EXPIATION THROUGH PSYCHOGENIC PAIN

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

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ABSTRACT

EXPIATION THROUGH PSYCHOGENIC PAIN

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Psychodynamically, chronic pain problems with no organic cause have been considered as a way of punishment through physical pain for aggressive and sexual feelings producing guilt. The purpose of the present study was to examine effect of guilt feelings on nocebo pain responses and the effect of psychologically induced nocebo pain on guilt feelings. The participants were 100 students from Middle East Technical University. There were two independent variables which were guilt induction (guilt-no guilt) and nocebo manipulation (nocebo-no nocebo). Guilt feeling was induced by asking participants to write guilt evoking memories for 10 minutes. Nocebo manipulation was done by telling the participants that they will receive electricity from an EEG cap. In addition, they watched a video in which a confederate imitates having pain during the procedure. Guilt feelings were measured with PANAS twice, once after guilt induction and once after nocebo pain manipulation. Pain was measured using a basic 0 to 10 visual pain scale. Independent t-tests, chi square test, two way Factorial ANOVA, and two way Mixed ANOVA were conducted on the data. The resutls revealed effects of

manipulations, but no significant interactions and increased likelihood of pain reporting frequency due to guilt induction. Although insignificant, guilt induction had an inhibition effect on reporting nocebo pain and subjective pain severity. Findings, limitations and clinical implications of the study were discussed.

Keywords: Nocebo, Chronic Pain, Guilt, Punishment, Expiation

ÖZ

PSİKOLOJİK KÖKENLİ AĞRI İLE DENEYİMLENEN SUÇLULUK KEFARETİ

Türkarslan, Kutlu Kağan
M.Sc, Psikoloji Bölümü
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Psikodinamik olarak, fiziyolojik temeli bulunamayan kronik ağrı şikayetleri, kişinin kendini suçluluk uyandıran saldırgan ve cinsel duyguları sebebiyle fiziksel ağrı çekerek cezalandırması şeklinde ele alınmıştır. Bu çalışmanın amacı suçluluk duygularının nocebo ağrı cevapları üzerindeki etkisini ve psikolojik olarak oluşturulan nocebo ağrısının suçluluk duyguları üzerindeki etkisini araştırmaktır. Katılımcılar Orta Doğu Teknik Üniversitesi'nden 100 öğrencidir. Bağımsız değişkenler suçluluk duygusunun uyandırılması (suçluluk / suçluluk yok) ve nocebo manipülasyonudur (nocebo / nocebo yok). Suçluluk duyguları katılımcılardan kendilerini hala suçlu hissettikleri bir anılarını tüm detayları ile 10 dakika boyunca yazmaları istenerek yaratılmıştır. Nocebo manipülasyonu ise katılımcılara yapacakları bir görev sırasında takacakları EEG şapkasından kafalarına elektrik akımı verileceği söylenerek yapılmıştır. Buna ek olarak katılımcılar sahte bir katılımcının bilgisayar görevi sırasında baş ağrısı çekiyormuş gibi yaptığı bir videoyu izlemişlerdir. Suçluluk duyguları PANAS ile suçluluk uyandırılmasından ve nocebo manipulasyonundan sonra iki kere ölçülmüştür. Ağrı hissi 0 ile 10

arasında değişen bir görsel ağrı skalasıyla ölçülmüştür. Bağımsız t-testleri, ki kare testi, iki yollu faktöriyel ANOVA ve iki yollu karma ANOVA analizleri yürütülmüştür. Manipülasyonların etkisi olmasına rağmen hipotezleri doğrulayacak etkileşim sonuçları ve ağrı rapor edilmesinde anlamlı artış bulunamamıştır. Anlamlı olmasa da suçluluk uyandırılmasının nocebo manipülasyonunda ağrı bildirilmesini baskıladığı görülmüştür. Çalışmanın sonuçları, kısıtları ve klinik çıkarımları tartışılmıştır.

Anahtar Kelimeler: Nocebo, Kronik Ağrı, Suçluluk, Cezalandırma, Kefaret

To Freud, Jung, Klein, Engel, Kernberg, Kohut and many other great psychoanalysts...

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INTRODUCTION

Chronic pain problems propose a challenge for physicians especially in the absence of clear and discernible organic causes for perceived pain of the patients (Melzack, 2005). In many cases of chronic pain problems, the practitioners generally assume that there may be an undiscovered and underlying physio-pathological process producing pain, or maybe the pain is caused by psychological factors (Engel, 1959). Thus far, series of studies have identified a long list of risk factors, but they have failed to find a prominent physical and psychosocial variable that can adequately explain chronic pain problems (Apkarian, Baliki, & Geha 2009). Researchers and practioners have tried to conceptualize experience of pain with different models since 19th century. First attempts generally focused on biomedical explanations of physical pain which later failed to provide a coherent and inclusive explanation about wide range of pain experiences and related psychological factors. Revolutionary gate control theory of pain by Melzack and Wall reintroduced significance of psychological variables into pain experiences (Campbell, Johnson, & Zernicke, 2013) and expanded understanding of pain broadly. The purpose of the present study was to investigate the effect of guilt feelings on nocebo pain responses and the effect of psychologically induced nocebo pain on guilt feelings. If guilt feelings exacerbate reported pain and experiencing psychologically induced nocebo pain successfully reduces guilt feelings, it may propose an underlying explanation for chronic pain problems with no organic causes. As theorized by some psychodynamic theorists, experiencing chronic pain may be a way of expiation for guilt feelings (Engel, 1959; Breuer, Freud, & Strachey, 1955).

1.1 Physical Pain and Its Functions

Pain is an aversive or unpleasant sensation related to both actual and potential body tissue damage (Broom, 2001; Merskey & Bogduk,1994). According to Sternbach (1970), the abstract concept of pain may mean a personal sensation of hurt, a signal that warns about a noxious stimulus that may result in tissue damage, or a pattern of responses produced to protect the living organism from damage. Generally, when a potentially dangerous stimulus exceeds physiological threshold of pain receptors, the alert is given in form of both subjective physical sensations and feelings. It is also well known that in absence of noxious stimulus from peripheral nociceptors, people may still experience pain like phantom limb pain or pain of paraplegic patients (Loeser & Melzack, 1999). Motor withdrawal, fight reaction, behavioral arousal, sympathetic system activation and other possible aversive and defensive responses may be executed to promote elimination of noxious stimulation (Millan, 1999). As implied in the definition of pain, the most general function of pain is to alert the person about an actual or a possible tissue damage occurring in the body (Coderre, Vaccarino, & Melzack, 1997).

Moreover, Broom (2001) distinguishes six possible functions of feeling pain. First, it enables the subject to discern between potential and actual damage by monitoring the magnitude of the pain. Second, it motivates aversive actions that are directed to prevent and abate harmful damages. Third, it facilitates learning the associations between situations, stimuli, and previous harmful stimulations. Fourth, it alerts the subject to change priority of concurring activities to prevent and avoid actual and potential damage. Fifth, it makes it difficult to pursue activities that may influence recovery processes adversely. And finally, some activities that can threaten survival (starvation, predation etc.) may be localized and inhibited by feeling pain. To experience physical pain, an organism must have receptor cells in various parts of the body, peripheral and central neural pathways connecting peripheral and central nervous system, and intact brain regions processing information transmitted from the nervous system.

1.2 Types of Physical Pain

In terms of pain duration, three types of pain can be distinguished as transient, acute, and chronic pain. Transient pain is produced in response to the activation of nociceptive transducers (structures transforming input into output) in skin or other tissues of the body in the absence of any tissue damage like in a venepuncture (incisions of vessels) or injection for immunization and usually is not a reason for seeking health care (Loeser & Melzack 1999). According to World Health Organization (2012), acute pain has a sudden onset, generally experienced following an injury or tissue damage (physical trauma, surgery etc.), and most importantly, it is a short-term experience. Symptoms of the patient can be attributed to tissue damage and there is reasonable treatment targeting the pain with two major components: temporary relief by analgesics or anesthetics and providing the environment for healing (Loeser, 1991).

On the other hand, chronic pain is a persistent or intermittent experience of pain and continues after the expected time of healing (usually 3 to 6 months) has passed. In many cases, etiology of the pain is also unclear. Black (1975) coined the term Chronic Pain Syndrome and summarized several aspects of chronic pain problems. People with chronic pain often have multiple pain complaints, there is no clear evidence about the organic basis for their complaints, multiple physicians are already visited, the pain experiences become a preoccupation for the person, and finally, they exhibit some features of depression and anxiety problems.

Addison (1984) similarly defined chronic pain syndrome as persistent pain relating to an organ system with no definitive diagnosis and treatment. The pain seems to have no biological function, environmental and psychological factors play a role in the development of chronic pain behaviors, the physiological mechanisms of pain cannot be identified, and therefore, classical medical treatment model becomes inappropriate. The most common chronic pain problems can be listed as chronic low back pain, headache, fibromyalgia, neuropathic pain, and phantom limb pain

(Ashburn & Staats, 1999). The factor distinguishing chronic pain from acute pain is that treatments for chronic pain generally don't lead to permanent pain relief, while healing diminishes pain experience in acute pain (Loeser & Melzack 1999). Problematically, if physicians cannot distinguish between acute or recurrent acute pain and chronic pain, chronic pain problems like low back pain, headaches, and myofascial problems may get worse (Black, 1975).

1.3 Theories of Physical Pain

1.3.1 Biomedical Models

During 19th and 20th centuries, biomedical model of pain dominated clinical and theoretical understanding of pain experiences. Gatchel, Peng, Peters, Fuchs, & Turk (2007) divided early biomedical models into two perspectives. The first one is specificity theory referring to a model delineating that unique receptor mechanisms transmit sensory information from the periphery to the spinal cord and then to the brain through neural pathways. The most important aspect of the Specificity Theory can be stated as that specific sensory receptors and connected sensory fibers are stimulus specific and each sensory modality has unique receptors and fibers (Moayedi & Davis, 2013). The other model was called *pattern response,* which means nociceptive information emanates from the stimulus intensity and processing of the pattern of responses in afferent neural systems rather than stimulation of specific nociceptive receptors (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). In other words, pattern of neural stimulation in terms of temporality (duration) and spatiality (location) distinguishes type and intensity of the stimulus (Moayedi & Davis, 2013).

Another pain theory was intensivity theory, which regarded pain as an emotional phenomenon (rather than a sensory experience) occurring when a stimulus is stronger than normal. Proponents of this model stated that when a threshold of intensity is exceeded, any sensory system can conceive pain experience. In a series

of experiments researchers showed that repeated sub-threshold tactical and electrical stimuli can produce pain, because the effect of each sub-threshold stimulus is summed up (Moayedi & Davis, 2013).

1.3.2 Gate Control Theory

In 1960s, Melzack and Wall proposed a new theory of pain called gate control theory, which is a far more comprehensive model that amalgamates different aspects of previous medical pain theories with emotional and cognitive influences regarding the experience of pain. They stated that stimulation of sensory receptors fire neural impulses transmitted to three specific spinal cord systems including substantia gelatinosa, dorsal-column fibers and first central transmission cells (T) in dorsal horn, and the experience of pain is regulated by the interaction between these systems (Melzack & Wall, 1967). Substantia gelatinosa in dorsal horn is the gate controlling the sensory information transmitted from the primary afferent neurons to T cells in the spinal cord. The activity in large and small fibers respectively inhibits or facilitates the gate and when a nociceptive stimulus exceeds threshold of inhibition, the gate is opened and experience of pain occurs (Moayedi, & Davis, 2013).

Melzack and Wall (1967) further suggested that brain processes of attention, emotion, and memories also influence descending fibers and sensory processes through the gate control system. They added that the concept of a specific pain center in the brain must be a misconception, because various brain centers such as thalamus, the limbic system, hypothalamus, reticular formation, parietal cortex, and frontal cortex are all involved in pain perception. This multidimensional model was revolutionary in the area and ignited theoretical advancement in the field of pain research. However, Loeser, & Melzack (1999) stressed that the theory does not comprise the effects of long term chances in the central nervous system due to noxious stimulus and other factors affecting the individual.

1.3.3 Neuromatrix Theory of Pain

Melzack (2005) was not satisfied with the gate control theory when it failed to explain phantom limb phenomena. He proposed four conclusions about the nervous system and pain perception. First, the phantom limb pain is experienced as real, so it can be assumed that the brain processes do not always need inputs from the body to emerge. Second, if people can have bodily experiences in the absence of an input, patterns producing these experiences may be stored in the brain's neural networks and sensory stimuli may only active the patterns rather than producing the patterns. Third, the self may be defined as a perceived unity of the body different from outer world and the unity of the self is a product of central neural processes, not a exact same and concrete derivative of peripheral nervous system or spinal cord. Finally, even though the genetic disposition of the person may have significant influence, the concept of the body-self and related brain processes should not be neglected. Moreover, the genetic specification of the person can also be modified by experience.

As a result, Melzack (2005) asserted a new conceptual model of pain called the Neuromatrix Theory. He defines the neuromatrix as a network of neurons having loops between the cortex, thalamus, and limbic system. Its spatial distribution and synaptic links are genetically connected to certain characteristic, but can be modified by sensory inputs. Loops of the system enable it to process different components of the neuromatrix and interactions between the outputs. Cyclical processing and synthesis of nerve impulses in the system create characteristic patterns called the neurosignature. As a result, pain is understood as an experience created by a characteristic neurosignature. The new theory can consolidate cognitive, sensory, affective, and motivational components related to pain experiences (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Melzack (2005, p. 91) articulates:

The neuromatrix theory guides us away from the Cartesian concept of pain as a sensation produced by injury, inflammation, or other tissue pathology and toward the concept of pain as a multidimensional experience produced by multiple influences. These influences range from the existing synaptic architecture of the neuromatrix, which is determined by genetic and sensory factors, to influences from within the body and from other areas in the brain. Genetic influences on synaptic architecture may determine or predispose toward the development of chronic pain syndromes.

1.4 Chronic Pain

Not surprisingly, 80% of visits to physicians are due to pain-related problems (Voscopoulos & Lema, 2010). According to the studies of pain epidemiology, chronic pain can be regarded as a widespread health problem, even though the methodology and results of the studies vary. Crook, Tunks and Browne (1986) revealed that 5% of adult population experience acute pain and 11% of the experience chronic pain. In European population, it is found that 20% of the adults suffer from chronic pain symptoms along with the physical and emotional burden brought by them (Van Hecke, Torrance, & Smith, 2013). Another study with a sample of 1806 participants showed that 55% of the population reported persistent pain for 3 months and 49% of them for 6 months (Andersson, Ejlertsson, Leden, & Rosenberg, 1993). According to a study with a nationally representative sample of the United States (n = 27,035), 30.7% (34.3% of females and 26.7% of males) of the participants reported chronic and recurrent pain lasting for at least 6 months (Johannes, Le, Zhou, Johnston, & Dworkin, 2010). In a randomly selected sample (n = 17.543) of adult Australian population, 17.1% of males and 20 % of females reported chronic pain (Blyth et al, 2001). In addition to high prevalence rates, chronic pain problems also puzzle researchers and practioners in terms of their etiology and maintenance.

Several studies suggested that musculoskeletal pains are the most frequently reported symptoms in primary care (Kroenke & Mangelsdorff, 1989; Kirmayer, Groleau, Looper, & Dao, 2004). Despite the vast knowledge and research on pain mechanisms, theories, and neurobiological basis of pain, clear organic diagnosis in more than 80% of all cases of back pain problems is absent (Traue, Jerg-Bretzke, Pfingsten, & Hrabal, 2010). In terms of medically unexplained symptoms, follow up studies showed that if no underlying organic cause is found as a result of initial assessment, it is extremely unlikely finding one latter in time (Mayou, 1991). As biomedical models of pain failed to adequately explain and diagnose complex pain phenomenon in many cases, various psychosocial factors like emotions, attention, environmental context, beliefs, attitudes, and expectation of the suffering person have been acknowledged in generation and perpetuation of pain problems (Turk & Okifuji, 2002).

Turk & Rudy (1992) discussed some aspects of persistent pain complaints that biomedical model fails to explain. First of all, the pain severity reports of patients with objectively equivalent tissue pathology can be very different from each other. Second, patients with asymptomic complaints have objective radiographic evidence targeting structural abnormalities which fail to explain their existing complaints. Third, in some cases, patients with minimal objective physical pathology may report pain that is discordant with their actual pathology. Fourth, surgical operations aiming to inhibit pain by isolating neurological pathways may not be successful in decreasing pain. Finally, the same intervention applied to patients with objectively equivalent pathology may conceive various responses. Of course, absence of organic evidence does not mean that it is all psychological. Nevertheless, all perceptual pain experiences are surely the output of our brains, which build subjective experiences both in case of sensory stimulation or in its absence (Gagliese & Katz, 2000). In most of the cases, onset of pain is tied to biomedical factors and psychosocial factors may operate later in maintenance and aggravation of the symptoms (Turk & Rudy, 1992). Current understanding of pain is

conceptualized in a biopsychosocial model which includes the interaction of biological, psychological, and social variables.

