interference and Health-related quality of life (HRQoL)***

Besides its negative association with physical functioning, pain catastrophizing was also associated with a number of HRQoL domains and interference in life due to pain in a varied patient population. Cross-sectionally, catastrophizing related to higher pain interference in individuals with disabilities including spinal cord injury and multiple sclerosis (Hirsh, Bockow & Jensen, 2011). Similarly, Craner et. al (2016) demonstrated pain catastrophizing to be positively associated with pain interference,

along with decreased quality of life including general health, physical role functioning, social and emotional role functioning, and mental health functioning. This result was also consistent in women with endometriosis at a tertiary referral center where higher pain catastrophizing was associated with a reduced pain HRQoL, after controlling pain intensity and other confounders (McPeak et al., 2018).

#### ***4. Depression***

Pain catastrophizing has been found to intensify not only the experience of pain but also depression (Gatchel & Neblett, 2017). Bond et.al (2015) found that catastrophizing participants did not only have increased headaches, but also greater depression as compared to non-catastrophizing participants.

Worldwide, depression is the third leading cause of disability. It is associated with poor health-outcomes, reduced quality of life, and increased healthcare costs (Chiu, Lebenbaum, Cheng, de Oliveira & Kurdyak, 2017). Indeed, the comorbidities of both pain and depression cause double trouble for patients (Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017). When a person is feeling depressed, he becomes anxious and starts experiencing feelings of helplessness. In order to avoid the severity of the pain and according to his belief, he will stop engaging in activities. This way of thinking would make him become more sensitive to symptoms and with catastrophic thoughts he will perceive greater pain (Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017).

#### ***5. Poor treatment outcomes***

The association between pain catastrophizing and poor outcomes of varied pain treatments is considered to be one of the most important clinical aspects of pain

catastrophizing. Lazaridou et.al, (2017) indicated that chronic pain patients recognized as high catastrophizers, reported greater misuse of opioids and higher incidence of side effects related drugs when compared to low catastrophizers. Likewise, high catastrophizing was significantly correlated with increased opioids' use post-surgery for musculoskeletal injury (Helmerhorst, Vranceanu, Vrahas, Smith & Ring, 2014) and total joint replacement for osteoarthritis (Valdes et al., 2015).

Similarly, in a variety of chronically painful conditions, poor pain relief from a wide range of pain medications including Gabapentin (Neurontin) and opioids was observed in patients with high pain catastrophizing scores (Toth, Brady & Hatfield, 2014; Grosen et.al, 2017). To add, there was a greater likelihood of discontinuation of pharmacotherapy patients with high pain catastrophizing scores who were treated for peripheral neuropathic pain (Toth, Brady & Hatfield, 2014).

## **C. Pain Catastrophizing And Adverse Outcomes In Rheumatoid Arthritis**

### ***1. Disease Activity***

A recent longitudinal study followed 209 patients with rheumatoid arthritis for a 12 months' duration after initiation or modification of biologic disease-modifying antirheumatic drugs (bDMARDs) (Hammer, Uhlig, Kvien & Lampa, 2018). The patients were assessed at baseline and after 1, 2, 3, 6 and 12 months of therapy. Assessments included (1) Patient-reported outcomes (PROs) (joint pain, physical function, fatigue, sleep, functional ability, emotional well-being and coping), (2) clinical and laboratory assessments (tender/swollen joint count, assessor's global visual analogue scale (VAS), erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) levels), (3) ultrasound, pain catastrophizing, and (4) composite scores for

Disease Activity score in 28 joints, clinical disease activity index, and simplified disease activity index. Results showed that pain catastrophizing is negatively associated with achievement of composite scores remission at 6 and 12 months of therapy, and is highly correlated with the patient-reported outcomes (PROs) and composite scores but not with the inflammatory parameters (swollen joint count, C-reactive protein level, and ultrasound results).

In contrast, some studies found a positive correlation between catastrophizing and elevated indices of inflammation in rheumatoid arthritis (Boyden, Hossain, Wohlfahrt & Lee, 2016). To add, a study in fibromyalgia, osteoarthritis and healthy adults, revealed that higher levels of catastrophizing predicted greater IL-6 reactivity to standardized noxious stimulation in a laboratory setting (Lazaridou et al., 2018). This finding was also supported in 42 healthy adults who were exposed to a series of psychophysical test pain testing procedures including mechanical, heat and cold stimulation (Edwards et al., 2008).

## ***2. Pain-Related Outcomes***

A cross-sectional study conducted on rheumatoid arthritis patients, who were recruited from the Johns Hopkins Arthritis Center, evaluated the association between pain catastrophizing and some important pain-related outcomes (Edwards et al., 2010). The short form 36 was used to assess pain severity, physical functioning and social functioning of the participants, and the pain catastrophizing scale was used to measure pain catastrophizing level. As in other chronic pain conditions, study findings revealed higher pain catastrophizing to be associated with higher levels of mental distress, increased pain intensity, and decreased physical and social functioning. Moreover,

another study on 55 rheumatoid arthritis patients from four Portuguese health units revealed a positive correlation between pain intensity and pain catastrophizing where high catastrophizers presented with higher physical limitation (Costa, Pinto-Gouveia & Marôco, 2014).

#### **D. Pain Catastrophizing: A Target Treatment For The Management Of Chronic Pain**

A number of studies indicated that the implementation of strategies to decrease pain catastrophizing and enhance effective coping can directly decrease the harmful effects of pain (Buenaver, Edwards, Smith, Gramling & Haythornthwaite, 2008; Craner, Sperry & Evans, 2016). Doménech et al. (2014) confirmed that a decrease in catastrophizing reduced pain intensity and overall disability in chronic anterior knee pain patients after appropriate treatment. Similarly, chronic pain patients who participated in a 3 week intensive comprehensive rehabilitation program had a significant decrease in pain catastrophizing scores, which ultimately led to improvement in health outcomes mainly pain interference, pain intensity, and depression (Craner, Sperry & Evans, 2016).

As for patients with rheumatoid arthritis, Hammer et.al (2018) confirmed in their study that those on disease-modifying antirheumatic drugs (DMARDs) treatment, and who had reduced levels of pain catastrophizing scores, had a significant reduction in both patient-reported outcomes (PROs) and composite scores at the 12 months follow up of therapy.

## **E. The Role Of Pain Intensity**

As illustrated, several studies across a variety of pain populations showed that pain catastrophizing is highly associated with a host of health outcomes even when controlling for pain intensity. However, research has also revealed that the relationship between pain catastrophizing and pain-related outcomes may be somehow influenced by other factors such as pain intensity ratings (Susó-Ribera, García-Palacios, Botella & Ribera-Canudas, 2017).

A recent study on 254 patients with heterogeneous chronic pain showed that the relationship between pain catastrophizing and pain interference, and pain catastrophizing and physical health, is moderated by different pain intensity ratings (Susó-Ribera, García-Palacios, Botella & Ribera-Canudas, 2017). When patients experienced severe pain, the relationship between pain catastrophizing and pain interference and between pain catastrophizing and physical health was reduced, but in contrast it was increased when patients experienced mild pain. On the contrary, pain intensity did not moderate the relationship between pain catastrophizing and mental health status (Susó-Ribera, García-Palacios, Botella & Ribera-Canudas, 2017).

In line with this idea, previous research studied the effect of pain catastrophizing on central nociceptive processing in 22 healthy individuals (Seminowicz & Davis, 2006). Two different pain intensity levels were induced (mild and moderate) through electrical median nerve stimulation and functional MRI was performed for each of these two induced pain intensity levels. Study showed that when mild pain was induced, pain catastrophizing was associated with activation of large brain regions involved in pain. In contrast, when moderate pain was induced, pain catastrophizing only correlated with few brain regions responsible for pain processing. Therefore, the

authors suggested that pain intensity may act as a moderator of the relationship between pain catastrophizing and brain activity.

As discussed previously, several researches confirmed that reducing pain catastrophizing would decrease the harmful effects of pain (Buenaver, Edwards, Smith, Gramling & Haythornthwaite, 2008; Craner, Sperry & Evans, 2016). Suso-Ribera et. al (2017) further added that in order to maximize the beneficial effect of reducing pain catastrophizing, efforts to decrease physical disability and pain interference would work best if pain intensity is firstly reduced, particularly when patients experience severe pain.

Therefore, exploring the role of pain intensity as a moderator in the relationship between pain catastrophizing and a number of pain-related outcomes might have important theoretical and clinical implications in the context of individualized pain therapy.

# CHAPTER IV

## METHODOLOGY

### **A. Research Design**

This study followed a cross-sectional correlational survey design of adult rheumatoid arthritis patients regarding the association between their pain catastrophizing and pain-related outcomes, and the moderating effect of pain intensity in this relationship.

### **B. Sampling Plan**

This study is a secondary data analysis of a 2016 data set of a convenience sample of one hundred and fifty (N=150; 75 males and 75 females) adults recruited from the outpatient pain clinic and rheumatologyclinics of the American University of Beirut Medical Center (AUBMC). For the 150 participants of the original study, adult patients aged 18 years or older, with chronic non-malignant pain for more than 3 months were included. Patients with chronic pain secondary to cancer, with significant intellectual limitations or important psychiatric comorbidities were all excluded.

As for this study, the sample inclusion criteria were: 1) Patients with rheumatoid arthritis aged 18 years or older, and 2) suffering from chronic pain for more than 3 months'. Patients with persistent pain secondary to other chronic non-malignant pain than rheumatoid arthritis were all excluded. This ended up with a sample size of N= 129 participants.