In relation to the effect of psychological factors, it has been found that chronic pain has a strong association with diagnosable psychopathology (Dersh, Polatin, & Gatchel, 2002) especially with depression. For instance, rates of major depressive disorder range between 5% and 26% in the general population (American Psychiatric Association, 1987), yet the rate of major depressive disorder ranges between 18% and 43% among individuals with chronic pain (Katon, Egan, & Miller, 1985; Magni, Caldieron, Rigatti-Luchini, & Merskey, 1990). Which comes first, depression or pain? No accurate answer has been found yet. Males with chronic low back pain (CLBP), compared to the controls, had significantly higher lifetime rates of major depression (32% vs 16%) and the first episode of depression preceded the onset of pain in 58.1% of the cases. In alcohol use disorder, the life time rates were 64.9% for males with CLBP vs. 38.8% for controls and alcohol use disorder preceded pain in 81% of the cases. Finally, in major anxiety disorder, the rates were 30.9% vs. 14.3% respectively (Atkinson, Slater, Patterson, Gant, & Garfin, 1991). In a follow up study, Magni, Moreschi, Rigatti-Luchini, and Merskey (1994) compared the data from 1974 to 1984 and they found that depressive symptoms at year 1 significantly predicted the development of chronic musculoskeletal pain at year 8. Brown (1990) examined a sample of 243 participants with rheumatoid arthritis and found that pain problems led to increased severity of depression especially in last 12 months of the study. Jarvik et al. (2005) compared 131 veterans at baseline and after 3 years and depression predicted low back pain better than any other baseline predictor.

In a review study examining 83 studies about the relationship between chronic pain and depression, there were greater support for chronic pain preceding depression than vice versa (Fishbain, Cutler, Rosomoff, & Rosomoff, 1997). Romano, & Turner (1985) also reviewed the literature and reported many methodological problems, such as no use of control groups in the studies investigating relationship

between depression and chronic pain. They reported tentatively that for nearly %50 of the patients, chronic pain and depression developed together and for %40 of the patient's pain problems preceded depression. Turk and Rudy (1992) reminded that the average duration of living with pain exceeds 7 years, which may involve serious psychosocial burden and warned about asserting causal assumptions between chronic pain and psychopathology, even if there is a diagnosed emotional problem.

1.5 Theoretical Approaches to Chronic Pain

1.5.1 Biological Approach

In recent years, physiological and neuroscientific approaches provided valuable information about chronic pain experiences. Yet, there is still no complete explanation of chronic pain problems. Evidence strongly suggests that gene expressions regulate sensivity to pain (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). It was found that three genetic haplotypes of the gene encoding catecholamine-*O*-methyltransferase are related to individual sensitivity variations including low pain sensitivity, average pain sensitivity, and high pain sensitivity. These haploptypes affect 96% of the world population (Diatchenko et al., 2005).

Gatchel, Peng, Peters, Fuchs, & Turk (2007) summarized findings from fields of molecular biology, anatomy, and physiology. First of all they indicated that genetic factors have an important role in vulnerability, onset, maintenance, and exacerbation of chronic pain problems. Second, chronic pain problems may be influenced by imbalances of neurotransmitters, neuromodulators and receptors. As an example, increased production of excitatory and decreased production of inhibitory neurotransmitters may lead to increased sensitivity of neurons located in the pain transmission systems. Third, neural wirings in the somatosensory system have plasticity and they can be modified according to signals received from other connections at intercellular level, which may lead to changes in expression of genes regulating pain experiences in the long term. Fourth, chronic pain problems are

highly affected by people's psychological states. Changes in symptoms may occur in hours, days or weeks due to endocrinal fluctuations. Fifth, invasive and non-invasive imaging tools have enabled us to learn far more about anatomical and pathological states of the nervous system. Finally, Nanotechnology may make promising contributions to both theoretical understanding and treatment of chronic pain.

May (2008) reviewed morphometric studies dealing with quantitative analysis of size and shape of brain parts and reported that most of the studies found structural alterations in brain's pain matrix and decrease of gray matter in cingulate cortex, the orbitofrontal cortex, the insula, and the dorsal pons. Being unsure of what actually causes decrease in gray matter, May further suggested that reduction of gray matter in brain regions dealing with pain suppression may cause dysfunctions in processes alleviating nociception. Later, Rodriguez-Raecke, Niemeier, Ihle, Ruether and May (2009) examined the gray matter reductions in patients with primary hip osteoarthritis and found characteristic gray matter decreases in dorsolateral prefrontal cortex, amygdala, and brainstem. However, a post-surgery follow up with 10 patients showed that gray matter increased in those regions after pain disappeared. Therefore, they suggested that gray matter abnormalities may be a consequence of chronic pain problems.

1.5.2 Psychodynamic Approach

It is well known that psychodynamic approach has had postulations about the role of psychological conflicts in occurrence of some somatic complains, including chronic pain, since the publication of Studies of Hysteria (Breuer, Freud, & Strachey, 1955). In case of Elisabeth von R, Freud (1955) believed the patient's problems like pain in legs and difficulty of walking were symptomic manifestations of her repressed erotic desires, guilt feelings, and anger. Psychodynamic scholars generally understood chronic pain problems within the framework of psychosomatics. Few renowned scholars like Ferenczi, Groddeck and F. Alexander

wrote about psychosomatics and their psychodynamics. Similarly, George L. Engel was one of the psychoanalysists dealing with chronic pain in terms of psychic conflicts and object relations. In his seminal paper, Engel (1959, p.899) first discussed specifity model of pain and stated:

> When a patient complains of pain, it is taken for granted that pain end organs somewhere in the body are being stimulated, presumably by a pathological process. That this often proves to be the case provides repeated and comforting support to those who hold this centripetal point of view. When no such explanation is found, it is assumed that a pathological process is there nonetheless, but simply has not yet been discovered.

He further discussed the subjectiveness of pain phenomenon. When the issue is pain, the only way we get information about the pain is through report of the person experiencing it and the people can only describe their bodily pain experiences in terms of other similar experiences causing pain (like burning, stinging, cut, pinprick). At the same time, we know that humans can perceive visual, auditory, olfactory or tactile experiences without direct physical stimulation of sensory receptors in dreams, during psychosis, via sensory deprivation, and under the influence of psychoactive drugs.

Treating pain as a similar sensory phenomenon, Engel asserted that it may be possible to experience pain without direct sensory stimulation. He stated (1959, p. 900):

> I make these points to emphasize that when it is possible to verify the presence of peripheral source of stimulation in studying sensory experiences, we have no difficulty in identifying a host of examples in which no peripheral stimulation takes place and yet the person clearly experiences sensation. Arguing by analogy alone, I contend that same must also hold true for pain.

He (Engel, 1959) presumed that a person collects a library of pain experiences resulting from peripheral pain stimulations during his or her course of life. Like visual or auditory experiences, they may be activated without any direct sensory stimulation. Then he listed six personal meanings of pain experiences by connecting them to development and psyche. First, pain is a part of our protection system and warns us about possible damage or loss of body parts. Therefore, when pain emerges it is important to learn and record what is causing pain in that environment and the body parts affected from the pain. The cause and location of pain are the main components of pain memories or body's pain image. This notion was included in Melzack's Neuromatrix Theory of Pain (Melzack, 2005). Second, pain is entangled with interpersonal relationships. Because of pain, an infant cries to get help from his or her significant other. An association between pain, crying, the soothing response of significant other, and relief of pain may be established.

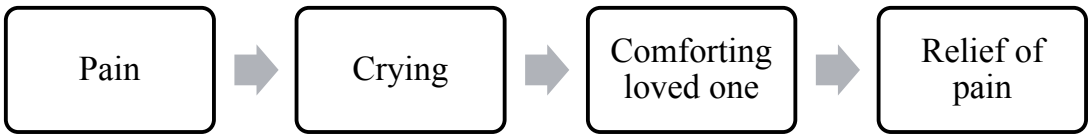

Figure 1. Engel's Model in terms of signal of discomfort

Third, during early childhood, pain and punishment are strongly linked to each other. Pain is generally induced as a form of punishment for a guilty deed of children. This punishment happens when one is a bad boy and girl. Therefore, pain signals that one is being bad or guilty. Several studies support prevalence of this notion. Strauss (2001) reported that one third of USA parents hit their children of all ages, and between ages of 4-5 corporal punishment rate is about 94%. Ripoll-Núñez and Rohner (2006) reported that approximately 75% of parents of the world's societies use physical punishment. Another study examining approval of corporal punishment in USA over 24 years found that the rate was 94% in 1968 and 68% in 1994 (Straus & Mathur, 1996).

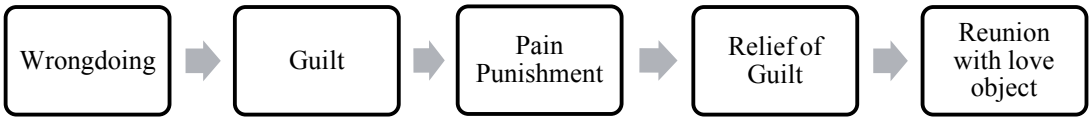

Figure 2. Engel's Model in terms of punishment

Furthermore, pain may connotate aggression and power. The person may regulate his or her aggression by inflicting pain on his or her own body. In other words, instead of the object evoking aggression, the self becomes the target of one's aggression. Fifth, loss of a significant other in real or in fantasy may involve memories of significant other suffering from physical pain, for example, before death. Conscious and unconscious aggressive feelings toward the significant other can produce feelings of guilt and in a way, suffering from pain at the same location of the body as the significant other may be an expiation for these guilty feelings. Finally, in cases of sado-masochism and some perversions, pain and sexual feelings may be nested and inflicting pain may become the dominant sexual activity.

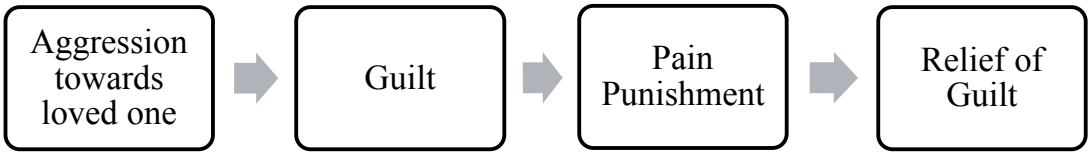

Figure 3. Engel's Model in terms of anger

Similar to Engel's view about control of aggression, conceptualization about anger and its suppression also have dominated cognitive and psychodynamic understanding of chronic pain for years. Burns, Quartana, and Bruehl (2008) extensively reviewed related literature and criticized the overuse of inventories to examine relationship between anger suppression and chronic pain complains. Quartana, Yoon, and Burns (2007) implemented an experimental procedure, requiring participants to suppress their anger after a provocation. It was found that participants suppressing their anger reported more pain during the cold pressor

application than control group. In their second study, they investigated the underlying mechanism leading to exacerbation of pain experience. Ironically, they explained the exacerbation of pain by the process of suppression. Accordingly, anger and pain are juxtaposing concepts in the mind and if anger suppression increases anger related cognitions such as pain, it can elevate the level of experienced pain. However, they found partial support for increased cognitive accessibility of anger. They stated: "…we did not find unequivocal evidence for suppression-induced increases in the cognitive accessibility of anger." (Quartana, Yoon, & Burns, 2007, p. 466).

Futhermore, Engel gave some examples of the situations in which pathophysiological changes lead to different pain experiences in different individuals. For example, some individuals continue to suffer from pain after the discovery, removal, and healing of the lesions causing pain. Then, he described pain prone patients whose psychic process have dynamic roles in the initiation of pain, even if there are no peripheral lesions. Moreover, complaints of some individuals may contradict with the well-known anatomical and physiological principles regarding the suspected peripheral lesion. Similar observations about continuing pain after surgery and discordant pain report due suspected lesion were also stated by Turk and Rudy (1992). He emphasized the role of psychological variables in the complex experience of pain rather than explaining pain purely with pathophysiology. Engel's assertion about psychogenic pain being a punishment for guilt feelings is striking. He (1959, p. 905) stated:

> I mention this component first because clinical observation leads me to conclude that guilt, conscious or unconscious, is an invariable factor in the choice of pain as the symptom, as compared to other types of body sensations. Clinically we should expect to find either a long-term background of guilt and/or an immediate guilt-provoking situation precipitating pain.

He also explained that in some situations pain occurs as a way of punishment for guilt feelings. For example, when a person's external circumstances are not enough to meet the unconscious need to suffer, when a significant other dies or is threatened in real life or in fantasy, or when there is aggressive and forbidden sexual feelings, a person may feel pain in order to escape from the guilt. A literature review did not reveal any empirical study that investigated the relationship between guilt and pain as suggested by Engel (1959).

1.5.3 Behavioral Approach

Behavioral approach to chronic pain focuses on pain behaviors of the patients, operant aspects of interpersonal relationships, and attention to pain and its consequences. Subjective pain experience does not play an integral part in the operant conditioning model of chronic pain (Turk & Rudy, 1992). Fordyce (1984) emphasized the notion of pain behaviors to conceptualize chronic pain problems. Accordingly, there must be pain behaviors signaling that the person suffers from pain. Otherwise, we can't be sure whether or not the person experiences pain.

According to Fordyce (1984), pain behaviors can occur due to nociception, other neurophysiological factors, or due to operant learning experiences and their contingent consequences. The pain behaviors may be positively reinforced by rewards in interpersonal relationships (care, sympathy and attention) which in return increase the likehood of occurrence of such behaviors. Similarly, pain behaviors may be negatively reinforced with avoidance behaviors like staying away from feared activities and situations (Turk & Rudy, 1992). Moreover, there may be other non-relational secondary gains that reinforce pain behaviors, like giving up chores and responsibilities. In their study of married couples, Block, Kremer, & Gaylor (1980) compared chronic pain behaviors of patients in the presence of solicitous and non-solicitous spouses and neutral observers in an interview. They found that chronic pain patients reported higher pain levels in the spouse-observer condition than neutral observer condition, if their spouses are solicitous to their pain

behaviors. On the other hand, if their spouses are relatively non-solicitous to their pain behaviors, the patients reported lower pain levels in spouse-observer condition than neutral observer condition. As the study suggests, attitudes and behaviors of the spouses may reinforce and help maintain pain behaviors.

Attention to pain is another studied concept in behavioral understanding of chronic pain. McCracken (1997) listed four major consequence of excessive attention to pain. First, the suffers would be less affected by other stimulus in their environment. Second, they were less likely to engage in positive and satisfying activities. Third, because of limited attention, they would not receive psychological and physical benefits of positive activities adequately. Finally, as a result, their distress and disability would be heightened. As predicted by McCracken (1997), a study with a clinical sample of chronic pain patients revealed that those who report more attention to pain also report higher pain intensity, higher emotional distress, increased psychosocial disability, and they visit physicians more often for their pain problems. However, McCracken also acknowledged one important question. Why do people focus on their pain despite of negative consequences? He made an analogy between attention to pain among people with chronic pain problems and hypervigilance in panic disorder. Maybe, focusing on pain enables one to avoid pain and feared exacerbations in pain experiences.

1.5.4 Cognitive Behavioral Approach

Cognitive approach to chronic pain shifts emphasis from reinforcement of pain behaviors to information processing, interpretations of pain experiences, expectations, and beliefs. Proponents of cognitive approach focus on appraisals of pain, coping-related self-statements, cognitions regarding problem solving, and consequences of such cognitions on interpersonal relationships. Accordingly, people with chronic pain have unrealistic perception of the seriousness of pain, may have significant others who may show extra care, sympathy and promote passivity of the patient (Turk & Rudy, 1992). Cognitive-behavioral therapists strive to

include family members or spouses into treatment processes to work on such interpersonal variables (Keefe, Dunsmore, & Burnett, 1992). This contextual conceptualization brings psychodynamic and cognitive behavioral approaches closer to each other, even though the former focuses on unconscious processes underlying the relationships.

In addition, physiological changes like autonomic and sympathetic nervous system arousal (catecholamine secretion, paraspinal and frontalis EMG responses, heart rate, and skin resistances) and muscle spams or reductions in physical activity affecting muscle flexibility and strength may be mediated by the cognitive evaluations of the patients (Bandura, Taylor, Williams, Mefford, & Barchas, 1985; Flor, Turk, & Birbaumer 1985). Turk and Rudy (1992) emphasized significance of self-efficacy, cognitive processes and distortions, cognitive content, cognitive behavioral coping strategies, and pain catastrophizing in conceptualization of chronic pain problems. For example, high self-efficacy is associated with high pain tolerance and high endogenous opiod activation during painful stimulus (Bandura, O'leary, Taylor, Gauthier, & Gossard, 1987). Similarly, chronic pain patients with high internal locus of control are found to report lower levels of pain (Toomey, Mann, Abashian, & Thompson-Pope, 1991). Moreover, chronic pain patients who have a passive attitude that involves catastrophizing, ignoring, reinterpreting, attention diversion, praying, and hoping as coping strategies report high levels of physical and psychological disability. In addition, functionality of the patients is higher if they have higher perceived control or if they use active and attentional coping strategies (Turner, 1991).

Another variable is the cognitive error of catastrophizing. Some patients exaggerate the likelihood of possible problems and mentally end up with the worst possibility. It was found that less the patients catastrophize, lesser is their pain intensity and physical and psychosocial impairments (Turner & Clancy ,1986). In a heterogeneous group of 1208 chronic pain patients from Netherlands, pain

catastrophizing was the single most important predictor (stronger than pain intensity) of quality of life (Lamé, Peters, Vlaeyen, Kleef, & Patijn, 2005).

Thus far, various approaches have strived to explain chronic pain problems. While, psychodynamic, behavioral and cognitive behavioral approaches to chronic pain stressed the significance of psychological factors like unconscious affections, environmental reinforcers or conscious beliefs and expectations of the patients, biological approach examined underlying biochemical, genetic and neural mechanisms contributing to chronic pain problems. But, absence of clear organic causes for perceived pain in chronic pain complains is a puzzling problem. Similarly, there is another pain inducing concept in which perceived pain stem neither from tissue damage or organic pathology, namely nocebo.

1.6 Nocebo

The concept of nocebo (Latin: I will harm) is not as well-known and popular as its sibling, *placebo*. The nocebo effect may be thought as the reverse of placebo effect. It is defined as the worsening or occurrence of a symptom in expectation of a negative outcome (Benedetti, Lanotte, Lopiano, & Colloca, 2007). In other words, it involves a non-pharmacodynamic, noxious, unpleasant, and generally undesirable effect experienced by the person getting an inactive treatment (Data-Franco, & Berk, 2013). Effects of expectation and mind on pain experience is mesmerizing in both conditions of placebo and nocebo. In nocebo's extreme forms, it may lead to even death like in "voodoo death" phenomena (Cannon, 1942). Chen, Papakostas, & Youn (2011) looked at a study's data to check effects of expectation on improvement and they found that treatment type had no significant effect on clinical improvement while the interaction of the treatment and guess of the patients about receiving real treatment lead to improvement. Patients who were led to believe that they received placebo had small improvement independent from the actual treatment compared to those who guessed active medications.

Another example comes from World War II. Beecher (1956) compared civilian patients having pain requiring narcotics with war veterans having similar injuries at war. It was found that veterans wanted significantly less morphine for similar injuries than the civilians. Spiegel (1997, p. 616) commented on the study:

> Beecher's work addresses the reactive component to pain. When an injury was severe enough to save a man from life-threatening combat experience, but not so severe as to impair his function in civilian life, the wound was associated with freedom and survival. The same degree of injury in civilian life was not interpreted as a welcome pathway to survival but rather as an unexpected catastrophe, usually accompanied by anger at whomever or whatever was to blame. Reactive components can minimize or maximize pain sensations and thus are additive to the physical irritation. This was reflected in Beecher's study by measuring patient requests for morphine.

Similarly, people may have pain without sensory stimulation or they may experience an innoxious stimulus as painful. For example, in a pioneering study, Schweiger and Parducci (1981) told college students that a mild electric current would be given to their heads through an EEG cap, while they are playing a game to reduce possible headaches. There was no real electrical stimulation, but two-thirds of 34 students reported mild headaches. In a study by Johansen, Brox and Flaten (2003), participants' pain reports increased after injection of a saline solution which was believed to be a substance that would exacerbate the pain. Colloca, Sigaudo and Benedetti (2008) were able to turn a painless tactile stimulus into a painful one, and low intensity pain into high intensity pain with verbal suggestions and conditioning.

Moreover, Vögtle, Barke and Kröner-Herwig (2013) showed that even observational learning may play on a role in nocebo responses. They compared the responses of three groups; control, verbal suggestion, and social observational learning, to an ointment that was said to increase pain sensitivity. In observational learning condition, the participants were shown a video of a model expressing more

pain with application of the ointment and the participants' pain ratings were higher with ointment than without. In control and verbal suggestion conditions, the pain ratings were similar, independent of the application of the ointment. Interestingly, Jensen et al., (2012) conducted two experiments consisting thermal pain stimulus conditioned with two male faces showing that nocebo effect is evident when conditioned stimuli is presented both consciously (100 ms) and unconsciously (stimuli for 12 ms, followed by a visual mask for 84 ms). The participants responded to low pain temperature with high cue as if it was high pain temperature. Moreover, as demonstrated by the results of a meta-analysis involving 10 studies, the nocebo effect is found to have a moderate to large effect size (lowest $g = 0.62$ [0.24–1.01] and highest $g = 1.03$ [0.63–1.43]) (Petersen et al., 2014). Finally, two studies examined the relationship between personality characteristics of pessimism /optimism and placebo and nocebo effects. The results showed that pessimists are more likely to be affected by nocebo effect (Geers, Helfer, Kosbab, Weiland, & Landry, 2005) while, optimists are more likely to be affected by placebo effect (Geers, Kosbab, Helfer, Weiland, & Wellman, 2007).

Underlying biological and neurological mechanisms producing nocebo reactions have been widely studied. Several studies have stressed the role of cholecystokinin in nocebo hyperalgesia through anticipatory anxiety mechanisms (Benedetti, Amanzio, Casadio, Oliaro, & Maggi, 1997; Benedetti, Amanzio, Vighetti, & Asteggiano, 2006). Keltner et al. (2006) examined the effects of two types of expenctancy (high and low) on noxious stimulus via fMRI and found that the ipsilateral caudal, anterior cingulate cortex, the head of the caudate, cerebellum, and the contralateral nucleus cuneiformis (nCF) were activated distinctly. In anticipation of pain, different levels of activation were spotted at insula (Chua, Krams, Toni, Passingham, & Dolan 1999), the anterior cingulate cortex, the ventromedial prefrontal cortex, and the periaqueductal grey (Hsieh, Stone-Elander, & Ingvar, 1999). In summary, nocebo effect is an important concept having real consequences on experience of pain, and from a psychodynamic perspective, psychologically induced pain may provide a way of expiation from the guilt feelings.

1.7 Guilt Feelings

Guilt is considered a self-conscious emotion similar to shame. Self-conscious emotions are less universal than basic emotions such as anger, fear, disgust, sadness, happiness, and surprise, and their expressions and subjective experiences show variation based on culture (Eid & Diener, 2001; Kitayama, Markus, & Matsumoto, 1995). According to Cambridge English Dictionary, guilt means a feeling of worry or unhappiness about a wrong deed (Guilt, n.d.). While, shame refers to something that is disappointing and unsatisfactory (Shame, n.d.). Baumeister, Stillwell and Heatherton (1994, p. 245), described guilt as "individual's unpleasant emotional state associated with possible objections to his or her actions, inaction, circumstances, or intentions. Guilt is an aroused form of emotional distress that is distinct from fear and anger and based on the possibility that one may be in the wrong or that others may have such a perception." Although used interchangeably, guilt and shame can be differentiated based on specificity. Guilt is about a specific act; on the other hand, shame is attributed to the entire self (Baumeister, Stillwell, & Heatherton, 1994; Tangney, 1990). Yet, both feelings of shame and guilt generally signify a negative evaluation either by the self or others, because of failing to meet cultural or individual standards and norms (Wong & Tsai, 2007).

Even though guilt is considered an unpleasant affect, it may have benignant consequences in social relationships as it enables one to prioritize the concerns of others more than his or her own concerns (Haidt, 2003). Obviously, our thoughts, feelings, and behaviours are heavily affected by self-conscious emotions (Campos, 1995; Fischer & Tangney, 1995). For example, guilt feelings may be invoked to apologize for misdeeds, to express sympathy for someone, to discipline children, to manipulate people, to increase self-control, and to control various human behaviours (Baumeister, Stillwell, & Heatherton, 1994). Baumeister, Stillwell, &

Heatherton (1994) also stressed three social functions of guilt. First, guilt drives people to behave in ways that the communal norms suggest, it decreases frequency of interpersonal transgressions by punishing them, and it facilitates people to direct their attention to their partner and express positive feelings to them. Secondly, guilt can be used as tool to implement influence on people. For example, a person can make another person do something by inducing guilt on him or her. Finally, guilt may balance emotional distress in the relationships. Due to the transgression, one side has benefits, while victim suffers. By feeling guilty, the benefited side's enjoyment would be reduced and in return, the victim may feel better.

Being a negative emotion, guilt also drives us to do things that would alleviate it or lead to compensatory actions to repair social bonds. There are several studies showing how guilt feelings promote prosocial behaviors like donating to charities, cooperating in social bargaining games, and engaging in reparative actions (De Hooge, 2012; Basil, Ridgway, & Basil, 2006; De Hooge, Zeelenberg, & Breugelmans, 2007). Nelissen and Zeelenberg (2009) asked what happens if there is no compensatory action to implement in situations like breaking of an heirloom, forgetting an important anniversary, and post adultery violence. In these situations, guilt feelings remain, unless another way of relief such as self-punishment is found.

1.7.1 Guilt and Psychopathology

Guilt's associations with psychological disorders like depression and obsessive compulsive disorder are well known and documented. Harder, Cutler, & Rockart (1992) examined the relation between Symptom Checklist 90-Revised (Derogatis, 1993) and guilt and shame. Both feelings were moderately to strongly related to the all symptomatology represented by SCL-90-R. Hostility and paranoid ideation had mild to moderate correlations, while global severity, positive symptoms, depression, somatization, obsessive-compulsive, interpersonal sensitivity, anxiety, psychoticism and phobic anxiety yielded moderate to large association with guilt and shame. Shafran, Watkins, and Charman (1996) compared guilt feelings of people with

obsessive compulsive disorder with normal controls. It was found that people with obsessive compulsive disorder had more trait and state guilt than the control group, and guilt was a significant predictor of obsessive compulsive complaints.

Fergus, Valentiner, McGrath and Jencius, (2010) studied the relationship between primary anxiety disorders and guilt and shame proneness. They found that only social anxiety disorder and general anxiety disorder symptoms had a significant relationship with shame proneness and the concurrent change in shame proneness was also significantly related to changes in obsessive compulsive disorder, SAD and GAD symptoms. Post-traumatic stress disorder is another disorder in which guilt feelings are related to severity of the symptomology. It was found that severity of guilt about combat was positively associated with symptoms of re-experiencing, avoidance, and general measure of PTSD severity (Henning & Frueh, 1997) and guilt about combat actions and survivor guilt were significantly correlated with suicide attempts (Hendin & Haas, 1991) in samples of military veterans.

O'Connor, Berry, Weiss and Gilbert (2002) compared 50 hospitalized people with depression and 52 students in terms of survivors' guilt, omnipotent responsibility guilt, submissive behavior, fear of negative evaluation, fear of envy, empathic distress, and being lower in social comparisons. Depressed patients had significantly higher scores in all mentioned constructs. In terms of eating disorder symptomatology, Sanftner, Barlow, Marschall and Tangney (1995) found that shame proneness had small to moderate positive correlations with drive for thinness, bulimia, body dissatisfaction, ineffectiveness, interpersonal trust, lack of interoceptive awareness, asceticism, difficulties with impulse regulation, and social insecurity. On the other hand, guilt proneness showed small and negative correlations with these symptoms. In their study, Beck et al. (2011) showed that PTSD was significantly correlated with shame, guilt-related distress, and guilt-related cognitions, but not with global guilt in women experienced intimate partner violence.

In a cross cultural study, 100 Pakistani and 100 Austrian people with depression were compared. Guilt feelings were categorized as ethical feelings (experience of reproach for failing ethical values) and delusions of guilt (excessive and overrated sense of guilt in depression). The ethical feelings of guilt were evident in both cultures independent of age and sex (Stompe et al., 2002). Shapiro and Evelyn (2011) extensively reviewed studies on pathological guilt and obsessive compulsive disorder that involved PET scans, fMRI, interviews, and inventories. Although they acknowledged the significant relationship between pathological guilt and OCD, they warned that it is not completely possible to determine the causal relationship between increased guilt and OCD due to the correlational nature of studies.

Apart from pathological consequences, being guilty generally end up with a punishment of the authorities like parents or legal system of the society. Psychodynamically, internalizing such a link between guilt and punishment may turn into a need for the punishment, whenever guilt is present.

1.7.2 Guilt and The Need for Punishment

In addition to the wide range of ritualized self-punishment practices for sinful acts among many religions, several scientific studies supported the existence of the link between guilt and the need for punishment. Participants who wrote about their unethical behaviors of rejecting or ostracizing another person, both held their hand in cold water longer (longer pain duration) and rated their experience as more painful than participants in control group (Bastian & Fasoli, 2011). Moreover, their guilt feelings were significantly reduced after experiencing the pain. In another study, Nelissen (2012) reported that participants administered higher level electrical shocks to themselves when they were with someone whom they felt guilty about. Therefore, self-punishment may be a way of alleviating guilt feelings, if no other alternatives to compensate are available.

Psychoanalytic and psychodynamic approaches have conceptualized shame and guilt in psychopathology more elaborately than other theoretical approaches. (Tangney, Wagner, & Gramzow, 1992). Freud was one of the pioneer thinkers who deal with guilt feelings and their psychic and behavioural consequences (Blum, 2008). His first mention of guilt can be found in his work entitled *The defense neuro-psychoses* (Freud, 1912). He wrote about an obsessive girl who became doubtful that she actually did the bad acts she reads in the newspaper. Even though she acknowledged the absurdity of such obsessions; in time, she began to believe that she did them in real life. Later, in the analysis, Freud traced causes of these absurd guilty feelings to the girl's sexual relationship with a woman for several years involving masturbation. Here, the guilt can be understood as a strong motivator underlying obsessional symptoms' formation. In his seminal paper, The Ego and The Id, he (2003, p. 345-346) further contemplated on the relationship between guilt and illness:

> We finally come to realize that what is involved here is a 'moral' factor, so to speak: a guilt-feeling that finds its gratification in illness and refuses to forgo the punishment that suffering represents. Although this explanation is scarcely cheering, it is one that merits our unwavering support. However, this guilt-feeling remains entirely mute vis-à-vis the patient: it doesn't tell him he is guilty, and instead of feeling guilty, he feels ill.

Freud thought that guilt can disguise itself in the form of illness or physical symptoms. Moreover, Freud shared his observation of children about the need for punishment. In his essay, *Some Character Types Met with in Psycho-Analytic Work* (1957, pp. 333), he wrote: "With children it is easy to observe that they are often 'naughty' on purpose to provoke punishment, and are quiet and contented after they have been punished. Later analytic investigation can often put us on the track of the guilty feeling which induced them to seek punishment.". He clearly stated that the guilt feelings may lead children to behave in a way that would elicit punishment. According to Freud, a more systematic conceptualization of guilt comes after the emergence of superego.

In terms of intrapsychic conflicts, guilt becomes a tool for superego to modulate ego (Baumeister, Stillwell & Heatherton, 1994). Superego is a societal agent comprising cultural norms and values, in other words, the representative of civilization within. In *Civilization and Its Discontents* (2010, p. 86), Freud wrote about the conflict between humans and civilization:

> The tension between the harsh superego and the ego that is subjected to it, is called by us the sense of guilt; it expresses itself as a need for punishment. Civilization, therefore, obtains mastery over the individual's dangerous desire for aggression by weakening and disarming it and by setting up an agency within him to watch over it, like a garrison in a conquered city.

Here, Freud considered the sense of guilt as one's own aggression turned from outside world towards the self as a success of civilization, which enables people to cooperate without conflict.

Yet, do we feel guilty only when we do something wrong? Freud was dissatisfied with a simple yes answer to this question and he stated (2010, p. 86):

> As to the origin of the sense of guilt, the analyst has different views from other psychologists; but even he does not find it easy to give an account of it. To begin with, if we ask how a person comes to have a sense of guilt, we arrive at an answer which cannot be disputed: a person feels guilty (devout people would say 'sinful') when he has done something which he knows to be 'bad.' But then we notice how little this answer tells us. Perhaps, after some hesitation, we shall add that even when a person has not actually done the bad thing but has only recognized in himself an intention to do it, he may regard himself as guilty; and the question then arises of why the intention is regarded as equal to the deed.

According to Freud, being aware of the intention of a wrong act may be enough for one to feel guilty. Moreover, in psychoanalytic literature, guilt feelings may be regarded as resistance and unconscious guilt can make people think they don't

deserve getting help (Bush, 2005), which contributes to the maintenance of symptoms. From a behavioral perspective, Cooper (1992) asserted that classically and operantly conditioned associations may involve affections. For example, guilt may be a stimulus that a person wants to get rid of. During the experience of guilt, if pain experience occurs (physically or psychogenically) and is regarded (consciously or unconsciously) as punishment, it becomes a response to guilty feelings. Due to the relationship between guilt, physical pain, and punishment, then, pain punishment would lead to relief from guilty feelings, the relief would become the outcome, and therefore, this pattern may be reinforced. So in case of chronic pain, one can utilize the pain experience to deal with guilt feelings arising from unexpressed aggressive and sexual feelings towards others.

In summary, the process underlying anger suppression and chronic pain may also be applicable to guilt feelings evoked by aggression, as Engel (1959) mentioned. Similarly, Freud considered guilt feelings as self-directed aggression. In other words, aggression becomes transformed and finds its expression as guilt feelings. For example, when one gets angry towards a loved one or an authority figure, it is more likely that the aggression would evoke guilt feelings. In this case, the expression of aggression is detrimental to object relations and it may be repressed, suppressed, or dealt with other defense mechanisms in the psychodynamic sense. Consequently, the person may not feel guilty, but he or she may express it as a somatic symptom, as pain in one's own body. Thus, there may be several ways aggression and guilt interact and produce pain symptoms. In cases of some medically unexplained pain symptoms, initiation of psychogenic pain or transformation of acute physical pain into chronic pain may be a way of expiation for conscious and unconscious guilt for sexual or aggressive feelings as suggested by psychodynamic theorists (Freud, Breuer, & Strachey, 1955; Engel, 1959). In this study, the effects of personal guilt feelings on psychogenic pain experience and the effects of pain experience on guilt feelings were examined.

1.8 Present Study

The aim of the present study was to test whether guilt feelings can increase the likelihood of reporting pain and severity of subjective pain reports (through mechanism of punishment for guilt) in a nocebo manipulation and whether guilt feelings alleviate after experiencing nocebo pain. Nocebo pain induction was selected to evoke pain, because it was found in various studies that it can produce psychogenic pain sensation without any noxious stimulation. Current literature has focused on correlations between chronic pain and various variables, such as psychopathology or dominant affective states (Burns, Quartana, & Bruehl, 2008; Dersh, Polatin, & Gatchel, 2002; Gatchel, Peng, Peters, Fuchs, & Turks, 2007). Due to the nature of previous studies, it is not possible to determine a robust causal relation between such variables and chronic pain problems, even if clinical observation frequently suggests such links. Therefore, examining effects of guilt on psychogenic pain experience in experimental settings may contribute to theoretical understanding of the relationship between guilt and pain.

1.9 Hypotheses

1. Guilt feelings will facilitate experiencing nocebo pain (because of seeking punishment). Significantly more participants who were asked to write a past guilt-inducing experience will report experiencing nocebo pain compared to participants who were asked to write about a neutral experience.