### **C. Procedure And Data Collection**

Eligible patients were selected by the physician and participants were introduced by the nurse to the research assistant (RA) at the clinic in the waiting area. The research assistant informed the patient about the purpose of the study; if the patient agreed to participate, the informed consents were explained and the research assistant secured their signature. The research assistant administered the self-reported questionnaire verbally to the participants in a structured interview-type format. After collecting all the questionnaires, the research assistant directly screened for depression by computing the scores of the Center for Epidemiologic Studies Depression Scale (CES-D). If the patient's score ranged 15-21 (mild to moderate depression) or >21 (major depression), then the primary physician was notified. In case the participant reported any distress or fatigue during his or her participation in the study, participation was stopped and the registered nurse (RN) of the clinic was notified. Data collection took place in 2015/16.

### **D. Ethical Considerations**

In the original study, the Institutional Review Board (IRB) and AUBMC administration approval was secured prior to participant recruitment. The research assistant explained thoroughly the aim of the study and informed consent to the participants. They were informed about the benefits to participants and society, that participation is completely voluntary and harmless, that they can refuse or withdraw at any time prior, during, and after the interview. To assure confidentiality, participants were informed that participation is anonymous; they will be identified only by a number and the results will be reported in a group format, thus their individual responses will

not be revealed. Participants who agreed to be enrolled in this study signed the informed consent. Consent forms were written using simple words suitable for participants from different educational backgrounds.

This secondary analysis of research data was exempt from IRB approval since the collected data of the original study had no identifiers.

## **E. Instrument**

The previously filled Chronic Pain Questionnaire-Arabic version (CPQ-A) of the original study was used in this study (Appendix B). Appendix A is the English version of the questionnaire used for this study. It was composed of four instruments with an added demographic section. All the administered tools have been validated in Arabic with published research representing psychometric properties that are equivalent to the original English-language versions.

Demographic section: It included questions about age, gender, marital and occupational status, educational level, pain site, and duration and intensity of pain.

Pain Catastrophizing scale Arabic version (PCS-A): It is similar to the original PCS consisting of 13 items that describe different thoughts and beliefs about the pain experience. It assesses three correlated factors of pain catastrophizing: (1) Four items for Rumination (Questions 8,9,10 and 11), (2) Three items for Magnification (Questions 6, 7 and 13), and (3) Six items for Helplessness (Questions 1, 2,3,4,5 and 12). The PCS asks clients to reflect on past painful experiences and to indicate the degree to which they experienced each of the 13 thoughts or feelings when experiencing pain, on 5-point scales (0= not at all, 1= to slight degree, 2= to moderate degree, 3= to great degree, 4= all the time). A total PCS score is calculated by adding the scores on all the items with higher

scores indicating higher pain catastrophizing (Terkawi et.al, 2017). The three correlated factors of the scale (rumination, magnification and helplessness) were comparable to those found in the original PCS; results of psychometric evaluation supported the PCS-A internal consistency (Cronbach's alpha range 0.88-0.92; range of interitem 0.57-0.65), construct validity, and clinical feasibility (Huijer, Fares & French, 2017).

Brief Pain Inventory Arabic version (BPI-A): The 16 items Brief Pain Inventory Arabic version (BPI-A) is a widely used self-administered questionnaire that allows patients to rate the severity of their pain and the degree to which their pain interferes with common function (such as general activity, mood, walking ability, normal work, and relationships with other people, sleep, and enjoyment of life). The BPI generates two separate scores; a pain severity and a pain interference score. The pain severity score is computed from four items about pain intensity with each item rated from 0= no pain to 10= worst possible pain. The pain interference score is computed from seven items with each item rated from 0= pain does not interfere to 10= pain totally interferes. In addition to pain severity and pain interference, the BPI includes a front and back bodily pain diagrams and a question related to the presence of pain during the last week other than every day pain (such as toothaches, minor headaches, sprains). There is also an open-ended question regarding the treatment and medications that the patient is receiving to alleviate his/her pain, followed by a rating of the percentage of relief from 0%= no relief to 100%= total relief (Poquet & Lin, 2016; Ballout, Nouredine, Huijer & Kanazi, 2011). The BPI-A has been found to be culturally appropriate for use in Lebanon and the psychometric properties were comparable to the original version when used in a sample of Lebanese cancer patients experiencing pain (Ballout, Nouredine, Huijer & Kanazi, 2011).

The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 (EORTC QLQ-C30) – Lebanese Arabic version: It is a widely used 30-item self-report questionnaire composed of five subscales for functional status (Physical, role, cognitive, emotional and social), three for symptoms (fatigue, pain, nausea and vomiting), a global health status (GHS) and a quality of life scale (QOL). All subscale scores range from 0 to 100. Higher scores on the functional subscales, as well as the GHS and QoL subscales, are indicative of higher levels of functioning as opposed to the symptom subscales for which higher scores are indicative of higher levels of symptom activity (Huijjer, Sagherian, & Tamim, 2012). Although the symptoms included in the symptom subscales of the EORTC QLQ-C30 were originally developed to reflect symptoms frequently reported by individuals with cancer, the nine subscales of this instrument assess several dimensions of quality of life that are also applicable for individuals with chronic pain with the possible exception of the Nausea and Vomiting subscale. The Lebanese Arabic translated version of the EORTC QLQ-C30 is culturally sensitive and the psychometric properties are comparable to the original version when used in a large sample of Lebanese cancer patients (Huijjer, Sagherian, & Tamim, 2012).

The Center for Epidemiologic Studies Depression Scale (CES-D) – Arabic version is a widely used self-report scale that consists of 20 items measuring depressive symptoms. The patient is asked to rate how often he or she has felt or behaved for each of the 20 items during the past week (0= rarely/none of the time; <1 day, 1= some/little of the time; 1-2 days, 2= occasionally/moderate amount of time; 3-4 days, 3= most/all of the time; 5-7 days). Positive items (4, 8, 12 and 16) are reverse coded and the responses are summed (<15= no depression, 15-21= mild to moderate depression, >21= major depression). Higher scores indicate greater depressive symptoms. In the only study of the

CES-D Arabic version that assessed Lebanese adults, Kazarian & Taher (2010) derived two orthogonal factors that they labelled Depressed Affect and Lack of Positive Affect correlating with each other ( $r=0.35$ ), and with the Arabic CES-D global scores ( $r=0.96$  and  $r=0.59$  respectively).

## **F. Statistical Analysis**

For descriptive findings of the research variables: Means and standard deviations were used to summarize numerical variables, whereas frequencies and percentages were calculated for categorical variables (research variables are discussed under instruments).

Pearson's  $r$  correlations were calculated to examine the relationship between pain catastrophizing and pain-related outcomes including pain interference, physical functioning, social and emotional functioning, and depression in patients with rheumatoid arthritis.

A series of multiple regressions analysis were conducted to investigate whether pain intensity acts as a moderator in the relationship between pain catastrophizing and all pain-related study outcomes, adjusting for potential confounders (age, gender, marital status, and education level, duration of pain and employment status) in patients with rheumatoid arthritis.

## CHAPTER V

### RESULTS

#### **A. Sample Description**

In the original study, 150 participants were approached; only chronic pain patients with rheumatoid arthritis were included in this secondary analysis study, resulting in a sample size of 129 patients. Patients were recruited from the outpatient pain clinic and the rheumatology clinics of the American University of Beirut Medical Center (AUBMC).

Demographic characteristics of patients are shown in table 5.1. Participants' age ranged from 23 to 79 years, with a mean of 49.17 years (SD 13.99). The majority were females (72.2%), completed secondary education (69.5%), were currently married (73.6%), were unemployed (58.6%), and had been experiencing pain for more than 6 months (63.6%).

**Table 5. 1:** Sample Characteristics (N=129)

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
Age	Mean 49.17	SD 13.99
Gender		
Female	91	72.2
Male	35	27.8
Marital status		
Not married	34	26.4
Married	95	73.6
Education level		
Below university	89	69.5
University	39	30.5
Duration of pain		
Less than 6 months	44	36.4
More than 6 months	77	63.6
Employment status		
Not employed	75	58.6
Employed	53	41.4

N.B: Data includes frequency and valid percent except where indicated.

## **B. Description Of Patients' Pain Catastrophizing, Pain Intensity, And Pain-Related Outcomes**

Results of patients' pain catastrophizing, pain intensity, and pain related outcomes (pain interference, physical functioning, emotional functioning, social functioning, and depression) are depicted in table 5.2.

Pain catastrophizing was measured using the PCS on a 0-4 scale for every item in which the total result yields a range of 0-52. The total mean score of patients' pain catastrophizing was 25.08 (SD 14.83). As for pain severity and pain interference, it was measured using the BPI on a 0-10 numerical scale. The mean score of patients' pain intensity and pain interference were 5.21 (SD 2.01) and 5.37 (SD 2.55) respectively.

Patients' mental status (depression) was measured on a 0-3 scale for every item in the CES-D with a range of total scores from 0-60. Patients' mean score for depression was 22.54 (SD 11.96). As for the variables physical functioning, emotional functioning, and social functioning, they were measured in the symptom subscales of the EORTC QLC-C 30 with each subscale scores ranging from 0-100. Patients' mean scores for physical functioning was 61.10 (SD 23.57), 49.80 (26.36) for emotional functioning, and 55.34 (SD 29.94) for social functioning.

**Table 5. 2:** Means and standard deviations values for study variables

<b>Variable</b>	<b>Mean</b>	<b>SD</b>
Pain catastrophizing	25.08	14.83
Pain severity	5.21	2.01
Pain interference	5.37	2.55
Depression	22.54	11.96
Physical functioning	61.10	23.57
Emotional functioning	49.80	26.36
Social functioning	55.34	29.94

### **C. Relationship Between Pain Catastrophizing And Pain-Related Outcomes**

The bivariate associations between pain catastrophizing and study outcomes were all statistically significant and correlated with each other (p value < 0.01) as summarized in table 5.3.