2. Guilt feelings will exacerbate magnitude of pain reports (because of seeking pain). Participants who were asked to write a past guilt-inducing experience will report higher levels of pain in nocebo compared to those participants who write about a neutral experience.

3. Guilt feelings of participants who were asked to write a past guilt-inducing experience will decrease after experiencing the nocebo pain.

CHAPTER 2

METHOD

2.1 Participants and Design

The study sample was comprised of 100 students from Middle East Technical University who were invited to participate in the study via departmental online subject pool system. In return of the participation, they got bonus points for their courses. Demographic characteristics the participants can be seen in Table 1. There were 78 female (78 %) and 22 male (22 %) participants with ages ranging between 18 and 33 (M = 21.67, SD = 1.92). 74 of the participants (74 %) were psychology undergraduate students and 26 of the participants (26 %) were undergraduates from various departments in METU. In terms of semesters; 18 the of participants (18,2 %) were freshman, 22 of the participants (22,2 %) were sophomore, 39 of the participant (39,2 %) were junior, 20 of the participants (20,2 %) were senior and one participant's semester info was missing. 94 of the participants (94.9 %) were from medium SES, 4 of the participants (4 %) were low SES, a participant (1 %) was from high SES, and a participant's SES info was missing.

The design of the study was 2 x 2 independent groups design. There were two independent variables (guilt and nocebo), two dependent variables (pain ratings and pre-post manipulation guilt scores). Each of four experimental groups had 25 participants (see Table 1). The participants were assigned to four conditions non-randomly.

Table 1.

Table showing four conditions of the study

		Guilt Induction	
		Guilt Induction	No Guilt Induction
Nocebo Manipulation	Nocebo Manipulation	$N = 25$	$N = 25$
	No Nocebo Manipulation	$N = 25$	$N = 25$

Table 2

Demographic Characteristics of the Participants (N = 100)

Variables	Frequency (%)	Mean(*SD*)
Age		21.67(1.92)
Missing	10 (10%)	
Gender		
Female	78 (78 %)	
Male	22 (22 %)	
Department		
Biology	1 (1%)	
Business Administration	1 (1%)	
Chemistry	1 (1%)	
Computer Engineering	1 (1%)	
Electrical Engineering	1 (1%)	
Foreign Languages	1 (1%)	
Industrial Engineering	3 (3 %)	
Geological Engineer	1 (1%)	
METE	2 (2%)	
Mechanical Engineering	2 (2%)	
Molecular Biology and Genetics	4 (4 %)	
Philosophy	2 (2%)	
Physics	1 (1%)	
Politics	2 (2%)	
Psychology	74 (74.7 %)	
Statistics	2 (2%)	
Missing	1	
Semester		
Freshman	18 (18,2 %)	
Sophomore	22 (22,2 %)	
Junior	39 (39,2 %)	
Senior	20 (20,2 %)	
Missing	1	
SES		
Low	94 (94.9 %)	
Medium	4 (4%)	
High	1 (1 %)	
Missing	1	

2.2 Instruments

2.2.1 Informed Consent Form. A form of consent explaining about the researchers, procedures, and disguised aim of the study was used (see Appendix A).

2.2.2 Demographics Form. A basic demographics form consisting questions about age, sex, educational status, occupation, socio-economical was used (see Appendix B).

2.2.3 EEG Cap. An EEG cap (CAPSOLAA20) by SPES MEDICA was used to make participants believe that they received mild electrical current to their head. An usb cable connected to the cap interface was inserted directly to the computer.

2.2.4 Memory Instructions. Cougle, Goetz, Hawkins and Fitch's (2012) instructions for inducing guilt were translated to Turkish. Accordingly, the participants were asked to describe a recent event that currently evoked guilt feelings in as much affective and behavioral detail as possible (see Appendix C). In neutral condition, the participants were asked to describe a recent event consisting their daily encounter with a friend (see Appendix D).

2.2.5 Inquisit 5. Inquisit 5 is a commonly used psychology experimentation program developed by Millisecond software. Instructions about the task, nocebo manipulations and Time-Wall Estimation task was shown to the participants via Inquisit 5.

2.2.6 Visual Nocebo and No Nocebo Instructions. A visual statement explaining pain procedure was shown to the participants on the computer. It told the participants that they would wear an EEG cap which gives some amount of electrical current to their head, this is a procedure used in the literature to induce headache, the headache is harmless and it disappears as the cap is taken off, the participants can stop the procedure anytime they want (see Appendix E). In no

nocebo condition, the participants were told that EEG cap only measures brain waves (see Appendix F).

2.2.7 Nocebo Inducing Video. A 134 seconds long video, in which a confederate plays a participant role was recorded in the lab. The angle of video was from sagittal plane, both showing the computer monitor and the face of the confederate. The confederate randomly touches his head and winces as if he has headache.

2.2.8 Time-Wall Estimation Task. It is a cognitive assessment tool. In the task, the participants were asked to estimate the location of a circle moving from the top of the screen to the bottom of it. When the circle reaches half way through the screen, the circle becomes invisible behind a blue wall. The blue wall has a grey circle que. The participants decide when the circle will fit exactly to grey circle que by clicking a button. There were 30 trails of the task and the procedure lasted approximately 5 minutes. The estimation task was used to distract the participants after nocebo manipulation.

2.2.9 PANAS. Positive and Negative Affect Scale was developed by Watson, Clark and Tellegen (1988) in order to measure positive and negative affective states. The scale has 10 positive (enthusiastic, interested, determined, excited, inspired, alert, active, strong, proud, attentive) and 10 negative affect items (scared, afraid, upset, distressed, jittery, nervous, ashamed, guilty, irritable, hostile). The scale involves 5-point Likert-type items and response anchors are 1 (very slightly or not at all), 2 (a little), 3 (moderately), 4 (quite a bit), and 5 (extremely). Turkish adaptation of the scales was done by Gençöz (2000). The internal consistencies of the sub-scales were .83 and .86 respectively for negative affect and positive affect. The criterion related validity of the scale was assessed with Beck Depression Inventory and Beck Anxiety Inventory. The correlations for positive affect were -.48 and -.22 and the correlations for negative affect were .51 and .47 with depression and anxiety respectively. The scale was used as a manipulation check to measure guilt feelings before and after guilt induction. Only the score for

the guilt item was used for this purpose (see Appendix G). The Cronbach's alpha in the current study was .71 for pre-manipulation PANAS and .79 for post-manipulation PANAS.

2.2.10 Visual Pain Scale. A basic visual pain scale consisting of a response format ranging from 0 to 10 was used to assess subjective pain reports of the participants. Zero indicates *no pain*, while 10 means *unbearable pain* experience (see Appendix H).

2.3 Procedure

The study was ethically approved by Research Center for Applied Ethics in Middle East Technical University, before data collection. The participants were met by the experimenter and they were asked to fill out informed consent and demographics forms. In informed consent form, the participants were told that the study is about effects of pain and memories on hand-eye coordination. Afterwards, they were asked to write about either a memory that involves guilt or a neutral memory consisting their daily interactions with other people. Then, PANAS was given to check whether guilt manipulation works. Later, they were asked to complete a visual task on the computer. Participants in the nocebo group received a visual statement and a verbal statement from the experimenters that EEG cap would give electric current to their head, and watched a video in which a confederate with EEG cap looks like having pain during the procedure. No nocebo group received a neutral statement that EEG cap measures brain waves and no electricity was given to the head. No nocebo group participants did not watch a video. During the task, the experimenter played a mild electricity sound on the computer as if it comes from the EEG device. After completing the time wall estimation task, the participants were asked to show how much pain they felt during the procedure on a virtual pain scale. When, they reported pain on the scale (any response different from 0), they were verbally asked about type, location and description of experience pain. Afterwards, PANAS forms were given again to check whether guilt scores drop after having or not having pain. Finally, the participants received the

debriefing form explaining the aim of the study partially as measuring the effects of guilt feelings and physical pain on pain perception. At the completion of the study the participants were not informed that the EEG cap did not actually induce electricity, in order to prevent them sharing this information with prospective participants. Once all the data were collected, the participants were contacted via e-mail and provided with a complete explanation of the study's procedures.

CHAPTER 3

RESULTS

In this chapter, the main findings of the study are presented. Statistical analyses revealed effects of manipulations, but no significant interactions and increased likelihood of pain report frequency due to guilt manipulation.

3.1 Data Transformation and Cleaning

Examining outliers group by group revealed that there were five scores exceeding z-score of 3. In Guilt-Nocebo condition, there was a participant with 3.374 z-score of pain. In No Guilt-Nocebo condition, there was a participant with 3.119 z-score of post-manipulation guilt and a participant with 3.273 z-score of pain. Finally, in No Guilt-No Nocebo condition, there was a participant with 3.524 z-score of pain and a participant with 3.690 z-score of post-manipulation guilt. These participants were kept, because, there were no extreme deviations of z-scores and Mahalanobis distance scores indicated no multivariate outliers for three dependent variables. Pain ratings across all groups were distributed non-normally with a kurtosis of 3.518 (*SE* = .241), and skewness of 1.656 (*SE* = .478). There was a substantially high number of zero values in pain report. Therefore, square root transformation was conducted on the pain ratings (see Table 3) (Mayers, 2013; Manikandan, 2010). Moreover, square root transformation yielded better skewness value than logarithmic transformation. Presented data were not back transformed, because, there were only slight differences between non-transformed and transformed values. There were no missing values for any of the dependent variables.

Table 3

Descriptive Statistics of Dependent Variables

	Pre-Manipulation Guilt	Pain	Sqrt-Pain	Log10-Pain	Post-Manipulation Guilt
Mean	2.540	1.090	.7512	0.2467	1.780
Median	2.000	1.000	1.000	0.3010	1.000
Mode	1.000	.000	.000	0.000	1.000
Std. Deviation	1.473	1.334	.729	0.2471	1.001
Variance	2.170	1.780	.5309	0.06105	1.002
Skewness	.355	1.656	.296	0.4476	1.260
Std. Error of Skewness	.241	.241	.241	0.2414	.241
Kurtosis	-1.385	3.518	-1.121	-0.9106	1.045
Std. Error of Kurtosis	.478	.478	.478	0.4783	.478
Range	4.000	6.000	2.449	0.8451	4.000

3.2 Correlations Between the Variables

Correlation between square root of pain ratings, Pre-Post Manipulation guilt ratings can be seen at Table 3.

Table 4

Pearson Correlation Matrix of The Variables

	Sqrt-Pain	Pre-Manipulation Guilt	Post-Manipulation Guilt
Pain	—	.033	.121
Pre-Guilt		—	.664*
Post-Guilt			—

*p < .001

3.3 Manipulation Check for Guilt Induction

In order to check whether guilt induction through writing memories has an effect on guilt scores, an independent t-test was conducted between guilt and no guilt conditions of pre-manipulation guilt scores. It was found that guilt scores were significantly higher for the participants who wrote guilt inducing experiences (M = 3.520, SD = 1.129) than for the participants who wrote daily interaction experiences (M = 1.560, SD = 1.072), $t(98) = -8.901$, $p < .001$, 95% CI [-2.397, -1.523] (see Table 5 and 6). This represented a very strong effect, $d = -1.780$. The guilt manipulation had a significant effect on participants' guilt ratings.

Table 5
Descriptives for Guilt Conditions

	Group	N	Mean	SD	SE
Guilt	1	50	1.560	1.072	.152
	2	50	3.520	1.129	.160

Table 6
The Results of Independent Samples T-Test for Guilt Conditions

							95% Confidence Interval	
	t	df	p	Mean Difference	SE Difference	Cohen's d	Lower	Upper
Guilt	-8.901	98	<.001	-1.960	.220	-1.780	-2.397	-1.523

3.4 Manipulation Check for Nocebo Induction

To test whether nocebo induction had an effect on pain ratings, an independent t-test was conducted on nocebo and no nocebo conditions of pain ratings. It was found that pain ratings were significantly higher for the participants who were exposed to nocebo manipulation ($M = 0.925$, $SD = 0.717$) than for the participants who were not exposed to nocebo manipulation ($M = 0.577$, $SD = 0.705$), $t(98) = -2.446$, $p = .016$, 95% CI [-.629, -.066] (see Table 7 and 8). This represented a moderate effect, $d = -.489$. The nocebo manipulation had a significant effect on pain ratings of the participants.

Table 7
Descriptives for Nocebo Conditions

	Group	N	Mean	SD	SE
Sqrt-Pain	1	50	.577	.704	.100
	2	50	.924	.716	.101

Table 8
The Results of Independent Samples T-Test for Nocebo Conditions

							95% Confidence Interval	
	t	df	p	Mean Difference	SE Difference	Cohen's d	Lower	Upper
Sqrt-Pain	-2.446	98	.016	-.347	.142	-.489	-.629	-.066

3.5 General Results

3.5.1 The Likelihood of Experiencing Pain in Guilt Condition

It was hypothesized that more number of participants who were asked to write a past guilt-inducing experience would report experiencing some level of pain than the number of participants who were asked to write about daily activities. In order to assess the likelihood of pain report, Chi Square analysis was conducted. It was found that there was no significant difference between the number of participants who were asked to write a past guilt-inducing experience and participants who were asked to write about a daily interaction experience in terms of reporting some level of pain, χ^2 (1) = 3.309, p = .069, φ = .257 (see Table 9 and 10). Hypothesis about seeking punishment was not supported; because, there was no significant difference in frequency of reporting pain between guilt and no guilt conditions.

Table 9
Contingency Tables For Nocebo Induction Condition

	Pain Frequency		Total
Guilt	0	1	
1	5	20	25
2	11	14	25
Total	16	34	50

Table 10
The Results of Chi-Squared Test

	Value	df	p	Phi-coefficient
χ^2	3.309	1	.069	.257
N	50			

3.5.2 The Effects of Nocebo and Guilt on Pain Ratings

It was hypothesized that the participants who were asked to write a past guilt-inducing experience will report higher levels of pain in nocebo condition compared to those participants who were asked to write about a neutral experience. In other words, a significant interaction effect of guilt and nocebo on pain ratings was expected. Two (Nocebo, No-Nocebo) x Two (Guilt, No-Guilt) Independent groups ANOVA was conducted to examine the interaction. Only the main effect of nocebo was significant, F (1, 96) = 6.003, p = .016, $\eta\rho^2$ = .0059 (see Table 11, 12 and 13). Hypothesis about seeking pain was not supported; because, there was no significant interaction between guilt and nocebo and the guilty participants in nocebo induction condition didn't have the highest pain ratings (see Figure 4).

Table 11
Descriptives for Main Effects of Guilt and Nocebo Conditions on Square Root of Pain Ratings

		G.Mean	SE	Lower CI	Upper CI	N
Guilt	1	.820	.100	.621	1.020	50
	2	.682	.100	.483	.881	50
Nocebo	1	.577	.100	.378	.777	50
	2	.925	.100	.726	1.125	50

Table 12
Descriptives for Interaction of Guilt and Nocebo Conditions on Square Root of Pain Ratings

Guilt	Nocebo	Mean	SE	Lower CI	Upper CI	N
1	1	.566	.142	.284	.848	25
	2	1.075	.142	.793	1.356	25
2	1	.588	.142	.306	.870	25
	2	.776	.142	.494	1.058	25

Table 13
The Results of ANOVA for Effects of Guilt and Nocebo Conditions on Square Root of Pain Ratings

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Guilt	.478	1	.478	.948	.333	.010
Nocebo	3.027	1	3.027	6.003	.016	.059
Guilt*Nocebo	.642	1	.642	1.274	.262	.013
Residual	48.415	96	.504			

Figure 4. Pain ratings as a function of nocebo and guilt conditions

3.5.3 The Effects of Nocebo and Time on Guilt Feelings

It was hypothesized that guilt feelings of the participants who were asked to write a past guilt-inducing experience would decrease after having nocebo pain. In other words, there would be an interaction between time 1, time 2 and nocebo, no-nocebo conditions on guilt scores. Two (Nocebo, No-Nocebo) x two (Pre-manipulation Guilt Scores, Post-manipulation Guilt Scores) Mixed ANOVA with repeated measures on last factor was conducted. Only the main effect of pre-post manipulation guilt was significant, F (1, 48) = 82.189, $p < .001$, $\eta\rho^2 = .631$ (see Table 14, 15, 16 and 17). Hypothesis about expiation through pain was not supported; because, there was no significant interaction effect and the guilty participants in nocebo induction condition didn't have the lowest guilt scores (see Figure 5)

Table 14
Descriptives for Main Effects of Pre-Post Manipulation Guilt and Nocebo Conditions

	Condition	G.Mean	SE	Lower CI	Upper CI	N
Time	1	3.520	.161	3.196	3.844	50
	2	2.200	.147	1.905	2.495	50
Nocebo	1	2.940	.192	2.554	3.326	50
	2	2.780	.192	2.394	3.166	50

Table 15
Descriptives for Interaction between Pre-Post Manipulation Guilt and Nocebo Conditions

Time	Nocebo	Mean	SE	Lower CI	Upper CI	N
Pre	1	3.600	.228	3.142	4.058	25
	2	3.440	.228	2.982	3.898	25
Post	1	2.280	.208	1.863	2.697	25
	2	2.120	.208	1.703	2.537	25

Table 16
The Results of Repeated Measures ANOVA for Main Effect of Pre-Post Manipulation Guilt and Interaction of Pre-Post Manipulation Guilt and Nocebo

	Sum of Squares	df	Mean Square	F	p	η^2_p
Pre-Post Manipulation Guilt	43.560	1	43.560	82.189	< .001	0.631
Pre-Post Manipulation Guilt * Nocebo	4.333e -32	1	4.333e -32	8.176e -32	1.000	.000
Residual	25.440	48	.530			