The results showed a weak positive relationship between pain catastrophizing and pain interference at  $r = 0.386$ , and an almost moderate positive relationship with depression at  $r = 0.587$ . Therefore, we could say that high values of pain catastrophizing are associated with high values of pain interference and depression.

As for the other variables, there was a weak negative relationship between pain catastrophizing and physical functioning at  $r = -0.441$ , pain catastrophizing and social functioning at  $r = -0.459$ , and an almost moderate relationship between pain catastrophizing and emotional functioning at  $r = -0.581$ . This in turns signifies that high values of pain catastrophizing are associated with low values of physical functioning, social functioning, and emotional functioning.

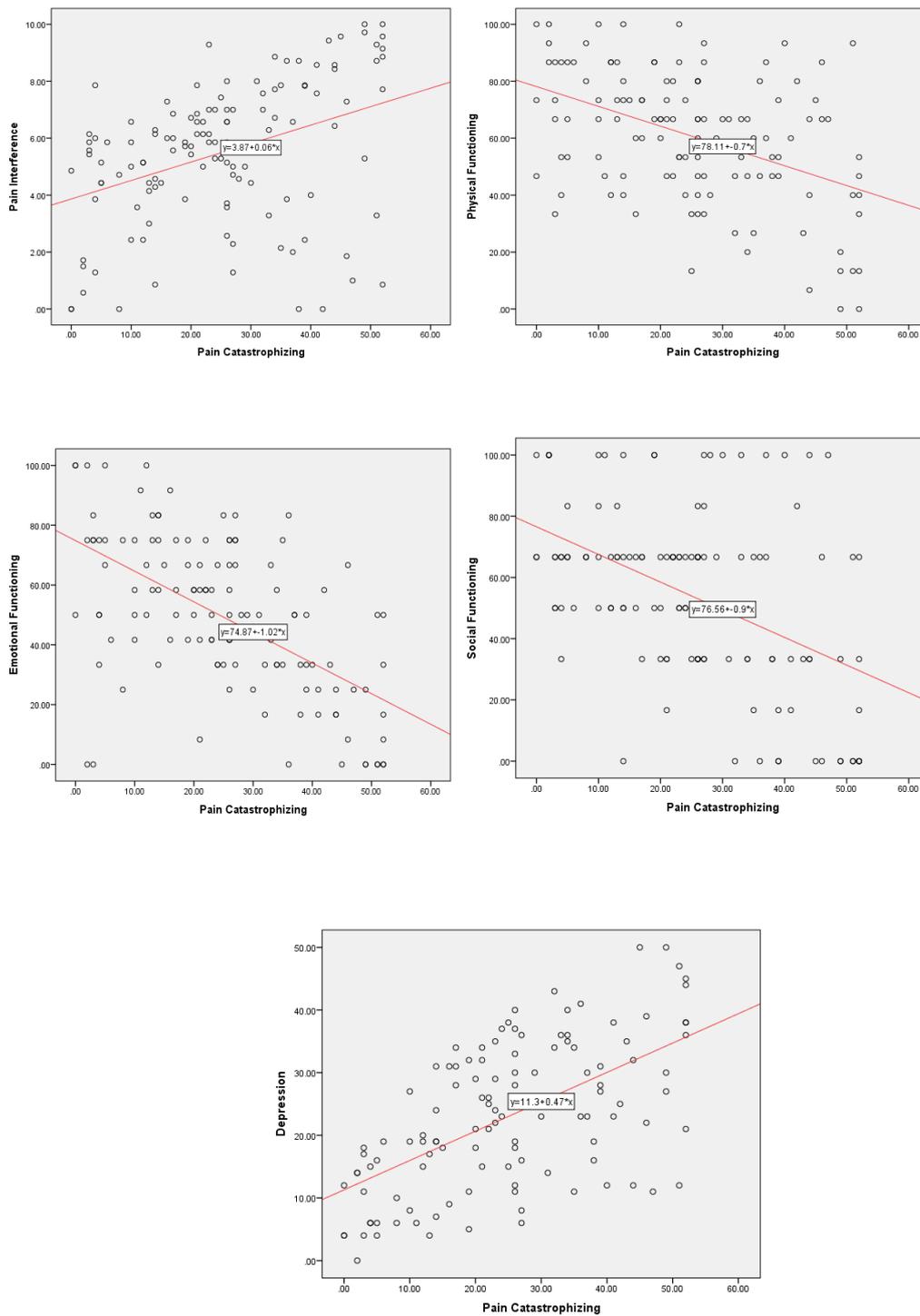
What could also be concluded from these results is that pain catastrophizing was more strongly associated with depression ( $r = 0.587$ ) and emotional functioning ( $r = -0.581$ ) as compared to respectively social functioning ( $r = -0.459$ ), physical functioning ( $r = -0.441$ ) and pain interference ( $r = 0.386$ ).

Figure 5.1 provides a graphical presentation of the linear relationship between pain catastrophizing and all study outcomes. For each regression line, the regression equation was:  $Y = \beta_0$  (intercept) +  $\beta_1$  (slope) \* X, where Y= study outcome and X= pain catastrophizing.

**Table 5. 3:** Pearson's r correlations between pain catastrophizing and each study outcome

<b>Variables</b>	<b>Pain Catastrophizing(r)</b>
<i>Pain Interference</i> r	0.386**
<i>Physical Functioning</i> r	-0.441**
<i>Social Functioning</i> r	-0.459**
<i>Emotional Functioning</i> r	-0.581**
<i>Depression</i> r	0.587**

\*\* Correlation is significant at 0.01  $\alpha$  level



**Figure 5. 1:** Graphical display of the relationship between pain catastrophizing and study outcomes (Y axis= outcome; X axis= pain catastrophizing)

## **D. The Moderating Effect Of Pain Intensity**

As illustrated in tables 5.4, 5.5, 5.6, 5.7 and 5.8, a series of multiple linear regression models were conducted to explore the moderating effect of pain intensity on the relationship between pain catastrophizing and all study outcomes.

Following the recommendations proposed by Baron & Kenny (1986), the effects of pain intensity on study outcomes were included in the first block, and pain catastrophizing was added in the second block. Of interest for the present study is the third block, where the interaction term between pain catastrophizing and pain intensity (Pain catastrophizing x Pain intensity) was included in order to examine whether pain intensity acts as a moderator of the relationship between pain catastrophizing and study outcomes. Moderation occurs when a significant R<sup>2</sup> change is observed. Finally, the fourth block was added to look at potential confounders and any additional significant variations and associations to the prediction of study outcomes.

### ***1. Prediction Of Pain Interference***

In the first block of table 5.4, pain intensity predicted pain interference. There was a significant and positive relationship between pain intensity and pain interference ( $B_{\text{pain intensity}} = 0.777$ ,  $p\text{-value} = 0.000 < 0.05$ ), with a one unit increase in pain intensity yielding on average a 0.777 increase in pain interference.

Similarly, the inclusion of pain catastrophizing in block 2 also contributed significantly and positively to the prediction of pain interference. There was a significant and positive relationship between both pain catastrophizing and pain interference and pain intensity and pain interference ( $p\text{-value} = 0.000 < 0.05$ ). A one unit increase in pain catastrophizing yielded on average a 0.041 increase in pain interference,

and a one unit increase in pain intensity yielded on average a 0.693 increase in pain interference. Together, pain intensity and pain catastrophizing of the participants explained 41.7% of the variation in pain interference.

The third block did not reveal a significant moderation effect in the prediction of pain interference ( $R^2$ change= 0.001,  $p= 0.678 > 0.05$ ). There was only a 0.1% change increase in the variation explained by the addition of the interaction term (pain intensity x pain catastrophizing). Also, after the inclusion of the interaction term, only pain intensity remained significant in the prediction of pain interference ( $B_{\text{pain intensity}}= 0.777$ ,  $p$ -value 0.001).

As a group, the covariates in the fourth block (age, gender, marital status, education level, duration of pain and employment status) did not add a significant variance to the prediction of pain interference ( $R^2 = 0.413$ ,  $p$ -value = 0.504 > 0.05). There was only a 2.9% change increase in the variation explained by the addition of the covariates. The  $p$ -value of  $B_{\text{pain intensity}}$  (0.687) was  $0.000 < 0.05$  and the  $p$ -value of  $B_{\text{pain catastrophizing}}$  (0.044) was  $0.02 < 0.05$ , which means that pain intensity and pain catastrophizing remained significant predictors of pain interference as in block 2. No additional significant associations were noted.

**Table 5. 4:** Hierarchical analysis for predicting Pain interference

	<b>Pain interference</b>			
	B	Adjusted R square	R square change	Significance F change
<b>Block 1</b>		0.3666	0.372	0.000
Pain intensity	0.777*			
<b>Block 2</b>		0.417	0.055	0.002
Pain intensity	0.693*			
Pain catastrophizing	0.041*			
<b>Block 3</b>		0.412	0.001	0.678
Pain intensity	0.777*			
Pain catastrophizing	0.054			
Pain intensity x Pain catastrophizing	-0.003			
<b>Block 4</b>		0.413	0.029	0.504
Pain intensity	0.678*			
Pain catastrophizing	0.044*			
Age	0.002			
Gender	0.206			
Education level	-0.318			
Marital status	0.797			
Duration of pain	-0.144			
Employment status	0.804			

\*p-value &lt; 0.05

## 2. Prediction Of Physical Functioning

In the first block of table 5.5, pain intensity predicted physical functioning. There was a significant and negative relationship between pain intensity and physical functioning ( $B_{\text{pain intensity}} = -5.170$ ,  $p\text{-value} = 0.000 < 0.05$ ), with a one unit increase in pain intensity yielding on average a 5.170 decrease in physical functioning.