Table 17
The Results of ANOVA for Main Effect of Nocebo

	Sum of Squares	df	Mean Square	F	p	η^2_p
Nocebo	.640	1	.640	.348	.558	.007
Residual	88.400	48	1.842			

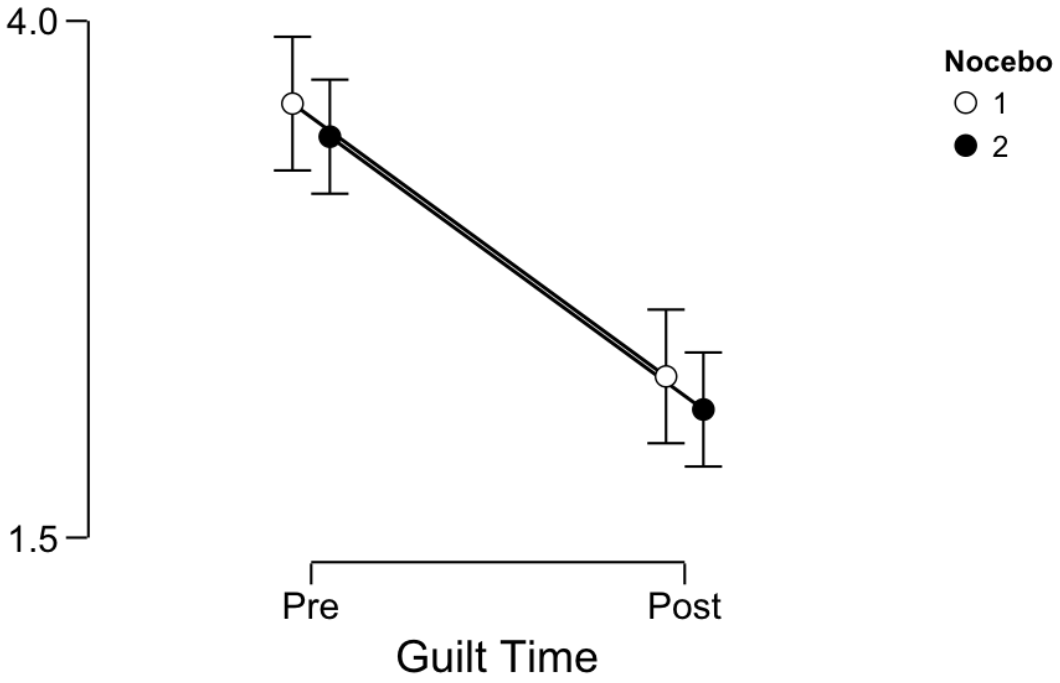

Figure 5. Guilt scores as a function of nocebo and pre-post manipulation guilt conditions

CHAPTER 4

DISCUSSION

4.1. Overview

There were three main predictions of the study. First, it was expected that more number of guilty participants would experience some level of nocebo pain compared to not guilty participants to punish themselves. Second, the guilty participants would experience higher levels of nocebo pain compared to not guilty participants. Finally, it was expected that guilty participants' guilt feelings would decrease after experiencing nocebo pain. The results revealed significant main effects for pre/post manipulation guilt and nocebo conditions, but no significant interaction effects supporting the hypotheses and increased likelihood of pain report frequency due to guilt manipulation.

4.2 Nocebo pain induction without any physical stimulation

Despite moderate to large effect sizes for the nocebo studies (Petersen et al., 2014), majority of the previous studies included physical stimulation to create nocebo effect. The only report of nocebo pain induction without any physical stimulation comes from Schweiger and Parducci's study (1981). In their study, two-thirds of the participants reported mild pain after weak and strong nocebo manipulations. The researchers prepared a realistic environment that included a shock inducer, power supply, oxygen tank, noise generator, amplifier, polygraph, brightness comparator consisting of a luminous disc with a concentric surrounding ring, and a dental chair (Schweiger & Parducci, 1981). All these instruments apparently increased suggestibility (Spiegel, 1997) and anxiety (Benedetti, Amanzio, Casadio, Oliaro, &

Maggi, 1997; Benedetti, Amanzio, Vighetti, & Asteggiano, 2006), which are underlying mechanisms for nocebo. There were no decorative materials except for an EEG cap and a computer in the present study, yet the nocebo effect could still be created without any physical stimulation.

One possible explanation about successful nocebo manipulation could be demand characteristics (McCambridge, De Bruin, & Witton, 2012), which means the participants behave in ways to satisfy expectations of the researchers. Yet in the current study, if the participants reported any level of pain, they were asked to define their pain and its location. Some participants even changed their response to no pain after they had been asked about the specific location o the pain. This procedure may have prevented reporting of pain due to demand characteristics.

4.3 The Likelihood of Experiencing Pain in Guilt Induction and The Effects of Nocebo and Guilt on Pain Ratings

The first hypothesis was that more number of participants who were asked to write a past guilt-inducing experience would report experiencing some level of pain in nocebo condition than the number of participants who were not asked to write a past guilt inducing experience. The hypothesis was not supported. Previous guilt induction did not significantly increase the frequency of reporting pain in nocebo condition. Therefore, it cannot be concluded that the participants seek punishment for their guilt feelings through nocebo pain.

Second hypothesis was that the participants who were asked to write a past guilt-inducing experience would report higher levels of pain in nocebo induction compared to those participants who wrote about a neutral experience. In other words, participants who wrote about past guilt inducing memories were expected to punish themselves by exacerbating their nocebo pain response. However, this hypothesis was not supported either. Nonetheless, even though the difference was

not significant, the pain ratings of participants who were in the guilt group was lower than the pain ratings of participants who were in no guilt group.

Contrary to the present findings, Bastian, Jetten, & Fasoli (2011) found that experiencing physical pain in cold pressor alleviated guilt feelings of the participants induced by writing a memory in which they were socially excluded by another person. Moreover, guilty participants rated their pain as higher than controls. Several possible explanations for this contradiction can be proposed. First of all, in the present study the guilt induction was done by asking participants to write a memory that they still feel guilty about. However, the context of the guilty act was not fixed. Their expected redemption may be something other than experiencing physical pain, like an eye for an eye approach in the context of the guilty act. Physical pain may be a punishment for socially excluding someone (Bastian, Jetten, & Fasoli, 2011), but may not lead to expiation for all types of guilty acts.

Second, previous studies revealed that emotional manipulations such as reading emotionally charged texts, listening to music, and looking at emotional pictures tend to modulate unpleasantness more than pain sensation, whereas attention affects both pain sensation and unpleasantness (Villemure & Bushnell, 2002). In other words, emotional manipulation during pain experience may not affect reported pain sensation, but may affect the degree of unpleasantness reported. On the other hand, shifting attention can alter both reported pain sensation and unpleasantness experienced. In terms of attention, it was found that focusing on another visual stimulus during experiencing pain reduced both perceived intensity and unpleasantness of the pain (Miron, Duncan, & Bushnell, 1989). Rhudy, & Meagher (2001) suggested that positive and negative emotions with high arousal (fear) lead to pain inhibition, while negative emotions with low arousal (anxiety) cause pain facilitation. In the current study, arousal induced by guilt manipulation was not controlled. Yet, it is more likely that it was a low arousal emotional induction. Therefore, it was expected that low arousal guilt would lead to pain facilitation.

However, in the current study, guilt induction seemed to have an inhibition effect on pain ratings.

Third, De Wall and Baumeister (2006) found that social exclusion leads to higher pain threshold and tolerance in physical pressure application procedure. This effect is called emotional numbness in which social exclusion leads to emotional and physical insensitivity by impairing functioning of the emotional system; because, emotional and physical pain experiences share same physiological mechanisms (MacDonald, & Leary, 2005). Baumeister, Stillwell and Heatherton (1994) asserted that guilt may be a form of anxiety resulting from threat of social exclusion. Combining that with guilt's beneficial effects on social relations, we may assume that guilt primes social exclusion. As mentioned before, self-conscious emotions like shame and guilt may signal a negative evaluation by others; because, one fails to meet cultural standards and norms. (Wong & Tsai, 2007). Therefore, guilt can be considered as a social emotion and inhibiting effect of guilt on pain ratings may be come from emotional numbness.

Fourth, Eisenberger, Lieberman, and Williams (2003) examined neural correlates of social exclusion and found anterior cingulate cortex (ACC) activation during social exclusion. ACC is also activated during experiencing physical pain (Foltz & White, 1962) and it is related to affective aspects of pain (Rainville, Duncan, Price, Carrier, & Bushnell, 1997). Interestingly, the patients having cingulotomies (surgical excision of some parts of ACC) for chronic pain complaints continued to feel physical pain, but they were not disturbed by it (Foltz & White, 1968). In addition, neuroscience studies about guilt feelings similarly suggested that ACC may be a guilt-processing unit in a wider neural network (Jnkowski & Takahashi, 2014) and nocebo pain expectations activate ACC (Hsieh, Stone-Elander, & Ingvar, 1999, Keltner et al., 2006). ACC seems to be an intersection area for social pain, physical pain, guilt, and nocebo. Eisenberger and Lieberman (2004) proposed that both physical and social pain may share the same neural circuitry and computational mechanisms. Therefore, it can be asserted that conscious experience of guilt

feelings activates ACC like physical pain activates it, and thus, simultaneous experience of physical pain is inhibited; because, guilt feeling is experienced as an inner unpleasantness and it overrides the unpleasantness of nocebo pain. This may also make the participants less likely to report nocebo manipulation as a pain sensation, because, the affective aspect of the pain is absent. On the other hand, unconscious guilt would not activate ACC and thus, unpleasantness of guilt would be absent. Under such circumstances, guilt may be experienced as physical pain due to shared neural circuitry. In addition, suppression or repression of guilt may produce an effect on ACC and leads to exacerbated physical pain symptoms.

Finally, in the present study, verbal instructions regarding nocebo condition included a statement that the pain would be harmless. This may have had an inhibiting effect on anticipatory anxiety and successive nocebo pain ratings.

4.4 The Effects of Nocebo and Time on Guilt Feelings

Third hypothesis was that guilt feelings of the participants who were asked to write a past guilt-inducing experience will decrease after having nocebo pain. In other words, experiencing nocebo pain would be an expiation for the guilt feelings and their guilt feelings would consequently decrease. However, the hypothesis was not supported by the results. The results suggested that guilt of the participants in both the nocebo and the no-nocebo conditions decreased from pre-manipulation to post-manipulation, possibly due to the effect of time. The standard procedures in the present study, such as Time-Wall Estimation Task may also have contributed to this effect. The task was easy to complete and as a result, it may have increased self-esteem of the participants. In a study examining relationship between proneness to guilt, self-esteem, and other variables, it was found that the correlation between proneness to guilt and self-esteem is -.51 (Strelan, 2007). Therefore, the guilt feelings may have decreased due to increased self-esteem.

Moreover, writing about a guilt inducing experience with affective details may serve as an expressive writing task (Pennebaker, 1997). It was repeatedly found that disclosing an emotional experience by writing or telling it may reduce felt distress later in time. Thus, writing about a guilt inducing experience with affective details may decrease guilt feelings of the participants in post-manipulation guilt measurement.

Finally, although, there was a significant nocebo manipulation, it may have been too mild to be effective or experienced as a punishment, because, mean pain rating of the participants who reported pain was only 1.946 (on a 0-10 point scale). Schweiger and Parducci (1981) reported that in their study the mean pain ratings of the participants in the weak nocebo group was 14.5 (on a 0-100 point scale) and the ratings of the participants in the strong nocebo group was 16.3. Moreover, although Bastian, Jetten and Fasoli (2011) found that physical pain can alleviate effects of guilt, they physically induced pain by a cold pressor. The authors reported that the mean pain rating for pain condition was 2.79 (on a 0-5 point scale). In summary, experienced pain was substantially higher in cold pressor, which may have had a stronger effect on guilt feelings compared to the present study.

4.5 Limitations of the study and suggestions for further studies

The study had several important limitations. First one is the achieved statistical power of the study. Based on power calculations, in order to detect an interaction effect with .80 statistical power a sample size of at least 180 participants was needed. Post-hoc power analysis was conducted via G*Power software. It was found that sample size of 100 participants achieved 0.52 statistical power. Low power leads to detrimental consequences such as higher chance of committing type two error, low positive predictive power, and exaggerated estimate of the effect magnitude (Button et al., 2013). It is strongly suggested that further studies meet required sample size for .80 statistical power.

Second, the study lacked random sampling and random assignment. Although, the results were non-significant, no causal inferences can be made between independent and dependent variables. Further studies can utilize random sampling and random assignment of the participants.

Third, the participants in no nocebo group did not watched a video with neutral content. Further studies can include such video to control any effect of watching a video.

Fourth, the study may have lacked an anxiety-provoking experimental environment as described by Schweiger, & Parducci (1981). This can be important, especially because nocebo manipulation did not consist of any physical stimulation. Needless to say, EEG devices are not designed to give electricity to the head. A real device designed for such purposes, such as Transcranial direct current stimulation device (tDCS), could have been used. It would have been more credible and may have provoked more anticipation anxiety. There are no standard environmental settings or materials to induce nocebo effects; but, further studies can pay attention to characteristics of the environment in which the experiment is conducted and materials used for nocebo manipulation.

Fifth, Guilt feelings were induced through consciously activated autobiographical memories. There are several other ways of inducing guilt in more experiential and disguised ways (Rebega, Apostol, Benga, & Miclea, 2013). For example, the participants can play a game to win tickets for both themselves and their teammates. In the first round, they win a ticket for themselves and they are given positive feedback about their performance. However, in second round, they fail to win ticket for their teammate regardless of their own performance (Katelaar & Au, 2003). This procedure may be a way to create guilt in a more subtle way. In addition, despite being consciously activated, the participants can be asked to suppress their feelings before nocebo manipulation (Burns, Quartana, & Bruehl, 2008; Wenzlaff & Wegner, 2000). Further studies may apply more subtle ways of inducing guilt or

they may examine effects of unconscious guilt on nocebo pain responses throughout suppression.

Sixth, majority of the participants were from psychology department. Despite the deception about the aim of the study, they may have been less likely to believe that they would receive electricity from an EEG cap. During undergraduate education, they learn about many experimental deception procedures. Their anxiety level may have been lowered due to this situation. In addition, they were a non-clinical sample. Clinical chronic pain samples consisting of pain prone patients, as defined by Engel (1959), can reveal intriguing results. Future studies may involve participants from non-psychology departments or clinical populations to overcome such shortcomings.

Seventh, duration of Time-Wall Estimation Task (4 minutes 50) may have been insufficient for some participants to develop nocebo pain responses. During verbal feedbacks, some participants reported that the pain developed towards the end of Time-Wall Estimation Task. Further studies may include longer procedures to ensure emergence of nocebo effects.

Finally, the effects of guilt on physical pain or vice versa can be studied with a procedure where pain and guilt are induced simultaneously. This might be a better way to understand the reciprocal relationship between guilt and pain. In future studies, guilt can be induced while the participants are experiencing physical pain rather than using a consecutive procedure as the current study employed.

4.6 The implications of the study

Despite non-significant results and low statistical power, several implications of the study can be suggested. First of all, it was shown once more that mild physical pain can be psychologically induced without any physical stimulation. It can be proposed that the mind is able to have a physical impact on the body because of

anticipation anxiety. Therefore, nocebo phenomena may partially explain non-organic somatic complaints of clients. For example, hypochondriasis could stem from the nocebo effect. The patients' anticipation about having an organic illness on some part of the body can really conceive somatic sensations via anticipation anxiety. And later, these sensations may be interpreted as serious signs of an illness by the patients. Therefore, such anticipations or expectations can be cognitively challenged in therapeutic settings.

Second, consciously experiencing guilt may have an inhibiting effect on sensing physical pain or vice versa. Underlying mechanisms for such an effect is not clear; but, emotional numbness phenomena (DeWall & Baumeister, 2006) or effect conscious guilt on unpleasantness of physical pain may be one of the mechanisms. Hypothetically, unconscious or suppressed guilt feelings may exacerbate experiencing physical pain and they may be a mechanism behind chronic pain complaints. Therefore, uncovering such guilt and related feelings in psychotherapy practices may alleviate client's physical pain complaints. Considering high comorbidity between depression and chronic pain (Katon, Egan, & Miller, 1985; Magni, Caldieron, Rigatti-Luchini, & Merskey, 1990), neural evidence for the prominent role of guilt feelings in depression (Green, Ralph, Moll, Deakin, & Zahn, 2012), and inhibiting effect of positive emotions on pain perception (Rhudy, & Meagher, 2001), emotional health of client's with chronic pain problems must be a fundamental target of psychotherapeutic interventions.

Chronic pain problems have been a controversial topic. Cumulating knowledge only beckons some areas requiring special attention of the researchers. Solving the problem of chronic pain still demands biopsychosocial means consisting neuroscientific, psychodynamic, and social psychological efforts. However, considering nocebo and placebo concepts, the clinicians can be more confident, while relating psychological states and somatic symptoms of the patients. As a result, a more holistic understanding of the patients' experiences can be formed and the clinicians can escape from traps of biological reductionism.

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APPENDICES

APPENDIX A: INFORMED CONSENT FORM

Bu araştırma Orta Doğu Teknik Üniversitesi psikoloji bölümü yüksek lisans öğrencisi Kutlu Kağan Türkarslan tarafından (Deniz Canel Çınarbaş danışmanlığında), yüksek lisans tezinin bir parçası olarak yürütülmektedir. Aşağıda sizin bu araştırmaya katılıp katılmamaya karar vermenize yardımcı olmak amacıyla birtakım bilgiler sunulmuştur.

Bu çalışma hafıza ve fiziksel ağrının el-göz koordinasyonu üzerindeki etkilerini incelemektedir. Çalışmada bazı hatıraları aktive edilen ya da bir miktar fiziksel ağrı çeken katılımcıların el-göz koordinasyon performansları birbirleriyle karşılaştırılacaktır. Araştırmaya katılımınız yaklaşık 30 dakika sürecektir. Bu süreçte, bazı katılımcılardan bir anılarını olabildiğince detaylı şekilde ve 10 dakika içinde önlerindeki deftere yazmaları istenmektedir. Daha sonra bazı katılımcılardan çok düşük düzeyde elektrik akımı vererek baş ağrısı yaratmak için geliştirilmiş bir EEG başlığı takılıyken basit görsel bir görevi tamamlamaları istenecektir. EEG başlığının yaratacağı ağrı sadece başlık takılı iken ortaya çıkmakta, tamamen geçici ve zararsızdır.

Araştırmaya katılmaya gösterdiğiniz ilgi için teşekkür ederiz. Araştırmaya katılımınız tamamen gönüllülük esasına dayalıdır. Araştırmaya katılmaya onay verdikten sonra, araştırmanın herhangi bir aşamasında dilerseniz herhangi bir sebep belirtmeksizin katılımınızı sonlandırma hakkınız olduğunu hatırlatmak isteriz. Eğer herhangi bir sebepten ötürü kendinizi rahat hissetmezseniz, odayı terk edebilirsiniz. Bu durumda verdiğiniz tüm bilgiler silinecektir.

Araştırma süresince verdiğiniz kişisel bilgiler gizli tutulacak ve araştırmada size bir kod verilip, kimliğiniz araştırma sonuçları ile hiçbir şekilde ilişkilendirilmeyecektir. Nihai raporda bireylerin kimliklerini geriye dönük olarak tespit etmek mümkün olmayacaktır. Bu araştırmada toplanan tüm veriler sadece araştırma amacı ile kullanılacaktır. Araştırma sonrasında size bireysel performansınızın sonucu verilmeyecektir. Fakat tüm çalışma tamamlandığında dilerseniz araştırmanın genel sonuçlarını edinebilir, var ise sorularınızı sorabilirsiniz. Çalışmaya veya haklarınıza dair detaylı sorularınız var ise çekinmeden Kutlu Kağan Türkarslan ile telefon ya da e-posta yoluyla iletişime geçebilirsiniz (Telefon: 0555 678 23 23, e-posta: kutlu.turkarslan@metu.edu.tr). Lütfen aşağıda imzanız ile haklarınızı anladığınızı ve araştırmaya kabul ettiğinizi belirtiniz. Haklarımı okudum, anladım ve bu araştırmaya katılmayı kabul ediyorum.

İmza :_____

APPENDIX B: DEMOGRAPHIC FORM

DEMOGRAFİK BİLGİLER

Yaşınız:
Biyolojik Cinsiyetiniz: □ Kadın □ Erkek □ Interseks

Eğitim durumunuz: □ İlkokul □ Ortaokul □ Lise □ Lisans □ Lisansüstü
□ Lisans Öğrencisi □ Lisansüstü Öğrencisi

Öğrenci iseniz; kaçıncı sınıftasınız ?: _____

Hangi bölümde okuyorsunuz ? : _____

Çalışıyor musunuz? □ Evet □ Hayır

Mesleğiniz:

Ailenizin algılanan gelir düzeyi: □ Düşük □ Orta □ Yüksek

GENEL BİLGİLER

Herhangi kronik (nörolojik, kardiyolojik vb.) bir rahatsızlığınız var mı?

□ Evet (Belirtiniz:.....) □ Hayır

Herhangi bir psikolojik ya da psikiyatrik rahatsızlığınız var mı?

□ Evet (Belirtiniz:.....) □ Hayır

Migren ya da kronik ağrı gibi bir rahatsızlığınız var mı ?

□ Evet (Belirtiniz:.....) □ Hayır

İleri düzeyde hafıza kaybınız, düzeltilmemiş, görüş/duyma problemleriniz var mı ?

□ Evet (Belirtiniz:.....) □ Hayır

Herhangi bir ilaç kullanıyor musunuz?

□ Evet (Belirtiniz:.....) □ Hayır

APPENDIX C: GUILT MEMORY INSTRUCTION

Lütfen 10 dakikalık bir süre içerisinde bu deftere, yakın bir süre zarfında başınızdan geçen ve kendinizi suçlu hissettiğiniz ve hala suçlu hissetmeye devam ettiğiniz bir yaşantınızı, olabildiğince detaylı bir şekilde yazmaya çalışın. Bu yaşantı yanlış olduğunu düşündüğünüz bir davranışınız olabilir.

Örneğin: intihal, kopya çekmek, yalan söylemek, bir şeyler çalmak, birini kandırmak, size yakın birini kendi çıkarlarınız için kullanmak, gizli olması gereken bilgileri başkalarıyla paylaşmak, birine ihanet etmek, birini aşağılamak, birine fiziksel olarak zarar vermek, başkasının emeğini çalmak vb…

Lütfen sizi suçlu hissettirmiş ve hala hissettirmekte olan bu yaşantıyı mümkün olduğunca detaylı ve gerçeğe uygun şekilde hatırlamaya çalışın. Sizi suçlu hissettiren yaşantınız sırasındaki duygularınıza, düşüncelerinize, fiziksel duyumlarınıza ve şu an geçmiş yaşantınızla ilgili olarak hissetmekte olduklarınıza yönelik detayları elinizden geldiğince anlatımınıza dahil etmeye çalışın.

Lütfen yazdığınız her şeyin tamamıyla gizli kalacağını unutmayın. Yazmanız için 10 dakikanız olacak. Lütfen 10 dakika boyunca yazmaya devam edin. Deneyin sonunda yazdığınız kağıdı yanınıza alabilirsiniz.

APPENDIX D: NEUTRAL MEMORY INSTRUCTION

Lütfen 10 dakikalık bir süre içerisinde bu deftere, yakın bir süre zarfında başınızdan geçen ve bir arkadaşınızla günlük karşılaşmanızı ve iletişiminizi içeren bir anıyı olabildiğince detaylı bir şekilde yazmaya çalışın.

Lütfen bu yaşantıyı mümkün olduğunca detaylı ve gerçeğe uygun şekilde hatırlamaya çalışın. Bu yaşantınız sırasındaki duygularınıza, düşüncelerinize, fiziksel duyumlarınıza ve şu an geçmiş yaşantınızla ilgili olarak hissetmekte olduklarınıza yönelik detayları elinizden geldiğince anlatımınıza dahil etmeye çalışın.

Lütfen yazdığınız her şeyin tamamıyla gizli kalacağını unutmayın. Yazmanız için 10 dakikanız olacak. Lütfen 10 dakika boyunca yazmaya devam edin. Deneyin sonunda yazdığınız kağıdı yanınıza alabilirsiniz.

APPENDIX E: VISUAL NOCEBO INSTRUCTION

Bu görevde, ekranın üst kısmındaki siyah bir disk aşağıdaki deliğe doğru sabit bir hızla düşecektir. Siyah disk mavi duvara ulaşınca arkasına geçeceği için disk görüş alanınızdan çıkacaktır.

Sizden istenen aşağı inmeye devam eden siyah diskin boşluğu tam olarak dolduracağı zamanı tahmin etmenizdir.

Siyah diskin duvardaki boşluğu tam olarak doldurduğunu düşündüğünüzde klavyedeki <SPACEBAR> tuşuna basınız. Bastığınızda delik siyah renge dönecek ve sonraki tura geçeceksiniz.

Eğer belli bir zaman aralığında basmazsanız, bip sesi çalınacak ve otomatik olarak sonraki tura geçeceksiniz.

Devam etmek ve baş ağrısı ile ilgili yönergeyi okumak için <SPACEBAR> tuşuna basabilirsiniz.

Press [space] for next page

Tüm bu süreç boyunca bir EEG şapkası ile şakaklarınızdan elektrik akımı verilecektir. Bu elektrik akımının önceki çalışmalarda baş ağrısına sebep olduğu tespit edilmiştir ve literatürde baş ağrısı oluşturmak için kullanılmaktadır. Ağrı şapka çıkınca geçmekte ve zararsızdır. Çok yoğun ağrı hissederseniz istediğiniz zaman çalışmayı sonlandırabilirsiniz.

Prosedürü gösteren videoyu izlemek ve sonrasında göreve başlamak için <SPACEBAR> tuşuna basabilirsiniz.

Press [⌫] for previous page

Press [space] to continue

APPENDIX F: VISUAL NO NOCEBO INSTRUCTION

Bu görevde, ekranın üst kısmındaki siyah bir disk aşağıdaki deliğe doğru sabit bir hızla düşecektir. Siyah disk mavi duvara ulaşınca arkasına geçeceği için disk görüş alanınızdan çıkacaktır.

Sizden istenen aşağı inmeye devam eden siyah diskin boşluğu tam olarak dolduracağı zamanı tahmin etmenizdir.

Siyah diskin duvardaki boşluğu tam olarak doldurduğunu düşündüğünüzde klavyedeki <SPACEBAR> tuşuna basınız. Bastığınızda delik siyah renge dönecek ve sonraki tura geçeceksiniz.

Eğer belli bir zaman aralığında basmazsanız, bip sesi çalınacak ve otomatik olarak sonraki tura geçeceksiniz.

Bu süreçte kafanızda beyin dalgalarını ölçen bir EEG şapkası takılı olacaktır.

Göreve başlamak için <SPACEBAR> tuşuna basabilirsiniz.

Press [space] to continue

APPENDIX G: POSITIVE AND NEGATIVE AFFECT SCALE

Katılımcı: Tarih:

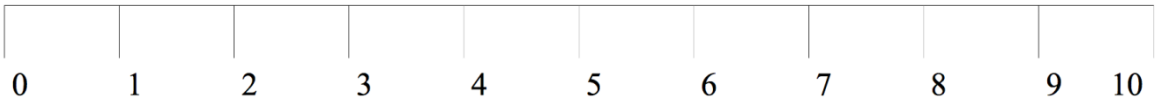
Bu ölçek farklı duyguları tanımlayan birtakım sözcükler içermektedir. Şu an nasıl hissettiğinizi düşünüp her maddeyi okuyun. Uygun cevabı her maddenin yanına ayrılan yere puanları daire içine alarak işaretleyin. Cevaplarınızı verirken aşağıdaki puanları kullanın.

1. **Çok az veya hiç**
2. **Biraz**
3. **Ortalama**
4. **Oldukça**
5. **Çok fazla**

1) ilgili	1…….	2…….	3…….	4…….	5…….
2) sıkıntılı	1…….	2…….	3…….	4…….	5…….
3) heyecanlı	1…….	2…….	3…….	4…….	5…….
4) mutsuz	1…….	2…….	3…….	4…….	5…….
5) güçlü	1…….	2…….	3…….	4…….	5…….
6) suçlu	1…….	2…….	3…….	4…….	5…….
7) ürkmüş	1…….	2…….	3…….	4…….	5…….
8) düşmanca	1…….	2…….	3…….	4…….	5…….
9) hevesli	1…….	2…….	3…….	4…….	5…….
10) gururlu	1…….	2…….	3…….	4…….	5…….
11) asabi	1…….	2…….	3…….	4…….	5…….
12) uyanık (dikkati açık)	1…….	2…….	3…….	4…….	5…….
13) utanmış	1…….	2…….	3…….	4…….	5…….
14) ilhamlı (yaratıcı düşüncelerle dolu)	1…….	2…….	3…….	4…….	5…….
15) sinirli	1…….	2…….	3…….	4…….	5…….
16) kararlı	1…….	2…….	3…….	4…….	5…….
17) dikkatli	1…….	2…….	3…….	4…….	5…….
18) tedirgin	1…….	2…….	3…….	4…….	5…….
19) aktif	1…….	2…….	3…….	4…….	5…….
20) korkmuş	1…….	2…….	3…….	4…….	5…….

APPENDIX H: VISUAL PAIN SCALE

Lütfen hissettiğiniz ağrının şiddetini 0 ="hiç ağrı duymadım", 10 ="dayanılmaz ağrı duydum" olacak şekilde 0'dan 10'a bir aralıkta işaretleyiniz.



APPENDIX I: TURKISH SUMMARY / TÜRKÇE ÖZET

PSİKOLOJİK AĞRI İLE DENEYİMLENEN SUÇLULUK KEFARETİ

BÖLÜM 1

GİRİŞ

Net ve fark edilebilir bir fizyolojik sebebin mevcut olmadığı kronik ağrı problemleri klinisyenler için ciddi bir problem oluşturmaktadır (Melzack, 2005). Bu gibi durumlarda kronik ağrı şikayetlerini oluşturduğu varsayılan ancak henüz keşif edilememiş fizyolojik bir sebebin olduğu ya da ağrının psikolojik faktörlerden dolayı kaynaklanıyor olabileceği öne sürülebilir (Engel, 1959). Psikodinamik literatürde öne sürülen psikolojik mekanizmalardan bir tanesi kronik ağrının suçluluk duygularına yönelik bir cezalandırılma olabileceğidir (Engel, 1959; Breuer, Freud, & Strachey, 1955). Bu çalışmanın amacı suçluluk duygusunun nocebo ağrı cevapları ve psikolojik olarak oluşturulmuş nocebo ağrısının suçluluk duyguları üzerindeki etkilerinin incelenmesidir.

1.1 Fiziksel Ağrı ve İşlevleri

Ağrı, mevcut ya da potansiyel doku hasarına karşı verilen rahatsız edici bir duyumdur. Bu yüzden ağrının en temel fonksiyonu kişiyi bedendeki mevcut ya da potansiyel bir doku hasarına karşı uyarmaktır (Broom, 2001; Merskey & Bogduk,

1994). Potansiyel olarak tehlikeli bir uyaran ağrı almaçlarının fizyolojik eşiğini aştığında öznel fiziksel duyumlar ve duygular olarak uyarılar verilir. Motor geri çekilme, savaşma reaksiyonu, davranışsal uyarılma, sempatik sistem aktivasyonu ve diğer caydırıcı ve savunmacı cevaplar tehlikeli uyarımı ortadan kaldırmak için harekete geçirilebilir (Millan, 1999). Fiziksel ağrı hissetmek için organizmanın vücudunun belli yerlerinde almaçları, çevresel ve merkezi sinir yollarının çevresel ve merkezi sinir sistemleri ile bağlantısı ve beyinde gelen bilgiyi işleyecek yapıların bulunması gerekmektedir.

1.2 Fiziksel Ağrının Çeşitleri

Hissedilen ağrının süresine göre üç çeşit ağrı tanımlanabilir. Geçiçi ağrı doku hasarı olmadan ağrı almaçlarının uyarılmasıdır (Loeser & Melzack, 1999). Akut ağrı aniden başlayan, bir yaralanma ya da doku hasarı sonucu ortaya çıkan ancak iyileşme ortamı sağlanınca geçen ağrıdır (World Health Organization, 2012). Kronik ağrı ise sürekli ya da kesik kesik devam eden, iyileşme süresinden sonra da devam eden ağrıdır. Kronik ağrısı olan kişilerin genelde birden fazla ağrı şikayetleri, daha önceden çok sayıda doktor ziyaretleri, ağrının kişinin temel meşgalesi olması ve depresyon ve kaygı problemleri göstermeleri gibi durumları vardır (Black, 1975). Kronik ağrıyı akut ağrıdan ayıran temel faktör kronik ağrının tedavi sonucu geçmemesidir (Loeser & Melzack, 1999).

1.3 Fiziksel Ağrı Kuramları

1.3.1 Biyomedikal Model

Fiziksel ağrıyı açıklamak için ortaya atılan ilk model biyomedikal modeldir. Bu modelin özgüllük kuramı özgün almaçların uyarılması ve bu duyumsal bilginin sinir yolları ile çevreden omuriliğe ve oradan da beyne aktarılması üzerine kuruludur (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Bu kurama göre her bir duyusal modalitenin ayrı bir almacı ve duyumsal sinirleri vardır (Moayedi & Davis, 2013).

Biyomedikal modelin içindeki ikinci kuram örüntü cevabı'dır. Bu kurama göre nosiseptif bilgi uyaran yoğunluğundan ve örüntü cevaplarının işlenmesi sonucu ortaya çıkmaktadır (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Sinirsel uyarımın süresi ve yeri ağrının tipini ve yoğunluğunu belirlemektedir. Bu konudaki son kuram ise yoğunluk kuramıdır. Ağrı herhangi bir uyaranın normalden daha güçlü olarak ortaya çıkması ve belli bir eşik değerini aşmasıdır (Moayedi & Davis, 2013).

1.3.2 Kapı Kontrol Teorisi

Melzack ve Wall tarafından ortaya atılan kapı kontrol kuramı önceki medikal kuramları ağrı deneyimini etkileyen duygusal ve bilişsel etkenleri de kapsayarak genişletmiştir. Bu kurama göre duyumsal almaçların uyarımı sinir tepilerininin omurilikteki üçü temel sistem olan substantia gelatinosa, dorsal-kolon fiberleri ve dorsal boynuzdaki iletim sinirlerine aktarılması ve bunların kendi aralarındaki etkileşimle oluşur (Melzack & Wall, 1967). En önemli yenilik olarak dikkat, duygu ve hafıza gibi beyinsel süreçlerin ağrı iletimini ve deneyimini etkiledikleri varsayılmaktadır.

1.3.3 Ağrının Nöromatris Kuramı

Melzack (2005) daha sonraki yıllarda kapı kontrol kuramının hayalet bacak fenomeni gibi ağrı deneyimlerini açıklayamaması sebebiyle yeni bir kuram ortaya atmıştır. Bu kuramda ağrının hissedilmesi için duyumsal girdiye gerek yoktur, ağrı deneyimleri beyinde kaydedilebilir ve daha sonra aktive edilebilir. Korteks, thalamus ve limbik sistem'deki sinir ağları ve bunların aralarındaki döngüler nöromatris denilen sistemi oluşturmaktadır. Bu kuramda bilişsel, duyumsal, duygusal ve motivasyonel etkenler ağrı deneyimlerine etki etmektedir.