Similarly, the inclusion of pain catastrophizing in block 2 also contributed significantly and negatively to the prediction of physical functioning. There was a significant and negative relationship between both pain catastrophizing and physical functioning and pain intensity and physical functioning ( $p\text{-value} = 0.000 < 0.05$ ). A one unit increase in pain catastrophizing yielded on average a 0.556 decrease in physical

functioning and a one unit increase in pain intensity yielded on average a 4.056 decrease in physical functioning. Together, pain intensity and pain catastrophizing of the participants explained 32.6% of the variation in physical functioning.

The third block did not reveal a significant moderation effect in the prediction of physical functioning ( $R^2_{\text{change}} = 0.000$ ,  $p = 0.826 > 0.05$ ). There was no change in the variation explained by the addition of the interaction term pain intensity. Also, after the inclusion of the interaction term, pain intensity and pain catastrophizing were not significant in the prediction of physical functioning ( $B_{\text{pain intensity}} = -3.629$ ,  $p\text{-value} = 0.094 > 0.05$ ,  $B_{\text{pain catastrophizing}} = -0.493$ ,  $p\text{-value} = 0.118 > 0.05$ ).

As a group, the covariates in the fourth block did not add a significant variance to the prediction of physical functioning ( $R^2 = 0.305$ ,  $p\text{-value} = 0.833 > 0.05$ ). There was only a 1.8% change increase in the variation explained by the addition of the covariates. The p-value of  $B_{\text{pain intensity}}$  (-3.993) was  $0.000 < 0.05$ , which means that pain intensity remained a significant predictor of physical functioning. Moreover, the p-value of  $B_{\text{pain catastrophizing}}$  (-0.517) was  $0.000 < 0.05$ , which means that pain catastrophizing remained a significant predictor of physical functioning as in block 2. There were no additional significant associations.

**Table 5. 5:** Hierarchical analysis for predicting Physical functioning

	<b>Physical functioning</b>			
	B	Adjusted R square	R square change	Significance F change
<b>Block 1</b>		0.204	0.212	0.000
Pain intensity	-5.170*			
<b>Block 2</b>		0.326	0.127	0.000
Pain intensity	-4.056*			
Pain catastrophizing	-0.556*			
<b>Block 3</b>		0.320	0.000	0.826
Pain intensity	-3.629			
Pain catastrophizing	-0.493			
Pain intensity x Pain catastrophizing	-0.013			
<b>Block 4</b>		0.305	0.018	0.833
Pain intensity	-3.993*			
Pain catastrophizing	-0.517*			
Age	0.018			
Gender	3.883			
Education level	-1.619			
Marital status	-5.305			
Duration of pain	0.724			
Employment status	3.637			

\*p&lt; 0.05

### 3. Prediction Of Social Functioning

In the first block of table 5.6, pain intensity predicted social functioning. There was a significant and negative relationship between pain intensity and social functioning ( $B_{\text{pain intensity}} = -6.649$ ,  $p\text{-value} = 0.000 < 0.05$ ), with a one unit increase in pain intensity yielding on average a 6.649 decrease in social functioning.

Similarly, the inclusion of pain catastrophizing in block 2 also contributed significantly and negatively to the prediction of social functioning. There was a significant and negative relationship between both pain catastrophizing and social functioning and pain intensity and social functioning ( $p\text{-value} = 0.000 < 0.05$ ). A one

unit increase in pain catastrophizing yielded on average a 0.703 decrease in social functioning and a one unit increase in pain intensity yielded on average a 5.225 decrease in social functioning. Pain intensity and pain catastrophizing of the participants explained 32.1% of the variation in social functioning.

The third block did not reveal a significant moderation effect in the prediction of social functioning ( $R^2$ change= 0.009,  $p= 0.217 > 0.05$ ). There was only a 0.9% change increase in the variation explained by the addition of the interaction term pain intensity. Also, after the inclusion of the interaction term, pain intensity and pain catastrophizing were not significant in the prediction of social functioning ( $B_{\text{pain intensity}} = -2.159$ ,  $p\text{-value} = 0.432 > 0.05$ ,  $B_{\text{pain catastrophizing}} = -0.246$ ,  $p\text{-value} = 0.541 > 0.05$ ).

As a group, the covariates in the fourth block did not add a significant variance to the prediction of physical functioning ( $R^2 = 0.325$ ,  $p\text{-value} = 0.356 > 0.05$ ). There was only a 4.1% change increase in the variation explained by the addition of the covariates. The  $p\text{-value}$  of  $B_{\text{pain intensity}}$  (-4.688) was  $0.000 < 0.05$ , which means that pain intensity remained a significant predictor of social functioning. Moreover, the  $p\text{-value}$  of  $B_{\text{pain catastrophizing}}$  (-0.605) was  $0.001 < 0.05$ , which means that pain catastrophizing remained a significant predictor of social functioning as in block 2. There were no additional significant associations.

**Table 5. 6:** Hierarchical analysis for predicting Social functioning

	<b>Social functioning</b>			
	B	Adjusted R square	R square change	Significance F change
<b>Block 1</b>		0.202	0.209	0.000
Pain intensity	-6.649*			
<b>Block 2</b>		0.321	0.124	0.000
Pain intensity	-5.225*			
Pain catastrophizing	-0.703*			
<b>Block 3</b>		0.324	0.009	0.217
Pain intensity	-2.159			
Pain catastrophizing	-0.246			
Pain intensity x Pain catastrophizing	-0.091			
<b>Block 4</b>		0.325	0.041	0.356
Pain intensity	-4.688*			
Pain catastrophizing	-0.605*			
Age	0.032			
Gender	-8.144			
Education level	4.487			
Marital status	-6.028			
Duration of pain	6.697			
Employment status	0.331			

\*p< 0.05

#### **4. Prediction Of Emotional Functioning**

In the first block of table 5.7, pain intensity predicted emotional functioning. There was a significant and negative relationship between pain intensity and emotional functioning ( $B_{\text{pain intensity}} = -5.956$ ,  $p\text{-value} = 0.000 < 0.05$ ), with a one unit increase in pain intensity yielding on average a 5.956 decrease in emotional functioning.

Similarly, the inclusion of pain catastrophizing in block 2 also contributed significantly and negatively to the prediction of emotional functioning. From the ANOVA regression table,  $p\text{-value} = 0.000 < 0.05$  for both pain intensity and pain catastrophizing. A one unit increase in pain catastrophizing yielded on average a 0.930 decrease in emotional functioning and a one unit increase in pain intensity yielded on

average a 4.072 decrease in emotional functioning. Together, pain intensity and pain catastrophizing of the participants explained 46.4% of the variation in emotional functioning.

Of interest to the present study, the third block did not reveal a significant moderation effect in the prediction of emotional functioning ( $R^2$  change = 0.001,  $p = 0.682 > 0.05$ ). There was only a 0.1% change increase in the variation explained by the addition of the interaction term pain intensity. Also, after the inclusion of the interaction term, pain intensity and pain catastrophizing remained significant in the prediction of emotional functioning ( $B_{\text{pain intensity}} = -4.890$ ,  $p\text{-value} = 0.029 < 0.05$ ,  $B_{\text{pain catastrophizing}} = -1.052$ ,  $p\text{-value} = 0.002 < 0.05$ ).

As a group, the covariates in the fourth block did not add a significant variance to the prediction of emotional functioning ( $R^2 = 0.458$ ,  $p\text{-value} = 0.569 > 0.05$ ). There was only a 2.4% change increase in the variation explained by the addition of the covariates. The  $p$ -value of  $B_{\text{pain intensity}}$  (-3.927) was  $0.000 < 0.05$  and that of  $B_{\text{pain catastrophizing}}$  (-0.858) was  $0.000 < 0.05$ , which means that pain intensity and pain catastrophizing remained significant predictors of emotional functioning as in block 2. There were no additional significant associations.

**Table 5. 7:** Hierarchical analysis for predicting Emotional functioning

	<b>Emotional functioning</b>			
	B	Adjusted R square	R square change	Significance F Change
<b>Block 1</b>		0.199	0.207	0.000*
Pain intensity	-5.956*			
<b>Block 2</b>		0.464	0.267	0.000*
Pain intensity	-4.072*			
Pain catastrophizing	-0.930*			
<b>Block 3</b>		0.459	0.001	0.682
Pain intensity	-4.890*			
Pain catastrophizing	-1.052*			
Pain intensity x Pain catastrophizing	0.024			
<b>Block 4</b>		0.458	0.024	0.569
Pain intensity	-3.927*			
Pain catastrophizing	-0.858*			
Age	-0.074			
Gender	-7.890			
Education level	-4.584			
Marital status	0.642			
Duration of pain	2.417			
Employment status	0.183			

\*p< 0.05

### **5. Prediction of Depression**

In the first block of table 5.8, pain intensity predicted depression. There was a significant and positive relationship between pain intensity and depression ( $B_{\text{pain intensity}} = 2.017$ ,  $p\text{-value} = 0.000 < 0.05$ ), with a one unit increase in pain intensity yielding on average a 2.017 increase in depression.

Similarly, the inclusion of pain catastrophizing in block 2 also contributed significantly and positively to the prediction of depression. From the ANOVA regression table,  $p\text{-value} = 0.000 < 0.05$  for both pain intensity and pain catastrophizing. A one unit increase in pain catastrophizing yielded on average a 0.439 increase in

depression and a one unit increase in pain intensity yielded on average a 1.133 increase in depression. Pain intensity and pain catastrophizing of the participants explained 38.6% of the variation in depression.

The third block did not reveal a significant moderation effect in the prediction of depression ( $R^2$ change= 0.000,  $p= 0.979 > 0.05$ ). There was no change in the variation explained by the addition of the interaction term pain intensity. Also, after the inclusion of the interaction term, pain intensity was not significant in the prediction of depression ( $B_{\text{pain intensity}}= 1.106$ ,  $p\text{-value}= 0.320 > 0.05$ ), whereas pain catastrophizing remained significant ( $B_{\text{pain catastrophizing}}= 0.435$ ,  $p\text{-value}= 0.008 < 0.05$ ).

As a group, the covariates in the fourth block did not add a significant variance to the prediction of emotional functioning ( $R^2 = 0.408$ ,  $p\text{-value} = 0.157 > 0.05$ ). There was only a 5.6% change increase in the variation explained by the addition of the covariates. The  $p\text{-value}$  of  $B_{\text{pain intensity}}$  (1.086) was  $0.000 < 0.05$  and that of  $B_{\text{pain catastrophizing}}$  (0.400) was  $0.000 < 0.05$ , which means that pain intensity and pain catastrophizing remained significant predictors of depression as in block 2. There were no additional significant associations.

**Table 5. 8:** Hierarchical analysis for predicting Depression

	<b>Depression</b>			
	B	Adjusted R square	R square change	Significance F change
<b>Block 1</b>		0.105	0.114	0.000
Pain intensity	2.017*			
<b>Block 2</b>		0.386	0.285	0.000
Pain intensity	1.133*			
Pain catastrophizing	0.439*			
<b>Block 3</b>		0.380	0.000	0.979
Pain intensity	1.106			
Pain catastrophizing	0.435*			
Pain intensity x Pain catastrophizing	0.001			
<b>Block 4</b>		0.408	0.056	0.157
Pain intensity	1.086*			
Pain catastrophizing	0.400*			
Age	-0.002			
Gender	2.483			
Education level	-3.764			
Marital status	-3.347			
Duration of pain	-1.244			
Employment status	-2.947			

\*p&lt;0.05

Overall, results of the study revealed a significant relationship between pain catastrophizing and all study outcomes including pain interference, physical functioning, social functioning, emotional functioning and depression. More specifically, results did not reveal a significant moderation effect of pain intensity in the prediction of all study outcomes. After the inclusion of covariates, there was no significant variance to the prediction of study outcomes and no additional significant associations were shown.

## CHAPTER VI

### DISCUSSION

The purpose of the current study was to examine the relationship between pain catastrophizing and pain-related outcomes (including pain interference, physical functioning, social and emotional functioning, and depression) among chronic pain patients with rheumatoid arthritis (N=129). More specifically, the study aimed to explore whether pain intensity acts as a moderator of the relationship between pain catastrophizing and pain-related outcomes while adjusting for potential confounders (such as age, gender, marital status etc.).

#### **A. Pain Catastrophizing In Rheumatoid Arthritis**

##### ***1. Relationship Between Pain Catastrophizing And Pain-Related Outcomes***

In line with the results obtained by a number of research studies that have been conducted on pain catastrophizing and pain-related disability in different patient populations (Doménech et al., 2014; Arnow et al., 2011; Holroyd et al., 2007; Sullivan et al., 2005; Wojtowicz et al., 2014), results of the present study indicated that the total score of pain catastrophizing had a significant relationship with pain-related outcomes in patients with rheumatoid arthritis.

More specifically, previous studies showed that pain catastrophizing is associated with pain interference, physical and mental health status, and social and emotional role functioning across several pain populations (Susó-Ribera, García-Palacios, Botella & Ribera-Canudas, 2017; Craner, Sperry & Evans, 2016) and

rheumatoid arthritis patients (Edwards et al., 2010; Costa, Pinto-Gouveia & Marôco, 2014; Hammer, Uhlig, Kvien & Lampa, 2018) even after controlling for pain intensity. The present study further supported these findings by demonstrating a significant positive relationship between pain catastrophizing and pain interference and depression, and a significant negative relationship between pain catastrophizing and physical functioning, social functioning and emotional functioning. Moreover, previous research verified that pain catastrophizing is more strongly related with mental health components when compared to the physical ones (Sullivan et al., 2001). Results of this study are to a certain extent in line with this statement. Pain catastrophizing was more strongly related with depression and emotional functioning as compared to pain interference, physical and social functioning.

To explain these findings, it seems that catastrophizing influences the experience of pain through multiple hypothesized mechanisms found in the literature as described below.

#### a. Pain Catastrophizing And The Cognitive-Behavioral Mechanism

A foremost interpretation of the significant relationship found between pain catastrophizing and pain-related outcomes could best be explained by the components of the fear-avoidance model of chronic pain proposed by Vlaeyen and Linton (2000).

##### i. Catastrophizing Intensifies The Attention/Hypervigilance To Pain

Hypervigilance or attention to pain is defined as an exaggerated search or scan for threatening information about the perceived threat which is in this case “Pain” (Herbert et al., 2014). Some studies examined the assumption that pain catastrophizing increases the experience of pain through its effects on attentional processes (Edwards,

Bingham, Bathon & Haythornthwaite, 2006). An experimental study showed pain catastrophizing to be associated with increased attention to pain in participants who were performing a certain task while being distracted by mild electrical stimulation (Vanceleef & Peters, 2006).

Initially, the most prominent effect of catastrophizing on chronic pain is inducing a negative appraisal on the pain as an indicative of serious threat to their well-being and picturing its worst possible outcomes. In turn, catastrophizers will feel like they cannot overcome their pain, will have difficulties in controlling the pain or decreasing pain-related thoughts, and tend to ruminate more frequently as compared to non-catastrophizers (Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017; Neblett, 2017)

This magnification and continuous detection of pain-related information can significantly exacerbate the pain experience resulting in a disruption in their physiological and cognitive performance (Herbert et al., 2014; Asmundson, Gomez-Perez, Richter & Carleton, 2012; Vlaeyen & Linton, 2000; Edwards, Bingham, Bathon & Haythornthwaite, 2006).

#### ii. Pain Catastrophizing: A Precursor Of Pain-Related Fear

Study findings could also be explained by the evidence that pain catastrophizing is considered as a precursor of pain-related fear resulting in avoidance behaviors. A prospective study in chronic low back pain patients demonstrated that pain catastrophizing was associated with fear of movement and re-injury after 6 months of follow-up, even after controlling for the presence of pain-related fear levels at baseline (Leeuw et al., 2007). Similarly, a recent study on 360 patients with rheumatic

diseases revealed that high pain catastrophizing scores was associated with stronger fear-avoidance beliefs resulting in physical disability and depression (Shim et al., 2017).

### iii. Pain Catastrophizing And The Avoidance Behavior

As the patient perceives pain as a threat and because of fear caused by high catastrophizing in an attempt to decrease the pain in the future, these patients tend to avoid certain activities that are thought to make them feel more pain; thereby reinforcing the fear-avoidance cycle. As a consequence, patients will achieve two outcomes: (1) escape the feelings/thoughts of the pain experience, and (2) experience less fear because of the avoidance behaviors. Individuals will then acquire this behavioral pattern unconsciously, and as the cycle becomes stronger, patients will experience a greater level of disability including pain interference, physical, emotional, and social functioning, and depression (Lee et al., 2015; Zale & Ditre, 2015; Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017). It is also believed that avoiding activities and not using the painful organs decreases patients' tolerance for pain and increases the frequency of painful experiences, thereby further amplifying the avoidance behavior pattern (Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017).

Besides the cognitive-behavioral model which is thought to explain the underlying mechanism of the influence of catastrophizing on pain-related outcomes, there is also some evidence that pain catastrophizing interferes with effective coping strategies.

### b. Pain Catastrophizing Interferes With Effective Pain-Coping Strategy

When patients feel that they have no control over their pain, they start experiencing feelings of helplessness which can interfere with their understanding of

their own ability to effectively cope with pain (Edwards, Bingham, Bathon & Haythornthwaite, 2006). These feelings of helplessness and repeated negative thoughts decrease the likelihood of catastrophizers to expect positive outcomes of pain from using other effective coping strategies, which may thereby be underused (Sullivan et al., 2001). Patients would then choose an ineffective coping approach and tend to naturally display greater intensity of physiological and psychological disabilities than it actually is (Severeijns, Vlaeyen, & van den Hout, 2004 ; Edwards, Bingham, Bathon & Haythornthwaite, 2006; Mortazavi Nasiri, Pakdaman, Dehghani & Togha, 2017).

A previous experimental study showed that high catastrophizers reported using less active coping strategies (such as relaxation techniques, distraction and others) during induction of pain by means of a cold pressor test (Sullivan, Adams & Sullivan, 2004). More recent studies revealed that high catastrophizers reported greater misuse of opioids and higher incidence of side effects related drugs when compared to low catastrophizers (Lazaridou et.al, 2017), and a greater likelihood of discontinuation of pharmacotherapy (Toth, Brady & Hatfield, 2014). Keefe et.al (2004) and Samwel et al. (2007) showed that continuous inefficient coping attempts may contribute to further disability and depression.

Therefore, the interference of pain catastrophizing with effective coping strategies provides a reasonable interpretation of the relationship found between pain catastrophizing and pain-related outcomes in the present study.

## ***2. The Moderating Effect Of Pain Intensity***

It is believed that pain catastrophizing activates areas in the brain which are responsible for pain processing (Jensen, Gianas, Sherlin & Howe, 2015; Seminowicz &

Davis, 2006). A physiological mechanism indicated that catastrophizing increases central sensitization to pain, which is a disorder characterized by increased response to painful stimuli (hyperalgesia) and pain response to non-painful stimuli (allodynia) (Chambers, 2014; Salaffi, Giacobazzi & Di Carlo, 2018; Walsh & McWilliams, 2014). Recent work showed an association between temporal summation (an indicator of central sensitization) in high catastrophizers chronic pain patients (Owens et al., 2015), and increased central sensitization upon laboratory manipulation of catastrophizing in women with chronic low back pain (Taub, Sturgeon, Johnson, Mackey & Darnall, 2017).

Some research also examined that catastrophizing amplifies pain processing in the central nervous system (CNS) from the spinal cord to the cortex (Edwards, Bingham, Bathon & Haythornthwaite, 2006). One hypothesized mechanism is that pain catastrophizing interferes with pain inhibition or promotes sensitization of pain in the CNS (Edwards, Bingham, Bathon & Haythornthwaite, 2006). In their review, Edwards et.al (2006) indicated that reducing catastrophizing resulted in the activation of descending endogenous opioid systems that inhibited nociception. Moreover, a more recent fMRI study on patients with fibromyalgia indicated that high catastrophizers showed enhanced activity in cortical regions involved in the affective processing of pain (Leung, 2012).

Literature also revealed that this activation by pain catastrophizing of brain areas responsible for pain signals might depend on pain intensity levels, suggesting pain intensity to be a moderator of the relationship between pain catastrophizing and pain-related outcomes (Seminowicz & Davis, 2006). However, these findings were not supported in the present study. Pain intensity did not moderate the relationship between

pain catastrophizing and all study outcomes. Nevertheless, another study conducted by Suso-Ribera et. al (2017) provided partial support for the latter where moderation occurred only when physical functioning and pain interference were the dependent variables. In contrast, moderation did not occur in the relationship between pain catastrophizing and mental health status (Suso-Ribera, García-Palacios, Botella & Ribera-Canudas, 2017).

The non-significant moderating effect could be perhaps explained by the existing fear-avoidance model which did not include the importance of pain intensity in disability. Vlaeyen and Linton (2000) stated that pain intensity is not the main factor to drive distress and disability, but instead, interpreting pain as a catastrophe which leads to fear and avoidance behaviors is more disabling than pain itself (Leeuw et al., 2007). On the contrary, Suso-Ribera et. al (2017) argued that the model should re-evaluate pain intensity as a primary factor mostly for physical functioning because the direct association between pain catastrophizing and physical functioning could be moderated by pain intensity levels.

Hence, the discordance of the results found between the present study and Suso-Ribera et. al's study (2017) suggests the need for further research to explore the moderating role of pain intensity on the relationship between pain catastrophizing and pain-related outcomes.

### ***3. Pain Catastrophizing As A Target Treatment For Better Outcomes***

Because of the significant relationship found between pain catastrophizing and pain-related outcomes, this current investigation may as well provide new insight into psychological interventions for pain management in rheumatoid arthritis patients. This

is further supported by Cunningham & Kashikar-Zuck (2013) which declared that other factors such as catastrophic thoughts have a great impact on the pain experience and treatment prognosis, thereby psychological interventions should be considered.

Previous research showed that pain catastrophizing can be reduced (Vlaeyen, de Jong, Onghena, Kerckhoffs-Hanssen & Kole-Snijders, 2002) resulting in improvement in physical and mental health status among pain patients (Jensen, Turner & Romano, 2001). For example, one study found that a reduction of 37 to 44% in pain catastrophizing resulted in better outcomes including pain intensity and return to work after treatment (Scott, Wideman & Sullivan, 2014). Similarly, chronic pain patients who participated in a 3 week intensive comprehensive rehabilitation program had a significant decrease in pain catastrophizing scores, which ultimately led to improvement in health outcomes mainly pain interference, pain intensity, and depression (Craner, Sperry & Evans, 2016). In addition, Hammer et.al (2018) confirmed that rheumatoid arthritis patients on DMARDs treatment had reductions in their level of pain catastrophizing scores, which had a significant reduction in both patient-reported outcomes (PROs) and composite scores at the 12 months of therapy.

Therefore, study results shed the light on the importance of reducing pain catastrophizing by considering non-pharmacological interventions as a critical component in the management of chronic pain in patients suffering from rheumatoid arthritis. Results from a systematic review and meta-analysis found cognitive-behavioral therapy, multimodal treatment, and acceptance and commitment therapy as the best evidence (moderate to high quality) for reducing pain catastrophizing in chronic non-cancer pain (Schütze et al., 2018).

## **B. Strengths Of The Study**

The secondary analysis of data provided a cost-effective way of gaining a broader understanding of the study's research questions.

As pain in rheumatoid arthritis is the most impairing symptom and most frequent reason for which patients seek rheumatologic care, the findings of the present study shedlight on the importance of a psychological construct that influences and exacerbates the pain experience.

The study identified that pain catastrophizing affects a host of health outcomes. For this reason, the available data can be used by researchers and specialists of this field in order to enhance pain management in rheumatoid arthritis' patients and prevent or reduce the subsequent disability of pain catastrophizing.

## **C. Limitations Of The Study**

Despite the strengths of the current study, several limitations can impact and influence the interpretation of these findings. Some methodological limitations have been identified that limits generalizability of the results. The convenience sampling used for data collection and the collection of data only from AUBMC may not be representative of the sample, thereby also limiting generalization of study results.

Because the study relied on secondary data, not all of the information desired was available. The data available related to the outcomes of chronic pain patients in general; for example, no data specifically targeting rheumatoid arthritis patients' health outcomes was available such as patient-reported outcomes (PROs), composite scores, and inflammatory parameters.

Moreover, the study did not include cancer patients and patients with persistent pain secondary to other chronic non-malignant diseases. Noting that, such patients also deserve a deeper understanding of what influences their pain as they tend to suffer from it in their everyday life.

Lastly, only the pain catastrophizing psychological factor was explored in the present study. Therefore, the findings cannot be generalized to other psychological variables.

# CHAPTER VII

## RECOMMENDATIONS AND CONCLUSION

### **A. Recommendations**

#### *1. Recommendations For Future Research*

Based on the study findings, the following is recommended:

- Because this study assessed health outcomes related to chronic pain patients in general, further research should explore the association between pain catastrophizing and rheumatoid arthritis' health outcomes (such as patient-reported outcomes (PROs), composite scores and assessment of inflammatory disease activity).
- Explore whether our findings are replicated using a sample of rheumatoid arthritis patients from different hospital settings.
- Explore whether our findings are replicated using important psychological factors in pain research, such as pain acceptance, fear of pain, pain self-efficacy, and pain vigilance.
- Conduct intervention studies to study the impact of non-pharmacological techniques in reducing pain catastrophizing and explore whether a decrease in pain catastrophizing leads to better outcomes.
- Study the influence of pain catastrophizing on other types of chronic pain such as cancer patients.
- Conduct further studies using the revised Pain catastrophizing scale in its Arabic version to assess its reliability and validity in Lebanese patients.

## *2. Recommendations For Clinical Practice*

- The Arabic Language version of the pain catastrophizing scale (PCS) was psychometrically validated in Lebanon. Because of the significant association found between pain catastrophizing, pain intensity, and pain-related outcomes, one recommendation for clinical practice would be: A pre-intervention pain catastrophizing screening for rheumatoid arthritis patients.

This may be useful to identify those with high levels of catastrophizing, thereby would assist clinicians to consider using therapies other than standard pharmacotherapies which are postulated to be of little benefit when implemented in high catastrophizers. This would also prevent patients from getting exposed to unnecessary dosing escalations of analgesics.

- Based on the important role of pain catastrophizing in influencing patient's pain experience, the acute pain service team in collaboration with rheumatology specialists and other healthcare personnel should educate nurses, physicians and patients on this psychological construct that has long-term disabling consequences:

Education on chronic pain in patients with rheumatoid arthritis should address the importance of pain catastrophizing in influencing patients' pain experience. This should address the fear-avoidance model of pain and the impact of pain catastrophizing on pain-related outcomes including pain interference, physical functioning, social and emotional functioning, and depression.

## **B. Conclusion**

Despite effective antirheumatic strategies and early introduction of biologic agents, pain remains problematic in the rheumatoid arthritis population. Based on the study findings, we now know that pain catastrophizing influences the pain experience in rheumatoid arthritis patients and is associated with physiological changes that might have long-term consequences. More specifically, pain catastrophizing was associated with a number of pain-related outcomes; including pain interference, depression, physical, social, and emotional functioning.

While research showed that strength of the relationship between pain catastrophizing and predominantly physical functioning and pain interference may vary as a function of pain intensity levels, results of this study suggest that pain intensity should not be considered as a moderator of this relationship. However, further research is needed to replicate study results and maximize generalizability.

Pain catastrophizing is particularly important to consider in the care of patients with rheumatoid arthritis as they tend to be exposed to years of potential suffering from chronic pain. It is still not fully understood how this psychological construct influences pain experience, yet growing evidence points to specific mechanisms which are thought to somehow explain its influence on pain outcomes such as coping and cognitive-behavioral changes.

Indeed, the study has important implications on clinical practice and research. As pain catastrophizing interferes with robust treatment response and is associated with negative health outcomes, it is important to identify these individuals at an early stage. With regards to existing psychological interventions in pain settings and if the fear-avoidance model is always held true, then intervening appropriately to decrease pain

catastrophizing could prevent or treat disability and depression resulting in better outcomes.

APPENDIX A  
THE CHRONIC PAIN QUESTIONNAIRE-ENGLISH  
VERSION

**I. Demographic Section**

1. Date: \_\_\_\_\_
2. Date of the accident/injury: \_\_\_\_\_
3. Type of accident: Check (√) one.  
 Work accident  Motor vehicle accident  Other \_\_\_\_\_
4. Sex:  Male  Female
5. Age: \_\_\_\_\_ Date of birth: (Day) \_\_\_\_\_ (Month) \_\_\_\_\_ (Year) \_\_\_\_\_
6. Education: Check (√) the highest education level that you have completed.  
 Primary school  Secondary school  Post-secondary (college, university, etc.)
7. Current marital status: Check (√) one.  
 Single/Living alone  
 Married/Remarried/Common-law  
 Separated/Divorced
8. Current employment status: Check (√) all that applies.  
 Employed full-time  Retired  
 Employed part-time  Student  
 Unemployed
9. Are you receiving compensation or disability payments?  Yes  No
10. Where do you have pain? Check (√) all the appropriate sites.  
.

- Neck
- Shoulders
- Arms
- Upper Back
- Lower back

- Wrist / hand
- Ankle / foot
- Legs
- Head
- Other \_\_\_\_\_

11 On average, how bad is your pain (BPI 5)? Circle one.

.

0      1      2      3      4      5      6      7      8      9      10

No Pain

Pain as bad as  
you can imagine

12 How long have you had your current pain problem?

.

- 0-4 weeks     5-8 weeks     9-11 weeks
- 3-6 months     6-9 months     9-12 months     more than 1 year

## II. Pain Catastrophising ScalePCS

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

**INSTRUCTIONS:** We are interested in the types of thoughts/feelings that you have when you are in pain. I am going to ask you 13 statements describing different thoughts and feelings that may be associated with pain. **Please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.**

*When I'm in pain ...*

	Not at all	To slight degree	To moderate degree	To great degree	All the time
1. I worry all the time about whether the pain will end	0	1	2	3	4
2. I feel I can't go on	0	1	2	3	4
3. It's terrible and I think it's never going to get any better	0	1	2	3	4
4. It's awful and I feel that it overwhelms me	0	1	2	3	4
5. I feel I can't stand it anymore	0	1	2	3	4
6. I become afraid that the pain will get worse	0	1	2	3	4
7. I keep thinking of other painful events	0	1	2	3	4
8. I anxiously want the pain to go away	0	1	2	3	4
9. I can't seem to keep it out of my mind	0	1	2	3	4
10. I keep thinking about how much it hurts	0	1	2	3	4
11. I keep thinking about how badly I want the pain to stop	0	1	2	3	4
12. There's nothing I can do to reduce the intensity of the pain	0	1	2	3	4
13. I wonder whether something serious may happen	0	1	2	3	4

### III. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ C-30)

#### Quality of life

We are interested in some things about you and your health. I am going to ask you a list of questions, please answer the questions by telling me how often you experience the following: 1=not at all, 2=a little, 3=quite a bit or 4=very much.

	Not at all	A little	Quite a bit	Very much
1. Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?	1	2	3	4
2. Do you have any trouble taking a long walk?	1	2	3	4
3. Do you have any trouble taking a short walk outside of the house?	1	2	3	4
4. Do you need to stay in bed or a chair during the day?	1	2	3	4
5. Do you need help with eating, dressing, washing yourself or using the toilet?	1	2	3	4

*During the past week:*

	Not at all	A little	Quite a bit	Very much
6. Were you limited in doing either your work or other daily activities?	1	2	3	4
7. Were you limited in pursuing your hobbies or other leisure time activities?	1	2	3	4
8. Were you short of breath?	1	2	3	4
9. Have you had pain?	1	2	3	4
10. Did you need to rest?	1	2	3	4
11. Have you had trouble sleeping?	1	2	3	4
12. Have you felt weak?	1	2	3	4
13. Have you lacked appetite?	1	2	3	4
14. Have you felt nauseated?	1	2	3	4
15. Have you vomited?	1	2	3	4
16. Have you been constipated?	1	2	3	4
17. Have you had diarrhea?	1	2	3	4
18. Were you tired?	1	2	3	4
19. Did pain interfere with your daily activities?	1	2	3	4
20. Have you had difficulty in concentrating on things, like reading a newspaper or watching television?	1	2	3	4
21. Did you feel tense?	1	2	3	4
22. Did you worry?	1	2	3	4
23. Did you feel irritable?	1	2	3	4
24. Did you feel depressed?	1	2	3	4
25. Have you had difficulty remembering things?	1	2	3	4
26. Has your physical condition or medical treatment interfered with your <u>family</u> life?	1	2	3	4
27. Has your physical condition or medical treatment interfered with your <u>social</u> activities?	1	2	3	4
28. Has your physical condition or medical treatment caused you financial difficulties?	1	2	3	4







C. Walking Activity

0	1	2	3	4	5	6	7	8	9	10
Does not Interfere										Completely Interferes

D. Normal Work (includes both work outside the home and housework)

0	1	2	3	4	5	6	7	8	9	10
Does not Interfere										Completely Interferes

E. Relations with other people

0	1	2	3	4	5	6	7	8	9	10
Does not Interfere										Completely Interferes

F. Sleep

0	1	2	3	4	5	6	7	8	9	10
Does not Interfere										Completely Interferes

G. Enjoyment of life

0	1	2	3	4	5	6	7	8	9	10
Does not Interfere										Completely Interferes

## V.Center for Epidemiologic Studies Depression Scale (CES-D)

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

### *During the Past Week*

	(Rarely/ none of the time; < 1 day)	(Some/little of the time; 1-2 days)	(Occasionally/ moderate amount of time; 3-4 days)	(Most/all of the time; 5-7 days)
1. I was bothered by the things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get "going"	0	1	2	3

## APPENDIX B

### THE CHRONIC PAIN QUESTIONNAIRE-ARABIC VERSION

#### (CPQ-A)

#### I. الإحصاءات:

الأسئلة التالية تتعلق بأمور إحصائية فقط

أ. التاريخ: \_\_\_\_\_ ب. تاريخ وقوع الحادث/

الإصابة: \_\_\_\_\_

ت. نوع الحادث

حادث عمل

حادث سيارة

غير: \_\_\_\_\_

ث. الجنس:

ذكر

أنثى

ج. العمر: \_\_\_\_\_

ح. تاريخ الولادة: \_\_\_\_\_ (اليوم) \_\_\_\_\_ (الشهر) \_\_\_\_\_ (السنة)

خ. ما هو أعلى المستوى العلمي

لديك؟

ابتدائي/متوسط

ثانوي

جامعي

د. هل أنت...؟

أعزب

متزوج

منفصل/مطلق

أرمل

ذ. هل أنت حالياً...؟

- موظف بدوام كامل
- موظف بدوام جزئي
- عاطل عن العمل
- متقاعد
- تلميذ

ر. هل تحصل على تعويض أو مساعدات للإعاقة؟

- نعم
- كلا

ز. في أي منطقة تشعر بالألم؟

- العنق
- الكتفين
- الذراعين
- أعلى الظهر
- أسفل الظهر
- المعصم/ اليد
- الكاحل/ القدم
- الساقين
- الرأس
- غير (حدد): \_\_\_\_\_

س. ما هو معدل الألم الذي تشعر إجمالاً؟ دع دائرة حول الرقم؟

- 10 9 8 7 6 5 4 3 2 1 0
- أسوأ ما يمكن تصورهِ من الم لا أشعر بالم

ش. منذ متى تعاني من هذا الألم؟

- 4-0 أسابيع
- 6-3 أشهر
- أكثر من سنة
- 8-5 أسابيع
- 9-6 أشهر
- 11-9 أسابيع
- 12-9 أشهر

## Pain Catastrophizing Scale PCS-CF .II

يمر الجميع عبر حياتهم بمواقف مؤلمة. وقد تتمثل هذه التجارب في حالات الصداع، وألم الأسنان، وآلام المفاصل والعضلات. وكثيرا ما يتعرض الناس لمواقف تسبب لهم الألم مثل المرض والإصابة وجراحات الأسنان أو الجراحات العامة.

**تعليمات:** نحن مهتمون بأنماط الأفكار والمشاعر التي تنتابك حينما يعتمرك الألم. ونورد أدناه ثلاث عشرة جملة تصف مختلف الأفكار والمشاعر التي قد تكون مرتبطة بالألم. وباستخدام التدرج التالي، يرجى تحديد درجة إحساسك بتلك الأفكار والمشاعر حينما تمر بتجربة مؤلمة.

حينما أتألم...

إطلاقا	بدرجة بسيطة	بدرجة متوسطة	يقدر كبير	طوال الوقت	
0	1	2	3	4	1. أقلق طول الوقت طلبا لانتهاؤ الألم
0	1	2	3	4	2. أشعر أنني لن أتحمل
0	1	2	3	4	3. يكون الأمر مريع وأظن أن الحال لنيتحسن أبدا
0	1	2	3	4	4. يكون الأمر صعبا وأشعر أنه يغتمرنى
0	1	2	3	4	5. أشعر أنني لا أستطيع التحمل أكثر من ذلك
0	1	2	3	4	6. أخاف من أن يسوء الألم أكثر
0	1	2	3	4	7. أظل أفكر في أحداث أخرى مؤلمة
0	1	2	3	4	8. أتلهف لأن يتبدد الألم
0	1	2	3	4	9. أشعر أنني لا يمكنني طرده من عقلي
0	1	2	3	4	10. أبقى أفكر في مدى ما يسببه لي من أذى
0	1	2	3	4	11. أبقى أفكر في رغبتى الشديدة في أن ينصرف هذا الألم
0	1	2	3	4	12. ليس ببدي ما يمكنني القيام به حتى أخففه
0	1	2	3	4	13. أتساءل عما إذا كان سيحدث لي شيء خطير

## III. نوعية الحياة (Quality of Life)

لدينا اهتمام بأمور تخصصك وتخصص صحتك. لذلك سنطرح عليك مجموعة أسئلة، من فضلك اجب عليها بالتالي:  
أبداً، نادراً، قليلاً، أو كثيراً جداً.

أبداً	قليلاً	كثيراً	كثيراً جداً
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

1. هل تواجه صعوبة عند قيامك بنشاطات شاقة، مثل حمل كيس أغراض ثقيل أو حقيبة سفر؟

2. هل تواجه صعوبة بالمشي مسافة طويلة خارج البيت؟ > 50 متر.

3. هل تواجه صعوبة بالمشي مسافة قصيرة؟ < 50 متر

4. هل تحتاج للبقاء في السرير أو الكرسي خلال النهار؟

5. هل تحتاج إلى مساعدة بالأكل، إرتداء الملابس، الإغتسال أو استعمال الحمام؟

## خلال الأسبوع الماضي:

أبداً	قليلاً	كثيراً	كثيراً جداً	
1	2	3	4	6. هل واجهت صعوبة في القيام بعملك أو غيرها من النشاطات اليومية؟
1	2	3	4	7. هل واجهت صعوبة في ممارسة هواياتك أو غيرها من النشاطات الترفيهية؟
1	2	3	4	8. هلاحسست بضيق تنفس؟
1	2	3	4	9. هل شعرت بألم؟
1	2	3	4	10. هل كنت بحاجة إلى أن ترتاح؟
1	2	3	4	11. هل واجهت صعوبة في النوم؟
1	2	3	4	12. هل شعرت بضعف جسدي؟
1	2	3	4	13. هل شعرت بفقدان الشهية؟
1	2	3	4	14. هل شعرت بالغثيان (بالعيان)؟
1	2	3	4	15. هل تقيأت (استقرغت)؟
1	2	3	4	16. هل اصبت بالإمساك؟
1	2	3	4	17. هل اصبت بالإسهال؟
1	2	3	4	18. هل شعرت بتعب؟
1	2	3	4	19. هل تعارض ألمك مع قدرتك على القيام بأعمالك اليومية؟
1	2	3	4	20. هل واجهت صعوبة في التركيز على الأشياء مثل قراءة الجريدة أو مشاهدة التلفزيون؟
1	2	3	4	21. هل شعرت بالتوتر؟
1	2	3	4	22. هل قلقت؟
1	2	3	4	23. هل شعرت بالإنفعال؟
1	2	3	4	24. هل شعرت بالإكتئاب؟
1	2	3	4	25. هل واجهت صعوبة في تذكر الأشياء؟

بشكل عام:

أبداً	قليلاً	كثيراً	كثيراً جداً	
1	2	3	4	26. هل تعارضت حالتك الجسدية أو علاجك الطبي مع حياتك العائلية؟
1	2	3	4	27. هل تعارضت حالتك الجسدية أو علاجك الطبي مع حياتك الاجتماعية؟
1	2	3	4	28. هل سببت لك حالتك الجسدية أو علاجك الطبي بصعوبات مادية؟

لأسئلة التالية أجب عنها من معدل 1 إلى 7 حيث 1 يعني ضعيف جداً و 7 ممتاز.

29. كيف تقيّم صحتك عامة خلال الأسبوع الماضي؟

1	2	3	4	5	6	7
ضعيف جداً					ممتاز	

30. كيف تقيّم نوعية حياتك عامة خلال الأسبوع الماضي؟

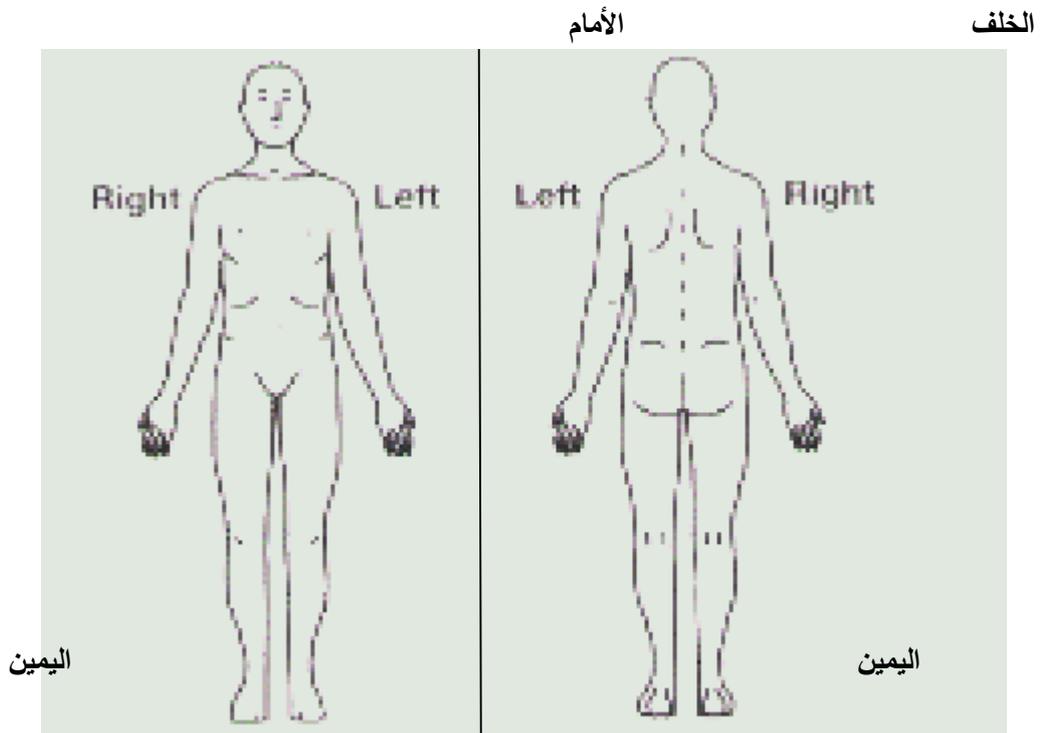
1	2	3	4	5	6	7
ضعيف جداً					ممتاز	

## Arabic Brief Pain Inventory .IV

1. خلال حياتنا، نعاني من بعض الآلام بين حين وآخر (كالصداع البسيط أوالتواء عضلة أو ألم الأسنان). هل عانيت خلال الأسبوع الماضي من ألم يختلف من هذه الأنواع من الآلام العادية؟

1. نعم
2. لا

2. على الرسم التالي، حدد مواضع الألم الذي تشعر به. ضع علامة  في الموضع الأشدّ ألماً



3. قيم ألمك بوضع دائرة حول الرقم الذي يصف ألمك في أسوأ حالاته خلال الأربع والعشرين ساعة الماضية.

10	9	8	7	6	5	4	3	2	1	0
أسوء ما يمكن										لا أشعر بالم
تصوره من الم										

4. منفضلك، قيم ألمك بوضع دائرة حول الرقم الذي يصف ألمك في أدنى حالاته خلال الأربع والعشرين ساعة الماضية

10 9 8 7 6 5 4 3 2 1 0  
لا أشعر بالم  
أسوء ما يمكن  
تصوره من الم

6. حدد درجة ألمك بوضع دائرة حول الرقم الذي يصف درجة ألمك الآن.

10 9 8 7 6 5 4 3 2 1 0  
لا أشعر بالم  
أسوء ما يمكن  
تصوره من الم

7. ما هو أنواع العلاجات أو الأدوية التي تتلقاها لمعالجة ألمك؟

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8. خلال الأربع والعشرين ساعة الماضية، كم كانت درجة الأرتياح من الألم لديك بعد تناولك الأدوية أو العلاجات للألم؟ منفضلك، ضع دائرة حول النسبة المئوية التي تصف مدى ارتياحك.

100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%  
لم يحصل  
اي ارتياح  
ارتياح كامل

9. ضع دائرة حول الرقم الذي يصف مدى التأثير السلبي أو العرقلة التي سببها لك الألم خلال الأربع والعشرين ساعة الماضية في النواحي التالية:

أ. نشاطك العام

10 9 8 7 6 5 4 3 2 1 0  
لا عرقلة  
عرقلة كاملة

ب. مزاجك

10	9	8	7	6	5	4	3	2	1	0
عرقلة كاملة										لا عرقلة

ج. قدرتك على المشي

10	9	8	7	6	5	4	3	2	1	0
عرقلة كاملة										لا عرقلة

د. العمل العادي (يشمل ذلك العمل خارج المنزل و العمل المنزلي)

10	9	8	7	6	5	4	3	2	1	0
عرقلة كاملة										لا عرقلة

هـ. علاقاتك مع الآخرين

10	9	8	7	6	5	4	3	2	1	0
عرقلة كاملة										لا عرقلة

و. نومك

10	9	8	7	6	5	4	3	2	1	0
عرقلة كاملة										لا عرقلة

ز. إستمعك بالحياة

10	9	8	7	6	5	4	3	2	1	0
عرقلة كاملة										لا عرقلة



3	2	1	0	17. أصبت بنوبات بكاء.
3	2	1	0	18. شعرت بالحزن.
3	2	1	0	19. شعرت أن الناس لا تحبني.
3	2	1	0	20. لم أستطع الاستمرار.

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