1.4 Kronik Ağrı

Doktorlara yapılan ziyaretlerin %80 fiziksel ağrılar ve bunlarla alakalı problemler yüzündendir (Voscopoulos & Lema, 2010). Epidemolojik çalışmalara göre kronik ağrı yaygın bir sağlık problemi olarak kabul edilebilir. Yapılan çalışmalarda çeşitli ülke popülasyonlarının %11'inin (Crook, Tunks, & Browne, 1986), %20'sinin (Van Hecke, Torrance, & Smith, 2013), %49'unun (Andersson, Ejlertsson, Leden, & Rosenberg, 1993), %30.7'sinin (Johannes, Le, Zhou, Johnston, & Dworkin, 2010) kronik ağrı şikayetleri olduğunu belirlenmiştir. İlginç olarak; ağrıyı oluşturan mekanizmalar, çeşitli ağrı kuramları ve ağrı deneyiminin nörobiyolojik temelleri bilinmesine rağmen kronik sırt ağrısı problemlerinin %80'ninde ağrı deneyimini yaratacak organik bir sebep bulunamamaktadır (Traue, Jerg-Bretzke, Pfingsten, & Hrabal, 2010).

Çalışmaların gösterdiği kadarıyla ilk değerlendirmede organik bir sebep bulunamıyorsa sonraki değerlendirmelerde bu sebebin bulunması ihtimali çok düşüktür (Mayou, 1991). Kronik ağrı şikayetlerinde biyomedikal modelin açıklayamadığı noktalar şunlardır (Turk & Rudy, 1992). İlk olarak nesnel olarak aynı doku hasarı olan hastaların rapor ettikleri ağrılar farklıdır. İkinci olarak asimptotik şikayetleri olan hastaların yapısal bozukluklara yönelik radyolojik bulguları onların mevcut şikayetlerini açıklayamamaktadır. Üçüncü olarak bazı durumlarda çok az fizyolojik hasarı olan kişiler bu hasarla uyumsuz ağrılar rapor edebilmektedirler. Dördüncü olarak ağrıyı baskılamaya yönelik olarak sinir yollarını hedef alan ameliyatlar ağrının azalmasına yardımcı olmayabilmektedir. Ve son olarak nesnel olarak benzer hasarlara yapılan aynı müdahaleler farklı sonuçlar doğurmaktadır. Yapılan çalışmalarda kronik ağrının depresyon ve kaygı bozuklukları gibi psikopatolojilerle güçlü bir ilişkisinin olduğu saptanmıştır (Dersh, Polatin, & Gatchel, 2002; American Psychiatric Association, 1987; Katon, Egan, & Miller, 1985; Magni, Caldieron, Rigatti-Luchini, & Merskey, 1990; Atkinson, Slater, Patterson, Gant, & Garfin, 1991). Depresyon ile ilgili olarak yapılan ileri

çalışmalar ağrının mı yoksa depresyonun mu öncelikli olarak ortaya çıktığı sorusunu tam olarak aydınlatamamıştır (Romano & Turner, 1985).

1.5 Kronik Ağrıya Kuramsal Yaklaşımlar

1.5.1 Biyolojik Yaklaşım

Çalışmalar gen ifadelerinin ağrıya olan duyarlılığı düşük, ortalama ve yüksek duyarlılıklar olacak şekilde etkilediğini bulmuştur (Diatchenko et al., 2005). Genetik yatkınlıkların ağrıya hassasiyet, ağrı oluşması ve sürmesi gibi noktalarda etkili olduğu düşünülmektedir. Kronik ağrı problemlerinde nörotransmiterler, nöromodülatorler ve almaçlardaki dengesizliklerin etkili olabileceği bulunmuştur (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Kronik ağrısı olanlarda beyinin cingulate korteks, orbitofrontal korteks, insula ve dorsal pons gibi bölgelerin gri madde miktarının azalmış olduğu tespit edilmiştir (May, 2008). İleri çalışmalar bu gri madde değişimlerinin ağrı sebebiyle ortaya çıktığını göstermiştir (Rodriguez-Raecke, Niemeier, Ihle, Ruether, & May, 2009). Endokrinel dalgalanmalar sebebiyle semptomlardaki saatlik, günlük ve haftalık değişimler olabilmektedir. Son olarak nanoteknolojik gelişmelerin kronik ağrı problemlerinin anlaşılması ve tedavisinde umut vaad eden rol oynayacağı beklenmektedir (Gatchel, Peng, Peters, Fuchs, & Turk, 2007).

1.5.2 Psikodinamik Yaklaşım

Psikodinamik yaklaşım bedensel şikayetlerin psikolojik çatışmalardan kaynaklanıyor olabileceğini 1800'lerin sonundan itibaren belirtmektedir. Psikosomatik rahatsızlıklar ve kronik ağrı üzerine çalışmış George L. Engel, kronik ağrının oluşumunu zihinsel çatışmalar ve nesne ilişkileri ile açıklayan bir kuram oluşturmuştur (Engel, 1959). Ağrının diğer görsel, işitsel, kokusal ve dokunsal uyaranlar gibi duyumsal almaçlar uyarılmadan da ortaya çıkabileceğini

savunmuştur. Kişilerin hayatları boyunca yaşadıkları ağrı deneyimlerini kaydettiklerini ve bu deneyimlerin daha sonra aktive edilebileceğini belirtmiştir.

Engel (1959) bu durumları gelişimsel aşamalara ve zihine bağlayarak altı önemli çıkarımda bulunmuştur. İlk olarak ağrının sebebi ve yerine yönelik bilgiler kayıt edildiğini ileri sürmüştür. İkinci olarak ağrıyı kişilerarası ilişkilerle iç içe bir kavram olarak ele almıştır. Bir bebek ağrı sebebiyle ağladığında kendisi ile ilgilenen kişiden yardım istemektedir. Bu yüzden ağrı, ağlamak, bakıcının sakinleştiren davranışları ve ağrının ortadan kalkması arasında bir ilişki kurulmaktadır. Üçüncü olarak erken çocukluk döneminde çoğu ebeveynin fiziksel ağrıyı çocuklarının yanlış davranışlarını cezalandırmak için kullandığını belirtmiştir. Bu sebeple fiziksel ağrı ve suçluluk arasında bir bağlantı oluşmaktadır. Dördüncü olarak ağrının saldırganlık ve gücü simgelediğini ifade etmiştir. Kişiler kendi vücutlarında ağrı oluşturarak saldırganlıklarını kontrol edebilirler. Beşinci olarak önemli bir kişinin gerçek ya da fantezi olarak kaybı bu süreçte ağrı çektiği durumlardan bahsetmiştir. O kişiye yönelik bilinçli ve bilinçdışı saldırgan duyguların oluşturacağı suçluluk duyguları kişinin aynı ağrıyı kendisinde oluşturarak bu suçluluk duyguları ile başa çıkmasına sebep olabilmektedir. Son olarak sado-mazoşistlik ve bazı perversyonlarda ağrı ve cinsel duyguların birleştiğini ve ağrı yaratmanın baskın cinsel aktivite olabildiğinden bahsetmiştir.

1.5.3 Davranışçı Yaklaşım

Davranışsal yaklaşımda kişinin öznel ağrı deneyiminden ziyade gösterdiği ağrı davranışlarına odaklanır (Turk, & Rudy, 1992). Kişilerarası ilişkilerde ağrı davranışlarının ödüllendirilmesi bu davranışları pekiştirecektir (Block, Kremer, & Gaylor, 1980). Diğer önemli bir etken ise kişilerin ağrılarına verdikleri dikkattir. Bu durumda kişiler çevrelerindeki diğer uyaranlardan daha az etkilenirler, olumlu aktivitelerle daha az uğraşırlar ve onların etkilerinden daha az yararlanırlar (McCracken, 1997).

1.5.4 Bilişsel Davranışçı Yaklaşım

Bilişsel davranışçı yaklaşım tamamıyla ağrı davranışlarına odaklanmak yerine bilginin işlenmesi, ağrı deneyimlerinin yorumlanması, beklentiler ve inançlar gibi faktörleri ele alır (Turk & Rudy, 1992). Kişilerarası değişkenler önemli görüldüğü için kişilerin aile bireyleri ya da eşleri de tedavi süreçlerine dahil edilir (Keefe, Dunsmore, & Burnett, 1992).

1.6 Nocebo

Nocebo etkisi kişilerin olumsuz beklentileri sonucu çeşitli semptomlar deneyimlemeleri ya da mevcut durumlarının kötü gitmesidir (Benedetti, Lanotte, Lopiano, & Colloca, 2007). Daha tıbbi bir tanımlama ise etkin olmayan bir tedavi alan kişilerin deneyimledikleri farmakolojik olmayan, rahatsızlık verici ve istenmeyen etkilerin oluşması durumudur (Data-Franco & Berk, 2013). Literatürdeki çalışmalar herhangi duyumsal uyarım almayan katılımcıların beklenti sonucu baş ağrıları rapor edebildiklerini (Schweiger and Parducci, 1981), ağrıya hassasiyetlerinin artabildiğini (Johansen, Brox, & Flaten, 2003), bu etkinin koşullanma yoluyla da ortaya çıkartılabildiğini göstermiştir (Colloca, Sigaudo and Benedetti, 2008). Meta analiz çalışmaları nocebo etkisinin etki büyüklüğünü orta-büyük olarak göstermiştir. Nocebo etkisinin altında yatan mekanizmalar beklenti kaygısı ve telkin olarak düşünülmektedir (Spiegel, 1997; Benedetti, Amanzio, Casadio, Oliaro, & Maggi, 1997; Benedetti, Amanzio, Vighetti, & Asteggiano, 2006).

1.7 Suçluluk Duyguları

Suçluluk duygusu utanç gibi öz bilinçli bir duygudur. Gösterilme şekilleri ve öznel deneyimleri mutluluk, öfke, korku vs gibi temel duygulardan daha az evrensellik gösterir (Eid, & Diener, 2001; Kitayama, Markus, & Matsumoto, 1995). Suçluluk yanlış eylem için hissedilen endişe ya da mutsuzluk olarak tanımlanırken (Guilt,

n.d.)., utanç daha çok hayal kırıklığı yaratan ya da tatmin edici olmayan bir şeye yöneliktir (Shame, n.d.). Zaman zaman birbirlerinin yerine kullanılmalarına rağmen suçluluk belli bir davranışa özgüyken, utanç tüm kendiliğe atfedilir (Baumeister, Stillwell, & Heatherton, 1994; Tangney, 1990). Suçluluk rahatsız edici bir duygu olmasına rağmen sosyal davranışlara faydası olan sonuçlar doğurabilmektedir (Haidt, 2003). Özür dilemek, sempati yaratmak, çocukları disiplin etmek, insanları manipüle etmek, öz kontrolü arttırmak ve çeşitli insan davranışlarını kontrol etmek için suçluluk duygularının uyandırılmasından faydalanılabilir (Baumeister, Stillwell , & Heatherton, 1994). Olumsuz bir duygu olduğu için kişileri bu olumsuzluktan kurtulmak için telafi davranışları yapmaya ya da sosyal bağları tamir etmeye itebilir. Çalışmalar suçluluk duygusunun uyandırılmasının toplum yanlısı davranışlar sayılabilecek vakıflara bağış yapma, sosyal pazarlık oyunlarında iş birliği yapma ve tamir edici davranışlarda bulunma gibi etkilerinin olduğu göstermiştir (De Hooge, 2012; Basil, Ridgway, & Basil, 2006; De Hooge, Zeelenberg, & Breugelmans, 2007).

1.7.1 Suçluluk ve Psikopatoloji

Suçluluğun depresyon ve obsesif kompülsif bozukluk ile yakından ilişkili olduğu bilinen bir bulgudur (Harder, Cutler, & Rockart, 1992; O'Connor, Berry, Weiss and Gilbert, 2002). Depresyon ve suçluluk arasındaki ilişki kültürler arası çalışmalarda da ortaya çıkmıştır (Stompe et al., 2002). Normal kontrollerle kıyaslandıklarında obsesif kompülsif bozukluğu olanların karakter ve durum suçluluklarının daha fazla olduğu bulunmuştur (Shafran, Watkins, & Charman, 1996). Travma sonrası stres bozukluktaki suçluluk duygularının yeniden deneyimleme, kaçınma ve TSSB'nin genel şiddeti ile ilişkili olduğu bulunmuştur (Henning & Frueh, 1997).

1.7.2 Suçluluk ve Cezalandırılma İhtiyacı

Birçok din ve kültürde suçluluk duygularını ortadan kaldırmak için kendi cezalandırma pratikleri mevcuttur. Az sayıda da olsa bilimsel çalışmalar da suçluluk

duygusunun kişiyi kendini cezalandırmak için motive ettiğini göstermektedir (Bastian & Fasoli, 2011; Nelissen 2012). Sigmund Freud bu konuyu 1800'lerin sonundan beri ele almıştır. Suçluluk duygularının yarattığı cezalandırılma ihtiyacının obsesif kompülsif semptomlar olarak ortaya çıkabileceğini ifade etmiştir. Çocukların davranışları ile cezalandırılma çalışmalarının ardında suçluluk duygularının olabileceğini düşünmüştür (Freud, 1957). Bunlara ek olarak suçlu hissetmek için bir davranışta bulunmanın gerekmediğini, o davranışa yönelik fantezinin de kişiyi suçlu hissettirebileceğini söylemiştir (Freud, 2010). Terapi ortamında suçluluğun bir direnç olarak ortaya çıkabileceği ve kişilerin tedaviden faydalanmalarını olumsuz etkileyeibleceği de psikodinamik literatürde belirtilmiştir (Bush, 2005)

1.8 Mevcut Çalışma

Bu çalışmanın amacı suçluluk duygularının nocebo manipülasyonunda ağrı rapor etme sıklığı ve bu ağrının şiddeti üzerindeki etkilerinin ve rapor edilen ağrının suçluluk duyguları üzerindeki etkilerinin incelenmesidir. Nocebo manipülasyonu kullanılarak ağrı uyandırılmaya çalışmasının sebebi hiçbir fiziksel ağrı uyaranı verilmeden ağrı oluşturulabilmesidir.

1.9 Hipotezler

1. Suçluluk duyguları nocebo ağrı deneyimlenmesini kolaylaştıracaktır. Ağrı rapor eden katılımcıların sayısı suçluluk duygusu uyandıran anılarını yazan katılımcılarda, yansız anılarını yazan katılımcılara göre daha çok sayıda olacaktır.

2. Suçluluk duyguları hissedilen ağrının şiddetini arttıracaktır. Suçluluk duygusu uyandıran anılarını yazan katılımcılar, yansız anılarını yazan katılımcılara göre daha şiddetli ağrı rapor edeceklerdir.

3. Suçluluk duygusu uyandırn anılarını yazan katılımcıların suçluluk duyguları nocebo ağrı deneyimlemeleri durumunda düşecektir.

BÖLÜM 2

YÖNTEM

2.1 Katılımcılar ve Dizayn

Çalışmanın katılımcıları Orta Doğu Teknik Üniversitesi'nden 100 öğrencidir. Katılımcılar çalışmaya psikoloji bölümünün katılımcı havuzundan seçilmişlerdir. Bu öğrencilerin 78'i kadın iken 22'si erkektir. Çalışmanın dizaynı 2 x 2 bağımsız gruplar dizaynıdır ve dört (suçluluk-suçluluk yok, nocebo-nocebo yok) gruptan oluşmaktadır. Çalışmanın her grubu 25'er katılımcıdan oluşmuştur. Katılımcılar deney gruplarına rastgele olarak dağıtılmamıştır.

2.2 Araçlar

2.2.1 Bilgilendirilmiş Onam

Araştırmacıları, prosedürleri ve çalışmanın amacını gizleyerek anlatan bir bilgilendirilmiş onam formu kullanılmıştır.

2.2.2 Demografik Bilgi Formu

Katılımcıların yaş, cinsiyet, eğitim durumu, iş durumu ve sosyo-ekonomik seviyelerini soran bir demografik bilgi formu kullanılmıştır.

2.2.3 EEG şapkası

Katılımcıların kafalarına elektrik verildiğine inanmaları için bir EEG şapkası kullanmıştır. Bu şapka usb kablosu ile direkt olarak bilgisayara bağlanmıştır.

2.2.4 Anı Yönergeleri

Cougle, Goetz, Hawkins and Fitch'in (2012) anı yönergesi Türkçe'ye çevrilmiştir. Bu yönergede katılımcılardan kendilerini hala suçlu hissetiklerini bir anılarını bütün detayları ile on dakika boyunca yazmaları istenmektedir. Diğer katılımcılardan ise yakında bir zamanda bir arkadaşları ile karşılaşmalarını içeren anılarını yazmaları istenmiştir.

2.2.5 Inquisit 5

Inquisit 5 psikoloji deneylerinde sıkça kullanılan ve Millisecond yazılım tarafından geliştirilmiş bir bilgisayar programıdır. Katılımcılar bilgisayarda yapacakları görev hakkındaki yönerge, nocebo manipülasyonu ve Zaman-Duvar görevi katlımcılara Inquisit 5 ile gösterilmiştir.

2.2.6 Görsel Nocebo ve Nocebo Yok Yönergeleri

Katılımcılara taktıkları EEG şapkasının kafalarına bir miktar elektrik verdiğini, bu yöntemin literatürde baş ağrısı oluşturmak için kullandığını ve baş ağrısının zararsız olup, şapkayı çıkarınca geçeceğini belirten bir yönerge gösterilmiştir. Nocebonun olmadığı gruptaki katılımcılara EEG şapkasının sadece beyin dalgalarını ölçtüğü söylenmiştir.

2.2.7 Nocebo Uyandıran Video

Nocebo grubundaki katılımcılara ayrıca 134 saniye uzunluğunda, sahte bir katılımcının deneyde yapılan görev sırasında baş ağrısı çekiyor gibi rol yaptığı bir video gösterilmiştir.

2.2.8 Zaman-Duvar Tahmin Görevi

Bilişsel değerlendirme yapma amacıyla geliştirilmiş olan bir görevdir. Katılımcılardan ekranda aşağıya doğru hareket eden bir dairenin ekranın altında konumlanan bir deliği dolduracağı zamanı tahmin etmeleri istenmektedir. Daire ekranın yarısına gelince bir duvarın arkasına geçerek görünmez olmakta ve aşağıya doğru hareketine devam etmektedir. Katılımcılar dairenin deliğe denk geldiğini düşündükleri anda, bir tuşa basarak bunu belirtirler. Bu görev nocebo yönergelerinden sonra katılımcıların dikkatini dağıtmak için kullanılmıştır.

2.2.9 PANAS

Pozitif ve Negatif Duygu Ölçeği Watson, Clark ve Tellegen (1988) tarafından pozitif ve negatif duygularını ölçmek için geliştirilmiştir. Ölçeğin 10 pozitif ve 10 negatif duyguyu, beşli likert tipinde ölçen 20 itemi vardır. Türkçe'ye adaptasyonu Gençöz (2000) tarafından yapılmıştır. Alt ölçeklerin iç tutarlılığı negatif duygu için .83 ve pozitif duygu için .86'dır. Kriter geçerliliği Beck Depresyon Envanteri ve Beck Kaygı Envanteri ile değerlendirilmiştir. Pozitif duygu için sırasıyla depresyon ve kaygı ile korelasyonlar -.48 ve -.22 iken, negatif duygu için .51 ve .47'dir. Bu ölçek suçluluk manipülasyonun çalışıp çalışmadığını kontrol etmek için kullanışmıştır. Çalışmanın örnekleminde nocebo manipülasyonu öncesi suçluluğun Cronback's alphası .71 iken manipülasyon sonrası .79'dur.

2.2.10 Görsel Ağrı Ölçeği

Katılmıcılarının deneyimledikleri ağrılarını rapor edebilmeleri için 0'dan 10'a olacak şekilde ağrı şiddetlerini gösteren basit bir ağrı ölçeği kullanılmıştır. "0" ağrı hissedilmediğini gösterirken, "10" dayanılmaz ağrıya karşılık gelmektedir.

2.3 Prosedür

Çalışma için etik sizin alındıktan sonra veri toplanmasına başlanmıştır. Katılımcılardan ilk önce bilgilendirilmiş onam ve demografik bilgi formlarını doldurmaları istenmiştir. Daha sonra katılımcıların bir kısmından kendilerini hala suçlu hissettikleri bir anılarını, diğerlerinden yakın zamandaki bir arkadaşları ile karşılaşmalarını içeren bir anılarını yazmaları istenmiştir. Takiben katılımcılara PANAS verilerek suçluluk manipülasyonunun çalışıp çalışmadığına bakılmıştır. Sonra katılımcılardan bilgisayarda el göz koordinasyonu ile ilgili bir görevleri yapmaları istenmiştir. Nocebo grubundaki katılımcılar görsel ve sözel olarak bu görev boyunca taktıkları EEG şapkasından elektrik verileceğini belirten nocebo yönergesine maruz kalmışlardır ve buna ek olarak sahte katılımcının rol yaptığı videoyu izlemişlerdir. Nocebo grubunda olmayan katılımcılara ise EEG şapkasının sadece beyin dalgalarını ölçeceği söylenmiştir. Daha sonra katılımcılara görsel ağrı ölçeği verilmiş ve hissettikleri ağrıyı göstermeleri istenmiştir. Eğer ağrı rapor ettilerse bu ağrının tipini, yerini ve özelliklerini belirtmeleri sözel olarak istenmiştir. Son olarak katılımcılara PANAS ölçeği tekrar verilmiş ve katılım sonrası bilgi formu kendilerine iletilmiştir. Katılım sonrası bilgi formunda çalışmanın amacı kısmen açıklanmış ve katılımcılara aslında elektrik verilmediği söylenmemiştir. Tüm verinin toplanması sona erdiğinde çalışmanın gerçek amacı ve elektrik verilmediği bilgisi katılımcılarla e-mail yolu ile paylaşılmıştır.

BÖLÜM 3

SONUÇLAR

3.1 Veri Dönüştürme ve Temizleme

Aykırı değerlerin incelenmesi sonucu herhangi bir değerin atılmasına gerek olmadığı fark edilmiştir. Ağrı derecelendirme skorları normal dışı dağılım göstermiş, bu sebeple bu bağımlı değişken üzerinde karekök dönüşümü uygulanmış ve verilerin normal dağılıma yaklaşması sağlanmıştır. Dönüştürülmüş değerler ile normal değerler arasında çok fark olmadığı için dönüştürülen değerler daha sonra eski birimine dönüştürülmemiştir. Bağımlı değişkenlerin hiçbirinde eksik değer mevcut değildir.

3.2 Değişkenler Arasındaki Korelasyon

Ağrı derecelendirmesi ile manipülasyon öncesi suçluluk derecelendirmesi arasında .033, manipülasyon sonrası suçluluk derecelendirmesi arasında .121 korelasyon bulunmuştur. Manipülasyon öncesi ve sonrası suçluluk derecelendirmeleri arasında ise .664 ($p < .001$) korelasyon bulunmuştur.

3.3 Suçluluk Uyandırılması İçin Manipülasyon Kontrolü

Suçluluk yaratılmasının başarılı olup olmadığını kontrol etmek için manipülasyon öncesi suçluluk derecelendirmeleri üzerinde bağımsız t-testi yapılmıştır. Suçluluk uyandıran anılarını yazan katılımcıların ($M = 3.520$, $SD = 1.129$) suçluluk derecelerinin, günlük karşılaşmalarını yazan katılımcılardan (M

= 1.560, *SD* = 1.072) anlamlı olarak daha yüksek olduğu bulunmuştur, $t(98) = -8.901$, $p < .001$, 95% *CI* [-2.397, -1.523]. Etki büyüklüğü ise çok güçlü olarak bulunmuştur, $d = -1.780$.

3.4 Nocebo İçin Manipülasyon Kontrolü

Nocebo manipülasyonun çalışıp çalışmadığı kontrol etmek amacıyla ağrı derecelendirmeleri üzerinde bağımsız t-testi yapılmıştır. Sonuç olarak nocebo manipülasyonuna maruz kalan katılımcıların rapor ettikleri ağrının, manipülasyona maruz kalmayan katılımcıların rapor ettikleri ağrıdan anlamlı olarak yüksek olduğu bulunmuştur. Etki büyüklüğü orta olarak bulunmuştur, $d = -.489$.

3.5 Genel Sonuçlar

3.5.1 Suçluluk Uyandırma Durumunda Ağrı Deneyimleme İhtimali

Ağrı rapor eden katılımcıların sayısının suçluluk duygusu uyandıran anılarını yazan katılımcılar ve yansız anılarını yazan katılımcılardaki frekansının değişimine bakmak için Chi Square analizi uygulanmıştır. İki grup arasında anlamlı bir fark bulunamamıştır $\chi^2(1) = 3.309$, $p = .069$, $\varphi = 257$.

3.5.2 Nocebo ve Suçluluğun Ağrı Derecelendirilmesine Etkileri

Suçluluk duygusu uyandıran anılarını yazan katılımcıların, yansız anılarını yazan katılımcılara göre daha şiddetli ağrı rapor edip etmediklerine bakmak için 2 x 2 bağımsız gruplar varyans analizi yapılmıştır. Sadece nocebo manipülasyonun ana etkisi bulunmuştur $F(1, 96) = 6.003$, $p = .016$, $\eta\rho^2 = .0059$.

3.5.3 Nocebo ve Zamanın Suçluluk Duygusu Üzerindeki Etkileri

Suçluluk duygusu uyandıran anılarını yazan katılımcıların suçluluk duygularının nocebo ağrı deneyimlemeleri durumunda düşüp düşmediğini kontrol etmek için suçluluk uyandırılan katılımcıların verileri üzerinde 2 x 2 karışık varyans analizi yapılmıştır. Sadece manipülasyon öncesi ve sonrası suçluluk derecelendirmesinin ana etkisi bulunmuştur F (1, 48) = 82.189, $p < .001$, $\eta\rho^2 = .631$.

BÖLÜM 4

TARTIŞMA

4.1 Genel Değerlendirme

Bu çalışmanın üç temel tahmininden ilki katılımcıların suçluluk duyguları sebebiyle kendilerini cezalandırmak için nocebo ağrı deneyimleyecekleridir. İkinci olarak suçlu katılımcıların suçluluk hissetmeyenlere göre daha fazla nocebo ağrısı rapor edecekleri düşünülmüştür. Son olarak da nocebo ağrı deneyiminden sonra katılımcıların suçluluk duygularının düşeceği öngörülmüştür. Sonuça göre manipülasyonların anlamlı etkileri gözükmesine rağmen, hipotezleri destekleyen anlamlı etkileşimler ve ağrı rapor etme frekansında anlamlı bir fark görülmemiştir.

4.2 Fiziksel Uyaran Olmadan Nocebo Ağrı Uyandırma

Şimdiye kadar nocebo etkisi üzerine yapılan araştırmalar çoğunluklu olarak fiziksel bir uyaranın ağrıya dönüştürülmeye çalışılmasını içermiştir. Literatürde fiziksel uyaran verilmeden nocebo etkisinin ortaya çıktığı tek çalışma Schweiger ve Parducci (1981) tarafından yapılmıştır. Araştırmacılar kaygı verici bir ortam yaratmak için oksijen tankından, poligrafa, dişçi koltuğundan, şok verme cihazına kadar deneyin gerçekleştiği odayı çeşitli cihazlar ve aletlerle dekore etmişlerdir. Mevcut çalışma normal bir deney ortamında yapılmış olmasına rağmen hiçbir fiziksel uyaran olmadan nocebo etkisi tespit edilebilmiştir.

Katılımcıların ağrı rapor etmelerinin bir açıklaması talep özellikleri olabilir. Talep özellikleri katılımcıların araştırmacıların beklentilerini fark edip buna göre davranışlarda bulunmalarıdır. Bunu engellemek için katılımcılar ağrı hissettiklerini rapor ettiklerinde kendilere hissetikleri ağrı ile ilgili daha ileri sorular sorulmuştur. Bazı katılımcılar bu sorulardan sonra verdikleri cevabı değiştirmişlerdir. Bu yöntemin talep özelliklerini engellemiş olduğu düşünülebilir.

4.3 Suçluluk Uyandırma Durumunda Ağrı Deneyimleme İhtimali ve Nocebo ve Suçluluğun Ağrı Derecelendirilmesine Etkileri

Çalışmanın ilk iki hipotezini destekleyen anlamlı etkiler bulunamamasına rağmen anlamlı değilse bile suçluluk duygusunu nocebo ağrısını baskıladığı görülmüştür. Bu bulguyu açıklayabilecek çeşitli hipotezler ortaya atılabilir. Öncelikli olarak fiziksel ağrı çekmek bütün suçluluk türleri için bir kefaret yöntemi olmayabilir. İkinci olarak duygu manipülasyonlarının fiziksel ağrıyı eğer yüksek uyarım yaratırlarsa baskıladığı bulunmuştur (Villemure & Bushnell, 2002). Bu çalışmadaki duygu manipülasyonu düşük uyarım seviyesindeymiş gibi olmasına rağmen fiziksel ağrıyı baskılamış gibi gözükmektedir. Üçüncü olarak sosyal dışlanmanın fiziksel ağrıya karşı bir hissizleşme yarattığı önceki çalışmalarda bulunmuştur (De Wall & Baumeister, 2006). Suçluluk duygusunun sosyal dışlanmayı öncüllemesi sebebiyle mevcut çalışmada böyle bir etki bulunmuş olabilir. Dördüncü olarak suçluluk duygusunun bilinçli şekilde yaratılması fizikel ağrı ve duygusal ağrının ortak beyin bölgeleri tarafından oluşturulması sebebiyle fiziksel ağrıya baskın çıkan bir uyarım yaratmış olabilir. Bilinçdışı suçluluğun ise ağrı olarak hissedilebilmesi hala mümkün olabilir. Son olarak nocebo manipülasyonu sırasında ağrının zararsız olacağının söylenmesi nocebo etkisini zayıflatmış olabilir.

4.4 Nocebo ve Suçluluğun Ağrı Derecelendirilmesine Etkileri

Çalışmanın üçüncü hipotezini destekleyen bulgular bulunamamış ancak suçluluk duygularının zamanla düştüğü gözlemlenmiştir. Bunu açıklayacak çeşitli faktörler olabilir. İlk ihtimal Duvar-Zaman Görevinin kolay olması sebebiyle özgüveni arttırmış ve bunun da suçluluğu azaltmış olması olabilir. Özgüven ve suçluluk arasında güçlü negatif bir ilişki mevcuttur (Strelan, 2007). İkinci olarak suçluluk duygularının detayları ile yazılması duygusal dışavurumcu (Pennebaker, 1997) bir etki yaratarak sonraki ölçümde suçluluğun azalmış olmasına sebep olabilir. Son olarak nocebo etkisi görülmesine rağmen zayıf bir ağrı duyumuna sebep olabilmiştir. Bastian, Jetten ve Fasoli (2011)'nin çalışmasında fiziksel ağrı çekmenin suçluluk duygularını azalttığı görülmesine rağmen çalışmanın yararttığı fiziksel ağrı mevcut çalışmadaki ağrıya kıyasla daha yüksektir. Ağrının suçluluğun düşmesine ek bir etkisinin olmaması ortaya çıkan ağrının zayıf olması olabilir.

4.5 Çalışmanın Sınırlılıkları Ve İleri Çalışmalar İçin Tavsiyeler

Çalışmanın bazı önemli sınırlılıkları bulunmaktadır. İlk sınırlılık düşük istatistiksel güçtür. 100 katılımcı .52 istatistiksel güce ulaşabilmiştir. Sonraki çalışmalar katılımcı sayısını arttırarak en az .80 istatistiksel gücü hedeflemelidir. İkinci olarak çalışma katılımcıların deney gruplarına rastgele dağıtılmasını içermemiştir. Bu sebeple sonuçlar anlamlı olmasa bile nedensel çıkarımlar yapılamaz. Sonraki çalışmalar rastgele atanma içerebilir. Üçüncü olarak standart deney ortamı ve EEG şapkası yerine daha gerçekçi bir ortam ve araçlar kullanılabilir. Dördüncü olarak suçluluk duyguları bilinçli olarak uyandırılmıştır. Sonraki çalışmalar suçluluğun daha örtük veya bilinçdışı şekilde uyandırıldığı prosedürleri içerebilir. Beşinci olarak sonraki çalışmalar daha heterojen ve klinik örneklemlerle yapılabilir. Altıncı olarak Duvar-Zaman Görevinin süresi yaklaşık 5 dakikadır. Mevcut çalışmada bazı katılımcılar ağrının görevin sonlarına doğru ortaya çıktığını belirtmiştir. Sonraki çalışmalar

daha uzun bir prosedür içerebilir. Son olarak sonraki çalışmalarda suçluluk ve fiziksel ağrının etkileri eş zamanlı manipülasyonlar yapılarak incelenebilir.

4.6 Çalışmanın Uygulamaları

Anlamlı sonuçlar bulunamamış olmasına rağmen çalışmanın bazı uygulamalarından bahsedilebilir. İlk olarak sadece psikolojik olarak zayıf da olsa ağrı yaratılabildiği görüşmüştür. Hipokondriyak durumlarda kişinin bir hastalığı olduğuna dair beklentisi vücudundan beklenti sonucu uyarımlar yaratıyor olabilir. Bu beklentilere terapi ortamında meydan okunması önemli olabilir. İkinci olarak mevcut çalışma bilinçdışı suçluluğun fiziksel ağrı olarak duyumlanabileceği hipotezini yanlışlamamıştır. Tam tersine suçluluğun bilinçli olarak ortaya çıkmasının fiziksel ağrıyı baskıladığı gözlemlenmiştir. Kronik ağrı ve depresyon arasındaki ilişkiler (Katon, Egan, & Miller, 1985; Magni, Caldieron, Rigatti-Luchini, & Merskey, 1990), depresyonda suçluluğun önemli rol oynadığına yönelik sinirsel bulgular (Green, Ralph, Moll, Deakin, & Zahn, 2012) ve pozitif duyguların fiziksel ağrıyı baskılaması (Rhudy, & Meagher, 2001) gibi bulgular düşünüldüğünde, kronik ağrı hastalarının duygusal sağlıklarının teröpatik müdahalelerin temel bir hedefi olması gerektiği söylenebilir. Son olarak kronik ağrı hala tartışmalı bir konu olmaya devam etmektedir. Oluşan bilgi birikimi araştırmacıları belli noktaları incelemeye daha çok itse de kronik ağrıyı anlamak için biyospsikososyal bir yaklaşımın önemli olduğu unutulmamalıdır. Böylece biyolojik indirgemecilikten uzak durulabilir.

APPENDIX J: TEZ FOTOKOPİSİ İZNİ FORMU

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ■

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı : Türkarslan
Adı : Kutlu Kağan
Bölümü : Psikoloji

TEZİN ADI (İngilizce) : Expiation Through Psychogenic Pain

TEZİN TÜRÜ : Yüksek Lisans ■ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ■
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☐

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: