RE-EXPERIENCING SOCIAL VERSUS PHYSICAL PAIN AND ITS INFLUENCE ON SELF-REGULATORY RESERVE

by

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ABSTRACT

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This study examined the influence of reliving social pain on current reports of pain, self-regulatory ability, and differences in reactions. Participants (N=137) completed personality measures in phase one. Days later, participants completed a mood measure and the Stroop. They were randomly assigned to recall a physical pain, social pain, possession loss, or Monday morning. Participants indicated current degree of pain, level of psychological needs, and current mood. Participants again completed the Stroop. The researcher then offered participants cookies, but noted there was not enough for other participants. Participants recalling social pain reported more pain and greater threatened belongingness and meaningful existence compared to other groups. The number of cookies consumed was correlated with Stroop percent error and pain

reports when re-experiencing social pain. Personality traits amplified reported pain and threatened needs when re-experiencing social pain. Results indicate the influence of social relationships for self-control and individual differences in these processes.

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CHAPTER 1

INTRODUCTION

Self-regulatory failure is a prominent concern in today's society. Lack of ability to self-regulate effectively has been linked to a myriad of problems such as poor emotional control, alcohol abuse, smoking, addictions, overeating, hostility, debt, and behavioral control problems (Barkley, 1998; Baumeister, Heatherton, & Tice, 1994; Baumeister & Vohs, 2004). The connection between self-regulation and such impulse control problems has led some researchers to consider poor self-regulation as the "social pathology of the present time" (Baumeister, et al, 1994, p. 3). Heatherton and Vohs (1998) suggest self-control is important because it maintains the structure of groups and prevents rejection. As such, self-control bolsters relationships ranging from friendships to larger group relationships.

Furthermore, it has been suggested that self-control has an evolutionary basis that is inherently social in nature (Barkley, 2001, 2004; Heatherton & Vohs, 1998). Heatherton and Vohs assert that the ability to inhibit certain impulses is vital for positive social interactions. Brain damage or impairment, which affects the executive system and hence self-control, also results in social impairments (Barkley, 2001). In addition, self-regulatory disorders, such as Attention-Deficity/Hyperactivity Disorder (ADHD), are associated with social relationship impairments as well as behavior problems (Barkley, 2001, 2004). Indeed, many of the symptoms of ADHD are social in

nature including problems in communication, problems handling interactive conflict, and an inability to pay attention (Barkley, 1998). Such symptoms often result in children with ADHD being rejected by their peers. Children with ADHD also have strained relationships with both parents and teachers (Barkley). Furthermore, individual differences in personality traits associated with effortful control processes (i.e., conscientiousness) are linked with peer interactions. For example, Jensen-Campbell and Malcolm (in press) found that conscientious individuals are less victimized, have higher quality friendships, and are more accepted among peers whereas individuals low on conscientious evidenced more externalizing problems which negatively influenced peer relations.

Some researchers suggest that self-control and executive function may have even evolved due to the human ancestral group lifestyle. It is believed that group life required the development of activities such as reciprocal altruism, the ability to imitate and learn from others, the ability to use tools, the ability to communicate effectively, self-defense skills, and the ability to avoid social manipulation (Barkley, 2001; Heatherton & Vohs, 1998). Each of these activities requires skill in self-control, specifically skill in inhibition, which is a key component of executive function (Barkley, 2001). Heatherton and Vohs note that the ability to control inhibitions helps "maintain group structure and keep people from being rejected by the group" (p. 215). In addition, Barkley asserts that without a social basis other aspects of the executive function and self-regulation, such as planning, flexibility, or problem solving, are incomplete.

The link between self-control and interpersonal relationships appears to be bi-directional. Finkel and Campbell (2001) demonstrated that low levels of self-control cause a decrease in accommodative behavior. With high levels of self-control, more accommodative behavior is seen. Finkel and Campbell define accommodation as a willingness to inhibit negative responses in order to bolster the relationship when a partner acts in a potentially destructive manner. Their findings provide evidence that interpersonal relationships are affected by self-control.

Other researchers have found that relationships may influence the ability to self-regulate. Tice and Baumeister (2002) suggest that when people experience guilt in a relationship, they will increase their self-regulatory activities to help mend the relationship and reduce their guilty feelings. Mischel, Cantor, and Feldman (1996) reviewed literature demonstrating that public commitments to individual goals leads to support in reaching the personal goal thereby yielding greater use of executive functions (i.e., planning and implementation). Furthermore, when a partner is present to help distract oneself from temptation, it is easier to persist in a task (as reviewed by Mischel, Cantor, & Feldman). On the other hand, social relationships can also impair self-regulation. For example, Baumeister, Twenge, and Ciarocco (2003) found that individuals who are rejected by others are more likely to have impaired self-regulation.

Given the important link between social experiences and self-control, the current study examined how social experiences, specifically painful experiences, would deplete the self-regulatory reserve. In particular, this study examined the influence of social pain as compared to the influence of physical pain on one's ability to self-

regulate. In addition, this study examined whether there are individual differences in how pain affects one's self-regulatory ability.

I will begin by defining self-regulation and social pain and proceed to discuss previous links between self-regulation and social pain. I also examine neural mechanisms that may be responsible for these associations and propose that there is a unique aspect of remembering social pain which should result in a greater depletion of one's self-regulatory reserve as compared to remembering physical pain, negative memories, or mundane experiences. Finally, I will discuss limitations of previous research and explain how the current study can help fill important theoretical gaps in the literature.

1.1 Effortful Control

Self-regulation is a construct that is deemed important across many fields in psychology (e.g., cognitive, developmental, social, clinical). In cognitive psychology, self-regulation is discussed in terms of the central executive and is often considered the most important of the components within Baddeley's working memory model. The central executive governs other memory components, namely the phonological loop, the visuo-spatial sketchpad, and the episodic buffer (Baddeley, 1996; 2003). The central executive is also responsible for tasks such as coordinating behavior during competing circumstances, determining where attention is allocated, deciding which strategy should be implemented, deciding when to inhibit responses, and holding information in long-term memory (Baddeley, 1996; 2003).

As such, the executive function is an essential component of the self (Baumeister, 1998; Barkley, 2001). This aspect of the self governs the choices a person makes as well as the activities in which one engages. The executive function is responsible for planned and intentional behaviors such as problem solving, alternating tasks, inhibiting responses, and focusing mental attention (Baddeley, 1996; Baddeley, 2003; Barkley, 2001; Schmeichel & Baumeister, 2004). The executive function of the self allows controlled, effortful responses to occur (Baumeister; Schmeichel & Baumeister). In addition to initiating behavior, the executive function is also thought to influence and alter behavior that is already taking place (Baumeister). As such, one of the key components of executive function is the ability of the self to alter or override its initial reactions. Overriding initial reactions requires the ability to inhibit initial responses, focus attention, be self-aware, and appreciate the benefit of future outcomes over immediate outcomes (Barkley, 2001; Heatherton & Vohs) The executive function embodies both self-control and self-regulatory abilities (Baumeister; Barkley; Schmeichel & Baumeister).

In developmental psychology, executive function processes have often been discussed under the umbrella of effortful control (Kochanska & Knaack, 2003; Kochanska, Murray, & Harlan, 2000; Posner & Rothbart, 2000; Rothbart, 1989; Rothbart & Bates, 1998; Rothbart & Ahadi, 1994; Kieras, Tobin, Graziano, & Rothbart, 2005). Developmental researchers define effortful control as the ability to inhibit a dominant or common response in order to execute a subdominant or uncommon response. It is noted that effortful control encompasses an array of self-regulatory

mechanisms. Effortful control is generally seen as an active system as opposed to a passive system. As such, effortful control accounts for both active components (i.e. suppressing a behavior) as well as excitatory components (i.e. executing and maintaining an uncommon response) (Kochanska and Knaack, 2003).

Effortful control is believed to have temperamental origins or a biological basis (Ahadi & Rothbart, 1994; Rothbart & Bates, 1998; Rothbart, Derryberry, & Posner, 1994; Derryberry & Rothbart, 2001). In other words effortful control is a constitutionally based individual difference that "includes individual differences in basic psychological processes constituting the affective, activational, and attentional core of personality and its development" (Rothbart & Bates, 1998, pp. 108). More specifically, temperament focuses on "individual differences in emotional, motor, and attentional reactivity and self-regulation" (Rothbart & Bates, pp. 109). As reviewed by Ahadi and Rothbart, effortful control is the superordinate system that controls other more reactive elements of temperament (e.g. emotionality, activity).

Effortful control is also known to play an important role in one's development. Ahadi and Rothbart (1994) review literature suggesting a link between effortful control and the development of personality factors. For example, effortful control may directly influence neuroticism, one of the Big Five dimensions, through decreased feelings of anxiety and negative affect. Agreeableness is thought to have temperamental origins in effortful control and may be influenced by the degree to which one can regulate anger and frustration in daily social interactions. Furthermore, Kochanska, Murray, and Coy

(1997) indicate that effortful control plays a role in the development of conscience in children.

Social psychologists, who are not necessarily in opposition to developmental or cognitive psychologists, define self-regulation as an effortful attempt to control or alter one's own response that requires the use of one's executive function (Muraven, Tice, & Baumeister, 1998; Schmeichel & Baumeister, 2004). Baumeister (1998) suggests that people control and alter their behavior by setting personal guidelines through which they are rewarded upon completion and punished upon failure to fulfill these guidelines. Similarly, self-control has been defined as an attempt to alter the way a person thinks, feels, and behaves (Muraven & Baumeister, 2000). Carver (2004) notes that self-regulation is purposeful behavior in which the individual makes adjustments in behavior in order to achieve personal goals.

Some social psychologists make a distinction between self-regulation and self-control. Self-control involves a more deliberate and conscious inhibition of impulses whereas self-regulation refers to broader goal-directed behaviors (Schmeichel & Baumeister, 2004; Vohs & Baumeister, 2004). Although this distinction is important, the current study will follow current research in using these terms interchangeably (Vohs & Baumeister). In addition, cognitive control can be further divided into withdrawal/inhibition and approach/activation control abilities (Baddeley, 1996; Dagenbach & Carr, 1994). Inhibition can include abilities such as selective attention, cognitive suppression (e.g., ability to control rumination), and response inhibition (e.g., Stroop performance, controlling cookie consumption). Self-control abilities associated

with approach/activation can include task switching or strategy use. For the current study, we focused solely on inhibition tasks.

From a neuroscientific perspective, one of the brain regions primarily responsible for self-regulatory and executive functions is the prefrontal cortex (PFC) (Banfield, Wyland, Macrae, Munte, & Heatherton, 2004; Goldberg, 2001; Luria, 1973). Goldberg (2001) offers the analogy of the PFC acting as an orchestra conductor that is overseeing and directing the rest of the brain. For example, the PFC is responsible in the behaviors and actions described above (i.e., attention allocation, problem solving, inhibiting responses) (Banfield, et al.; Goldberg). Self-regulation is thought to emerge with the maturation of the frontal cortex; this system of higher-level control appears at approximately 6 to 12 months of age and corresponds to the development of the PFC throughout the preschool years and again in adolescence (e.g., Rothbart, Derryberry, & Posner, 1994; Ruff & Rothbart, 1996). While the PFC initiates these control processes, the anterior cingulate cortex (ACC) is thought to be responsible for the more intricate details of altering and adjusting the control processes (Ochsner & Gross, 2004). In this sense, the ACC is an important area associated with traditional executive functions (i.e. attention and inhibition of response). Failure of the ACC results in disorders involving a deficiency in behavioral inhibition such as obsessive-compulsive disorder and attention-deficity/hyperactivity disorder (Barkley, 2004; Banfield, et. al).

1.2 Evidence for Depletion of Self-Regulation

The strength model for self-regulation has received much support (Baumeister, 1998; Schmeichel & Baumeister, 2004; Muraven, Tice, & Baumeister, 1998; Muraven

& Baumeister, 2000; Vohs & Ciarocco, 2004). This model states that self-regulation is similar to a muscle in that when overworked, fatigue results (Muraven, Tice, & Baumeister). In fact, the effectiveness of behaviors involving self-regulation is dependent upon recent past self-regulatory behaviors even if the behaviors are seemingly unrelated (Schmeichel & Baumeister; Muraven & Baumeister; Muraven, Tice, & Baumeister; Vohs & Ciarocco). For example, Muraven, Tice, and Baumeister found that when people regulated their emotions, there was a substantial decrease in their ability to maintain physical stamina. Muraven and Baumeister further reported that prior acts of self-regulation affect subsequent regulating behaviors such as stress levels and emotions. This self-regulatory dependence upon prior self-regulatory acts has consistently been found using a variety of techniques and measures of self-regulation. These findings show that there is a limited reserve of self-regulatory ability that can be depleted through behaviors involving self-regulation. It is worth noting that behaviors not involving self-regulation do not impair future attempts at self-control (Muraven & Baumeister).

1.3 The Importance of Social Relationships

An important empirical question involves what might deplete the ability to regulate one's behavior. As stated previously, one possible answer may involve social relationships. Many researchers believe that maintaining social relationships with others and belongingness are fundamental needs (Baumeister & Leary, 1995). According to Baumeister and Leary, individuals are driven to form and maintain positive, significant,

lasting relationships. This need to belong drives people to engage in frequent and positive interactions.

Moreover, Bowlby (1979) reports that interpersonal bonds, regardless of the stage of the relationship (i.e., development, maintenance, or loss of a bond), elicit the most intense emotions that humans feel. The loss of central relationships (i.e. parent-child, loved one) can result in anxiety, depression, grief, and even suicide (Bowlby, 1979; 1980). In addition, this loss "is one of the most intensely painful experiences any human being can suffer" (Bowlby, 1980, pp. 7). Interestingly, Bowlby also notes that seeing another person grieving the loss of a loved one can be comparably difficult to personally losing a loved one.

Seeley and Gardner (2003) also suggest that the need to belong encourages a strengthening in one's self-regulatory reserve. They demonstrated this idea by showing that individuals from a collectivistic culture, who are thought to be motivated to act on the need to belong, were able to persist longer in a handgrip task than those from an individualistic culture, who are thought to be taught to focus more attention on personal desires.

Baumeister and Leary (1995) assert that there is a fundamental need to belong and form lasting relationships. MacDonald and Leary (2005) even go further to suggest that the importance of maintaining social relationships and avoiding the possibility of social exclusion may have been vital to ancestral survival. Social relationships are so vital that threats to relationships (i.e. exclusion) may be processed as a basic survival threat (MacDonald & Shaw, 2005; MacDonald & Leary). On the other hand, knowing

that a trusted person is supportive and willing to intervene in the presence of difficulties or problems allows people to test their talents and abilities confidently (Bowlby, 1979).

Leary and Springer (2000) also highlight the importance of social relationships through the widespread experience of hurt feelings. They report that 20% of college students experience hurt feelings at least once a week whereas 60% of college students experience hurt feelings more than once a month. According to Leary and Springer, hurt feelings can be a result of minor incidents (i.e. a forgotten birthday, thoughtless remarks) or substantial incidents (i.e. betrayal by a close friend, public humiliation). Hurt feelings occur due to a person feeling that another person does not place the desired importance and value on the relationship (Leary & Springer). The intense negative feeling of hurt feelings might result due to an increased probability of social exclusion (MacDonald & Leary, 2005). In fact, participants' ratings of the degree of hurt they felt correlated with how rejected they felt (Leary, Springer, et al., 1998). This correlation was seen even though it had been over a year since most of the reported events had occurred.

1.4 Social Pain versus Physical Pain

Hurt feelings can be seen as part of the larger construct of social pain. Eisenberger and Lieberman (2004) and MacDonald and Leary (2005) define social pain as a particular emotion that is experienced when social relationships are (or are perceived to be) injured or harmed. Physical pain, on the other hand, is experienced when the body is injured or harmed. In day-to-day life, people devote much attention and understanding to physical pain and the accompanying healing process. Until

recently, the pain associated with social loss, social rejection, social exclusion, and ostracism – inclusively called social pain – has been overlooked in both day-to-day understanding and in pain research. In their Social Overlap Theory, Eisenberger and Lieberman (2005) suggest that aspects of the same underlying processing system are shared between social and physical pain. Indeed, similarities between physical pain and social pain have been highlighted in the shared activated regions of the brain when experiencing and reliving the pain (Eisenberger & Lieberman; MacDonald & Leary).

Previous research has dubbed the anterior cingulated cortex (ACC) as the "neural alarm system," which sounds at the detection that something has gone wrong. Previous research asserts that pain is a natural indicator that "something is wrong" (as cited in Eisenberger, Lieberman, & Williams, 2003; Craig, 1999). Because physically painful experiences are typically harmful to our bodies, it is not unusual that physical pain has been found to activate the ACC (as cited in Eisenberger, Lieberman, & Williams). More precisely, the dorsal ACC is activated when the affectively distressing component of pain is prominent. In fact, Eisenberger and Lieberman (2004) suggest that the ACC is involved in recognizing the distress associated with physical pain although not the intensity of the pain. In addition to the ACC being activated by physical pain, Eisenberger, Lieberman, and Williams found that social exclusion was associated with greater ACC activation as well as heightened self-reports of distress. The prefrontal cortex (PFC) is another brain region that appears to be activated by both physical and social pain experiences. The PFC is largely responsible for alleviating some of the

emotional distress experienced from pain and thus lessens the signal given by the ACC (Vastag, 2003).

In addition to relying on the same neural correlates, Eisenberger and Lieberman (2004, 2005) suggested that decreasing one's sensitivity to one type of pain would, in turn, reduce one's sensitivity to the other type of pain. For example, the presence of others can increase an individual's tolerance for intense electrical shock (Amoroso & Walters, 1969; Buck & Parke, 1972). In addition, people who experienced a personal failure (scoring below average on a college entrance exam and reading comprehension task, respectively) reported higher pain ratings on a subsequent cold-pressor task (van den Hout, Vlaeyen, Peters, Engelhard, & van den Hout, 2000; Levine, Krass, & Padawer, 1993). Furthermore, Eisenberger, et al. (2006) found that participants with a lower sensitivity to physical pain thresholds reported heightened distress responses when experiencing rejection during an on-line ball tossing game. Finally, many older patients have been admitted to coronary care units after experiencing social pain (i.e. hearing about the death of a loved one, being in an argument) with symptoms similar to a heart attack, namely chest pain and difficulty breathing; this phenomena has been named "broken heart syndrome" in the medical community (Wittstein, et al., 2005).

1.5 Differences between Social Pain and Physical Pain

While there are definite similarities between social pain and physical pain, it is important to recognize the notable differences between these two types of pain. Pain has two components: (a) the sensory-discriminative component, which consists of information such as the location, duration, and intensity of the painful stimulus and (b)

the affective-motivational component, which consists of information such as emotions caused by the painful stimulus (Craig, 1999). As such, pain is often discussed in terms of "pain sensation" and "pain affect," with the pain sensation being the focus of most pain research. It is important to note that the biological pathway of each component is different. The most commonly discussed sensory-discriminative component pathway includes neurons in the spinothalamic tract, the thalamus, and the primary somatosensory cortex. In addition to the pathways found in the sensory-discriminative component, the affective-motivational component of pain also consists of the medial thalamus, the hypothalamus, the amygdala, and the limbic cortex (Craig). Physical pain is believed to be comprised of both the sensory-discriminative component as well as the affective-motivational component. On the other hand, social pain is thought to rely on the affective-motivational component of pain (Craig; MacDonald & Leary, 2005; MacDonald & Shaw, in press).

Another distinction between physical pain and social pain is the way in which the pain is remembered. For example, Williams and Fitness (2004) found that people wrote significantly more when recalling socially painful experiences as compared to physically painful experiences. They also found that participants reported that it was easier to re-experience social pain than to re-experience physical pain. In addition, participants re-experienced social pain more intensely than physical pain (Williams & Fitness).

1.6 Individual Differences in Reactions to Social Pain

People often react differently when faced with experiences of social pain. Often, differences in reactions to social pain can be traced to underlying individual differences. One such underlying individual difference is people's reaction to rejection. Reactions to rejection are typically strongly emotional, perhaps due to the high importance of interpersonal relationships (Kelly, 2001; Leary, 2001; Leary, Koch, & Hechenbleikner, 2001).

Overall, most people find rejection highly distressing and attempt to avoid instances of possible rejection (Leary, 2001; Leary, Koch, & Hechenbleikner, 2001). People high in rejection sensitivity anxiously expect others to reject them, easily perceive instances of rejection, and overact to instances of rejection whether the rejection is real or perceived (Downey & Feldman, 1996; Downey, Feldman, & Ayduk, 2000; Brookings, Zembar, & Hochstetler, 2003). Sensitivity to rejection appears to develop from previous experiences of rejection (Levy, Ayduk, & Downey, 2001). This idea centers on the intensity of the relationship and how much value was placed upon the relationship. Levy, Ayduk, and Downey report that rejection from one relationship (i.e. from parents) can influence one's sensitivity to possible rejection from another relationship (i.e. from peers).

Downey and Feldman (1996) performed a series of studies examining the role of rejection sensitivity in reactions to social pain. In Study 2, Downey and Feldman found that people who were high in rejection sensitivity were more likely to feel rejected when in an ambiguous situation. When termination of an interaction was

explicitly nonrejecting there were no differences found in feelings of rejection between persons high and low in rejection sensitivity. This study highlights that one's level of rejection sensitivity influences perceptions of rejection in an ambiguous situation. Downey, Lebolt, Rincon, and Freitas (1998) found similar results with children in that children high in rejection sensitivity were more distressed and reacted more negatively in an ambiguous situation than children low in rejection sensitivity.

Furthermore, in Study 3 Downey and Feldman (1996) found that levels of rejection sensitivity prior to the start of a relationship influenced whether people perceived a partner's insensitive behavior as being rejecting or not. In Study 4, they found that high levels of rejection sensitivity led to relationship dissatisfaction and insecurity. Levels of rejection sensitivity also affected partner's satisfaction in the relationship. Downey, et al. (1998) also found that rejection sensitivity plays a role in relationships. Specifically they found that over time, children high in rejection sensitivity were found to have more problems with peers and teachers, experience more victimization, and behave in a more aggressive and anti-social manner than children low in rejection sensitivity. Kelly (2001) notes that being rejected early in life affects sensitivity to future rejection situations.

Another difference in reactions to social pain may involve how easily people's feelings are hurt. Hurt feelings, whether caused by large or small events, cause distress and damage within relationships (Leary, 2001; Leary, Springer, et. al, 1998; Leary & Springer, 2001). According to Leary, et al., hurt feelings are a result of relational devaluation. In other words, hurt feelings are due to one person feeling that another

does not value the relationship as much as desired. Examples of relational devaluation may include feeling unappreciated, being teased, being betrayed, or being criticized (Leary & Springer). Furthermore, the distress or damage within the relationship can often be irreversible and may affect people's ability to trust in future relationships. Hurt feelings can be the result of intentional actions (i.e. explicitly trying to hurt another) or unintentional actions (i.e. being unaware of hurting another) (Leary, et al.). Leary, et al. also note that the degree to which people's feelings are hurt correlate with the degree to which they feel rejected by another individual. In sum, proneness to hurt feelings may alert people to possible instances of social pain by drawing attention to the potential for exclusion or rejection (Leary & Springer).

In addition, individuals differ in their reactions to pain and their perceptions of the pain experience. For example, pain catastrophizing has been defined as an exaggerated negative and often maladaptive response to a painful stimulus (Sullivan, Bishop, & Pivik, 1995). Pain catastrophizing levels predict sensitivity to pain and quality of life and is often associated with increased pain intensity, negative thoughts linked to pain, emotional stress, and difficulty disengaging from the pain experience (Seminowicz & Davis, 2006; Sullivan, Bishop, & Pivik). As such, individual differences in levels of pain catastrophizing greatly influence the experience of pain and how persons respond to painful stimuli. According to Sullivan, Adams, and Sullivan (2004), individuals high in pain catastrophizing engage in fewer cognitive coping mechanisms than persons low in pain catastrophizing. Sullivan, Bishop, and Pivik identify three components of pain catastrophizing, namely rumination, magnification,

and helplessness. They suggest that helplessness may be related to individuals' negative appraisal of their ability to cope with the pain stimulus. Thus, persons higher on pain helplessness may be especially vulnerable to situations that threaten their control. Magnification and rumination may be associated with focusing on and exaggerating painful stimuli. In sum, each of these pain catastrophizing dimensions appears to be associated with poor self-control in painful situations.

1.7 The Link between Self-Control and Social Pain

Given the importance of social relationships, it is worthwhile to consider the link between social relationships and self-control. Studies reviewed by Vohs and Ciarocco (2004) connect this need to belong with the importance of self-regulation. Vohs and Ciarocco argue that self-regulation is important in maintaining interpersonal relationships as well as helping individuals fit into society. For example, Heatherton and Vohs (1998) show that awareness of society's expectations of self-control is vital to being accepted. Furthermore, people sensitive to these expectations are more effective in self-regulating than those who are unaware of society's expectations (Seeley and Gardner (2003). Vohs and Ciarocco assert that the need to belong may be a motivating force behind developing self-regulatory abilities. Furthermore, there appears to be a negative relationship between low self-control and poor social bonds (particularly moral belief) and the amount of drug use, suggesting that a model integrating social bonds and self-control may help account for a larger portion of variance explaining drug usage (Longshore, Chang, Hsieh, & Messina, 2004).

Evidence also indicates that threats to belonging can have negative effects on one's self-regulatory ability. For example, Baumeister, DeWall, Ciarocco, and Twenge (2005) conducted a series of six studies showing that self-regulation is diminished by social exclusion. Social exclusion was manipulated in two ways: feedback indicating a lonely future and peer rejection in which no one wanted to work with the participant. Baumeister et al. measured self-regulation in several ways: ability to consume a healthy yet bad-tasting beverage, number of cookies eaten, persistence on frustrating tasks, and attention regulation during a dichotic listening task. In each case, experiences of social exclusion led to impaired ability to self-regulate. Looking at the relationship between social exclusion and self-regulation from an alternative angle, researchers have found that rejecting another person subsequently depletes the rejecter's self-regulatory reserve (as reviewed in Vohs & Ciarocco, 2004). These studies provide evidence suggesting that social exclusion can significantly deplete one's self-regulatory reserve.

The current literature examines whether certain past behaviors involving self-control deplete the self-regulatory reserve. However, a lack of research exists on how emotional distress affects the self-regulatory reserve. Baumeister (1998) suggested that perhaps emotional distress drains the reserve through efforts to reduce the felt distress. The current study seeks to provide further support that there is a limited reserve of self-regulatory ability, which can be depleted by coping with emotional distress that arises from social relationships. As such, it is predicted that coping with the emotional distress of recalling past socially painful experiences will result in a larger depletion of self-

regulatory ability than recalling other past experiences (i.e. physical pain, sad events, or neutral events).

1.8 Vocabulary of Pain

One potential way to examine differences between social pain and physical pain and its influence on self-regulation is to explore how people describe their painful experiences. In other words, the descriptions of pain could be subjected to linguistic analyses. According to Leary and Springer (2001), the vocabulary used when discussing socially painful experiences mirrors the vocabulary used when discussing physically painful experiences. Eisenberger and Lieberman (2004) also refer to the similarity in language between social pain and physical pain experiences. For example, people speak of their "broken hearts" or "hurt feelings." While identifying this overlap in terminology is an important first step, it is important to look at how people talk about an experience rather than solely looking at what they are talking about (Campbell & Pennebaker, 2003; Pennebaker, 2002; Pennebaker & King, 1999; Pennebaker, Mehl, & Niederhoffer, 2003).

Pennebaker and his colleagues suggest that the way people write may be as informative as what is being written about. Pennebaker suggests that how people utilize words can provide a clearer and deeper insight into psychological processes than strictly looking at which words are being used. For example, Cohn, Mehl, and Pennebaker (2004) found that people's linguistic style in on-line diaries significantly changed following the September 11th plane crashes. This stylistic change was taken to be reflective of the psychological, emotional, and cognitive changes caused by the

September 11th trauma. In addition, changes in linguistic style have been found to provide markers of people's personality that are independent of traditional personality tests (Cohn, Mehl, & Pennebaker; Pennebaker & Graybeal, 2001). For example, Pennebaker and Graybeal report that language correlates with physical health, alcohol use, and school grades, all of which rely on aspects of self-regulation.

By examining how people use language, researchers may gain insight into how particular experiences relate to people's cognitive functioning, personality, and social lives (Pennebaker & King, 1999; Pennebaker & Graybeal, 2001). Certain words are worth taking a closer look at (Pennebaker, Mehl, & Niederhoffer, 2003). Campbell and Pennebaker (2003) found that changes in writing style predicted number of visits to the physician. Specifically, changes in pronoun usage predicted improvement in health. Pronouns fall in the larger linguistic category of particles, which consists of prepositions, articles, auxiliary verbs, and conjunctions. This group of words is used in tying together different sentence components and can take the place of proper nouns. This ability to predict improvements in health from changes in pronouns is important because it suggests that examining changes in linguistic style, particularly in the linguistic category of particles, can help make important psychological predictions. According to Campbell and Pennebaker, particles account for over half of the words we use in our day-to-day vocabulary. Interestingly, it is the day-to-day changes in linguistic style, specifically one's use of particles, that predict changes in health rather than overall net changes.

1.9 Limitations to Previous Studies

As discussed above, while much advancement has been made in the study of self-regulation and social experiences, there is a shortage of literature available connecting the two areas of research. The current study seeks to begin to bridge this gap in the literature. Specifically, there is a shortage of information addressing the influence of social pain on self-control. As discussed above, previous studies have indicated that there is an inherent need to belong (Baumeister & Leary, 1995) and that failure to develop and maintain interpersonal relationships leads to feelings of distress and anxiety. Other researchers have found a difference in how physical pain and social pain are recalled (Williams & Fitness, 2004). The present study seeks to bridge the gap in the literature between social pain experiences and its influence on self-regulation. Furthermore, this study will provide a clearer understanding of the importance of dealing with pain, namely social pain. Because self-regulation is such an integral part of every day life, this study could have widespread implications and benefits for society.

1.10 Present Study

The present study sought to determine whether pain in general influences self-regulation or whether a unique aspect of social pain as compared to physical pain exists that depletes the self-regulatory reserve. The first four hypotheses examined whether re-experiencing social pain influenced current reports of pain and threatened needs. It was anticipated that socially painful experiences would be associated with greater reports of pain compared to the other three conditions (Hypothesis 1). Second, it was anticipated that re-experiencing social pain would be associated with increased reports of negative

affect (i.e., fear, anger) as compared to re-experiencing physical pain (Hypothesis 2). Third, it was predicted that recalling social pain as compared to physical pain would result in greater threatened needs (i.e., belongingness, meaningful existence, control, self-esteem) (Hypothesis 3).

The linguistic styles of the essays were examined to determine if the recall of socially painful experiences significantly differed from the recall of physically painful experiences (Hypothesis 4). It was expected that participants who recalled experiences of social pain would have longer essays than participants recalling other experiences would. LIWC can provide a valuable insight into how people recount painful experiences and how language correlates with behaviors dependent upon self-regulation. It was anticipated that persons who reported a physical or social pain would use more pain words in their essay. Moreover, it was predicted that social pain experiences would involve more references to social processes than would physical pain or material loss. Third, I expected social pain essays to involve more negations than would other relived experiences. Fourth, I hypothesized that social pain experiences would involve more discussion of metaphysical issues (e.g., religion, death and dying) than would other relived experiences. Finally, I expected differences in the use of affective and emotional processes. For example, I expected persons who relived painful experiences would use words associated with negative emotions (e.g., fear, anger) than would persons who re-experienced material loss or a routine Monday morning.

A second set of hypotheses examined the relationship between social pain and self-regulatory depletion. That is, I examined how writing about and re-experiencing

painful experiences would deplete the self-regulatory reserve. It was expected that recalling social pain would deplete the self-regulatory reserve at a greater rate than recalling physical pain, material loss, or mundane experiences would (Hypothesis 5). As such, it was anticipated that participants who recalled an experience of social pain would exhibit a greater impairment in self-regulation than would participants who recalled an experience of physical pain, a nonsocial pain experience, or a neutral non-painful experience.

Finally, it was expected that rejection sensitivity, hurt proneness, and components of pain catastrophizing (i.e., magnification, rumination, helplessness) would moderate the relation between re-experiencing social pain and current self-reported pain and threatened needs (Hypothesis 6). It was also anticipated that persons higher in these dimensions would experience greater self-regulatory depletion when they experienced social pain (versus physical pain) compared to persons lower in these dimensions. (See Figure 1.1 for the theoretical model.)

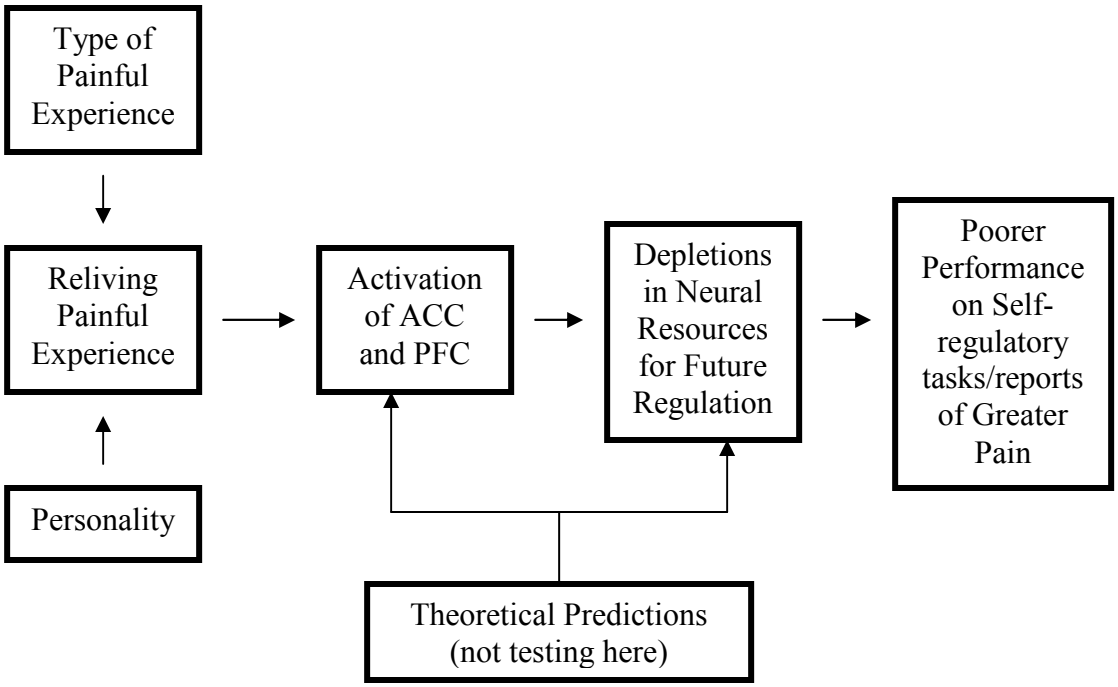


Figure 1.1 Theoretical Model

CHAPTER 2

METHOD

2.1 Participants

Undergraduate men (n = 53) and women (n = 84) in introductory to psychology courses and upper level psychology courses at the University of Texas at Arlington participated for partial course credit. Using a power analysis with an anticipated effect size of .30 (medium effect size) and a desired power of .80, it was determined that 31 participants were needed per group (see Cohen, 1988, pp. 380-391). The actual number of participants per group exceeded the number determined by the power analysis (n_{social} = 34, $n_{physical}$ = 33, $n_{material}$ = 34, n_{Monday} = 36).

The current sample consisted of 61.3% female participants and 38.7% male participants. This sample is reflective of the gender composition of the overall subject pool as reported in the pretest (60% females, 40% males). Participants were at least 18 years of age (M = 23.22, SD = 5.99) and ranged in age from 18.08 to 50.67. Participants were fluent in English with 95.6% of participants frequently speaking English and 73% of participants reporting English as their first language. Socioeconomic Status (SES) information was available for roughly half of the sample (n = 63). The socioeconomic status of participants was variable with 13% reporting income less than $30,000 a year, 13.8% reporting $30,000 - $50,000, 7.2% reporting $50,000 - $70,000, 2.9% reporting $70,000 – $90,000, 4.3% reporting $90,000 - $110,000, 1.4% reporting $110,000 -

$130,000, and 2.9% reporting more than $130,000. These numbers are somewhat reflective of the subject pool (19.6%, 23.6%, 18.2%, 10.6%, 12.6%, 5.8%, and 9.5%, respectively). The racial composition of the sample included 41% White/Anglo-American, 24.8% Asian, 17.5% Black/African American, 13.9% Hispanic/Latino, and 2.2% Other.

2.2 Materials

2.2.1. Rejection Sensitivity Questionnaire (RSQ)

The RSQ is a measure consisting of 36 items that assesses the anxious expectations of rejection when making a request of a significant other (Downey & Feldman, 1996). Each item creates a hypothetical situation in which interpersonal interactions may result in rejection (i.e., "You ask someone in class if you can borrow his/her notes"). For each item, participants indicate on a six-point Likert-type scale the degree of anxiety and concern over the outcome (i.e., "How concerned or anxious would you be about how the other person would respond?") as well as how likely they think the other person will respond (i.e., "How do you think the other person would be likely to respond?"). RSQ scores are computed by first reverse-scoring the expectancy of acceptance. Next, the rejection sensitivity of each question is calculated by multiplying the rejection concern by the acceptance expectancy and then averaging the scores across the 18 items. The RSQ had a high internal reliability in the present sample with $\alpha = .84$.

2.2.2. Hurt-Proneness Scale

The Hurt-Proneness Scale is a measure that assesses the frequency of how easily people's feelings are hurt (Leary & Springer, 2001). Participants indicate on a five-point scale the degree to which each of the six statements are true or are characteristic of them. The Hurt-Proneness score is computed first by reverse scoring statements 3, 4, and 6 and then summing all the responses. In the current sample, the Hurt-Proneness Scale was found to have high reliability with $\alpha = .78$.

2.2.3. Pain Catastrophizing Scale (PCS).

The PCS is a measure that assesses the cognitive and affective responses to pain (Sullivan, Bishop, & Pivik, 1995). The PCS is comprised of three subscales including rumination (i.e., I can't seem to keep it out of my mind), magnification (i.e., I become afraid that the pain will get worse), and helplessness (i.e., I feel I can't go on). Participants indicate on a five-point scale (where 0 = not at all, 4 = all the time) the degree to which they experience particular thoughts and feelings during an experience of pain. Scores are computed by summing the scores within each subscale. In the current sample, the rumination and helplessness subscales both had high reliability (α = .87, .84, respectively). The magnification subscale had a relatively low reliability (α = .61).

2.2.4. Emotional Assessment Questionnaire (EAQ).

The EAQ was adapted from a mood questionnaire used by Harmon-Jones & Sigelman (2001). This 24-item Likert-type scale assessed the current mood of the participant before and after writing their essay. Each item contained an emotion word

for which participants indicated to what extent the word matched their current emotional state. Participants responded to each mood word by using a scale of 1 (*very slightly or not at all*) to 5 (*extremely*). Emotions assessed included changes in anger (i.e. angry, bad, irritable, annoyed, agitated, hostile, frustrated), fear (i.e. afraid, scared, nervous, jittery), general negative affect (angry, bad, irritable, annoyed, agitated, hostile, frustrated, afraid, scared, nervous, jittery) and positive affect (i.e. good mood, happy, uplifted, alert, active, determined, enthusiastic, excited, inspired, interested, proud, strong, attentive) (Harmon-Jones & Sigelman, 2001). Only the negative emotions of anger and fear were examined in this study. Specifically, I examined changes in mood by regressing the pre-score onto the post-score (Appelbaum & McCall, 1983; Cronbach & Furby, 1970). In other words, all analyses were run using the standardized residual mood scores as the dependent measure. (See Table 1 for reliability estimates of mood.)

2.2.5. McGill Pain Questionnaire (MPQ).

The MPQ is a 78-item self-report questionnaire used to assess pain syndromes. The MPQ contains 20 subcategories that fall into one of four major dimensions of pain quality including Sensory, Affective, Evaluative, and Miscellaneous (Melzack, 1975). For the current analyses, only the present pain intensity subscale was examined.

2.2.6. Wong-Baker FACES Pain Rating Scale.

The Wong-Baker FACES Pain Rating scale consists of a 10-point scale (1 = no pain, 10 = intense pain) which assesses the intensity of the pain being experienced. Participants identify the face that best matches the pain intensity they are experiencing.

2.2.7. Stroop Task.

The Stroop task is a traditional executive function measure associated with PFC and ACC activity. For example, ACC activity has been found during tasks such as the Stroop that require decisions involving competing response choices associated with executive control (Awh & Gehring, 1999). For example, during each trial participants are presented with color words (i.e., blue, red, green) for which they are to name the ink color and inhibit the automatic process of reading the color word (i.e., the word *green* written in blue ink). The Stroop task was originally developed to explain interference (MacLeod, 1991). In addition, the Stroop task is one of the most well known measures for collecting information about attention processes (MacLeod, 1991; 1992). Posner and Rothbart (2000) note that the Stroop task is a direct measure assessing "executive attention," which is a key component of self-regulation.

Participants were counterbalanced to complete both a congruent condition (the written word matches the ink color) and an incongruent condition (the written word differs from the ink color). The Stroop task was completed on a computer using the LSA Stroop program for Windows. Two measures of self-control were assessed: reaction time (RT) and percent errors (PE). First, reaction times (RT) required for identifying the incongruent ink color controlling for RT of identifying congruent ink color words were computed by regressing the congruent RT onto the incongruent RT for both pre- and post-Stroop tasks and obtaining the standardized residuals. Second, percent of errors (PE) for identifying incongruent ink color words were computed by

regressing the congruent PE onto the incongruent PE for both pre- and post-Stroop tasks.

2.2.8. Cookie Task.

The cookie task served as an additional measure of self-regulatory ability. As part of this task, the participant was left alone with a plate full of cookies while the experimenter presumably went to retrieve a forgotten survey. A pre-counted mix of seven raspberry cookies and 8 chocolate chip bite-size cookies were placed on a plate prior to the participant's arrival and moved out of view. Upon completion of the second stroop task, the experimenter offered each participant a snack but feigned surprise that there were so few left. She stated, "Oh no! It doesn't look like there are that many cookies left… well, I'll have to figure something out for the next participant. Help yourself if you'd like and I will have to figure something out later." The experimenter then left the participant with the plate of cookies for five minutes. Baumeister, et al. (2005) found that the weakening of self-control is linked with the consumption of a greater number of cookies in a similar cookie task (i.e., a cookie taste test). A larger number of cookies eaten thus indicated a larger depletion in self-regulatory ability.

Due to the high positive skewness and kurtosis of the cookie measure (skewness = 1.79; kurtosis = 5.32), I transformed the data by taking the natural log (after adding a constant of one to each cookie score). Indeed, 34 participants ate no cookies. This procedure is an accepted method for dealing with positively skewed data (skewness = -0.13; kurtosis = -0.92) (Fox, 1997, pp. 64-65).

2.2.9. Rumination Questionnaire (RQ).

Participants completed a 5-item Likert-type scale (1 = not at all, 4 = all the time) to assess current rumination. For example, questions tapped into the extent that the recalled experience intruded post-recall thoughts and whether persons anxiously thought about the experience post-recall. There was poor reliability between questions, $\alpha = .51$.

2.2.10 Need Threat Scale.

The Need Threat Scale is a 20-item measure that assessed the degree to which psychological needs were threatened (Zadro, Williams, & Richardson, 2004). There are four subcomponents of the Need Threat scale, namely belonging, self-esteem, control, and meaningful existence. Five Likert-type items (1 = not at all, 5 = extremely) assessed each need. Each psychological need was found to have high reliability (αs = .76, .88, .70, and .77, belongingness, self-esteem, control, and meaningful existence, respectively). The Need Threat Scale also included mood items that were not examined in this thesis.

2.2.11. Manipulation Check Questionnaire.

This questionnaire consisted of 13 questions that assessed the degree to which participants re-lived versus remembered the personal experience. Eight of these questions were in Likert form with a scale from 1 to 5. Four of the questions were in short answer format and collected information regarding how many times the event had been discussed, with whom it had been discussed, and the essay topic focus. Finally, the

last question was a forced choice question that indicated whether the participant *relived* the experience or *retold* the experience while writing the essay.

2.3 Procedure

In Phase I, participants completed the Rejection Sensitivity Questionnaire (RSQ), the Hurt-Proneness scale, and the Pain Catastrophizing Scale (PCS). This series of questionnaires assessed participants' sensitivity to hurt or pain. Participants also completed additional surveys that are part of a larger study. Most students who completed phase one returned for the second phase of research.

A between-subject design was used in which participants came into the lab for a session lasting approximately one hour. Participants signed consent forms and completed the EAQ as a baseline measure of mood. In addition, all participants completed the Stroop task to serve as a baseline measure of self-control. Participants were then randomly assigned to one of four conditions in which they were instructed to recall in detail a time in the last five years of their life when either (1) they had been physically injured (an experience of physical pain), (2) they had been socially injured (an experience of social pain), (3) their typical Monday morning routine (a neutral, non-painful experience), or (4) they lost an important material possession (a nonsocial pain experience). The recall of the experience was typed in an essay-like format using a word processing program on a computer. They were directed to recall what happened in as much detail as possible and to give a step-by-step recount of what happened. In addition, participants were instructed to consider how they felt during the experience and to include their feelings in as much detail as possible in their essay. Finally,

participants were told to take a moment to try as hard as possible to relive the experience and not to just remember it. (See Appendix D for actual directions.)

After completing the essay, participants filled out the McGill Pain Questionnaire (MPQ) in relation to the respective pain experience they recalled and indicated on the Wong-Baker FACES pain slide the degree of pain that they were experiencing. In addition, participants completed the manipulate check questionnaire to determine to what degree they were re-experiencing versus recalling their experience.

Participants then completed the Stroop task. At the end of the Stroop task, the experimenter offered each participant a snack of cookies. As the experimenter placed the plate of cookies down, she noted that there were "not that many left" and commented that she would need to figure something out for the next participant. The experimenter then supposedly realized she forgot to print a survey and stated that she needed to go print it before the participant could complete the last batch of questionnaires. She left the room for five minutes before returning.

Upon the experimenter's return, participants again completed the EAQ in order to re-assess their mood. In addition, they completed the Zadro, Williams, and Richardson (2004) Need Threat Scale, the Rumination Questionnaire, and the Wong-Baker FACES scale. Participants were then fully debriefed as to the true nature of the study and were given an opportunity to discuss their reactions to the recall of past experiences.

2.4 Linguistic Analysis and Word Count

All essays were subjected to a linguistic analysis using a computer program called Linguistic Inquiry and Word Count (LIWC2001; Pennebaker, Francis, & Booth, 2003). This program categorizes words into either psychologically relevant or linguistically relevant categories (Pennebaker & Graybeal, 2001; Pennebaker, 2002). Thus, experimenters can calculate the percentage of emotion words, cognitive words, and self-reference words that are used. In addition, the LIWC zeros in on the linguistic style people utilize by identifying patterns of high usage words such as prepositions, conjunctions, and pronouns. Finally, it allows researchers to create their own dictionary of terms. This ability is beneficial to identify whether the way people describe their re-experience of social pain differs from the way people describe their re-experience of physical pain. Additionally, these differences can be correlated with differences in self-reported pain and self-control depletion.

CHAPTER 3

RESULTS

3.1 Manipulation Checks

Analyses were performed to determine the extent to which participants re-experienced the pain experience as opposed to recalled the pain experience. It was expected that the results would mirror those found by Williams and Fitness (2004) in that participants would generally relive social pain and recall physical pain. A one-way ANOVA examined differences among groups regarding the degree to which they relived the experience (e.g., "To what degree did you actually relive the experience?"). Unlike the findings of Williams and Fitness, no differences were found between the four groups on the degree to which they relived the experience, $F(3, 133) = 1.05$, $p = .37$. A one-way ANOVA was also run to determine whether there were differences among the groups on the degree to which they recalled the experience (e.g., "To what degree did you simply recall the experience?"). Again, no differences were found between the four groups in the degree to which they recalled the experience, $F(3, 133) = .526$, $p = .67$.

For the forced choice question, a chi-squared analysis was run to determine whether persons in the social pain group reported reliving the event more than persons in the physical pain group did. Persons in the social pain group did not report reliving the experience more than persons in the physical pain group, $\chi^2(1) = .98$, $p = .32$. An

additional chi-squared test showed that there were no differences in reports of reliving versus recalling the experience between any of the four groups, $\chi^2(3) = 1.72$, $p = .63$. In a sense, this lack of difference between the groups could be expected due to the between-subject design of the current study as opposed to the within-subject design of the Williams and Fitness study. Since participants were solely recalling/reliving one memory type, they would not have other memory types with which to make comparisons regarding the degree to which they recalled versus relived the experience. In addition, all participants were given the same instructions to try to relive the experience rather than to simply recall it. Hence, there is no concrete reason to expect differences between the groups.

The frequency with which participants correctly responded to the question "About what were you to write your essay?" was calculated to ensure that participants were accurately aware of which memory they recalled. Most participants correctly reported which essay they were assigned to recall (social = 97%, physical = 97%, material = 91.2%, Monday = 91.7%).

Two one-way ANOVAs examined whether there were significant differences in the amount of time participants took to recall their experience. With respect to differences in recall time for the pain conditions, a significant difference was found such that participants in the social pain group spent significantly more time recalling the experience than did participants in the physical pain group, $F(65) = 3.95$, $p = .05$ ($M_{social} = 20.66$ ($SD = 7.87$), $M_{physical} = 16.94$ ($SD = 7.42$)). This finding was expected as it was predicted that participants recalling social pain would write significantly more words

than participants recalling physical pain. A one-way ANOVA examining recall time for all four conditions also yielded a significant effect, $F(133) = 4.06$, $p < .05$. Tukey HSD post hoc tests revealed significant differences between social pain and material pain (MD < .05) and between material pain and Monday morning (MD < .05). (See Table 3.1 for descriptive statistics of manipulation checks).

Table 3.1 Descriptive Statistics for Manipulation Checks

Manipulation Check Question	Mean	SD	Skewness
To what degree did you relive the experience?			
Social pain	3.79	.88	-.99
Physical pain	3.58	1.23	-.40
Material pain	3.62	1.16	-1.06
Monday morning	3.97	.88	-1.28
To what degree did you simply recall the experience?			
Social pain	3.18	1.24	.05
Physical pain	3.24	1.17	-.26
Material pain	3.26	1.31	-.35
Monday morning	2.94	1.07	-.03
About what were you to write your essay?			
Social pain	1.06	.38	5.83
Physical pain	1.94	.33	-5.75
Material pain	2.97	.31	-1.48
Monday morning	3.87	.46	-3.5
Time to recall experience			
Social pain	20.66	7.87	.34
Physical pain	16.94	7.42	.66
Material pain	15.08	7.58	1.04
Monday morning	19.94	7.39	.06

3.2 Descriptive Statistics

Descriptive statistics were calculated for measures of pain, mood, and linguistic style (e.g., Wong-Baker FACES Pain Scale, the McGill Pain Scale, the EAQ mood measures, and the LIWC analysis) (see Table 3.2). In addition, descriptive statistics for personality measures were also calculated (e.g., Rejection Sensitivity, Hurt Proneness, and Pain Catastrophizing; see Table 3.2).

Table 3.2 Descriptive Statistics and Reliability Estimates

Variable/Scale Name	Mean	SD	Skewness	Possible range	Actual range	Alpha
Personality Measures						
Hurt Proneness	17.28	4.50	- .11	6 - 30	6 – 30	.78
Rejection Sensitivity	8.49	3.06	.77	1 - 36	1.56 – 9.56	.84
Rumination (PCS)	8.07	3.57	.459	0 – 16	4 – 16	.87
Magnification (PCS)	4.43	1.78	1.01	0 – 12	3 – 9	.61
Helplessness (PCS)	9.12	3.63	1.27	0 – 24	6 – 21	.84
Rumination (DV)	6.05	3.31	.64	0 - 20	0 - 15	.51
Threatened Needs						
Belongingness	11.65	4.37	.92	5 – 25	5 – 25	.76
Self-esteem	15.40	5.52	- .10	5 – 25	5 – 25	.88
Control	15.69	4.47	- .18	5 – 25	5 – 25	.70
Meaningful existence	11.61	4.19	.90	5 – 25	5 – 25	.77
Mood						
Anger (Baseline)	10.17	4.61	1.72	7 – 35	7 - 30	.86
Fear (Baseline)	6.47	2.86	1.48	4 – 20	4 – 16	.75
Anger (Post)	10.44	5.00	1.74	7 – 35	7 – 31	.88
Fear (Post)	5.40	2.18	2.00	4 - 20	4 – 13	.68
Pain Measures						
FACES1 (Wong-Baker)	1.01	.99	1.48	0 - 5	0 – 5	
FACES2 (Wong-Baker)	.77	.84	1.58	0 - 5	0 – 5	
Present Pain Intensity (McGill)	1.03	.89	.74	0 - 5	0 - 4	
Self-Regulatory Measures						
Cookie task	2.60	2.58	1.79	0 – 15	0 – 15	

Correlation analyses were conducted to examine the interrelationships among the dependent measures for pain (see Table 3.3). Indeed, scores on the first and second Wong-Baker FACES pain slide were correlated with the overall Present Pain Intensity (PPI), r = .75, .69 (respectively) (see Table 3.3).

Table 3.3 Correlations between Dependent Measures of Pain

	I	II	III	IV	V	VI	VII	VIII
FACES- 1 (I)	-	.82**	.58**	.56**	.45**	.57**	.50**	.75**
N		137	137	137	137	137	137	137
FACES-2 (II)		-	.57**	.53**	.40**	.64**	.49**	.69**
N			137	137	137	137	137	137
PRI-T (III)			-	.97**	.82**	.76**	.88**	.52**
N				138	138	138	138	138
PRI-S (IV)				-	.72**	.70**	.77**	.50**
N					138	138	138	138
PRI-A (V)					-	.51**	.73**	.31**
N						138	138	138
PRI-E (VI)						-	.66**	.59**
N							138	138
PRI-M (VII)							-	.49**
N								138
PPI (VIII)								-
N								

Correlation analyses were also conducted to examine the interrelationships among the personality measures (see Table 3.4). Many of the personality measures were indeed correlated. For example, hurt proneness was positively correlated with rejection

sensitivity (r = .40) and components of the pain catastrophizing scale including magnification (r = .19), helplessness (r = .22), and rumination (r = .29). Rejection sensitivity was positively correlated with magnification (r = .22) and hurt proneness (r = .40). (See Table 3.4 for additional correlations between personality measures.)

Table 3.4 Correlations between Personality Measures

	I	II	III	IV	V
Hurt Proneness (I)	-	.40**	.19**	.22**	.29**
N		137	137	137	137
Rejection Sensitivity (II)		-	.22**	.10	.04
N			138	138	138
Magnification - PCS (III)			-	.59**	.56**
N				138	138
Helplessness – PCS (IV)				-	.78**
N					138
Rumination - PCS (V)					-

The essays were coded by two undergraduate research assistants in order to determine the amount of overlap of social pain with physical pain and material loss. The degree to which physical and material loss overlapped with social pain was coded using a 5-point Likert-type scale (1 = no overlap at all, 5 = total/complete overlap). The overlap between both physical pain (M = 1.80, SD = 1.25) and material loss (M = 1.21, SD = .35) with social pain was minimal (see Table 3.5). In addition to the minimal overlap between types of pain experiences, the extent to which others were involved in

the material pain memory was also minimal (M = 1.86, SD = 1.28). Because participants were told to think of their worst experience of pain, the severity of physical pain and the importance of the material object lost were also examined. Participants chose experiences that were moderately painful as assessed by the ratings of two undergraduate research assistants ($M_{physical}$ = 2.58, $SD_{physical}$ = .98; $M_{material}$= 2.85, $SD_{material}$ = .83). Finally, undergraduate research assistants coded for the type of social pain that was re-experienced (e.g., rejection, death of a loved one). Most of the 32 social pain essays involved a death (6.5% of essays), relational aggression (5.8% of essays), or rejection (4.3% of essays). Other social pains recalled include ostracism (i.e., exclusion; 2.2%), seeing others suffer (1.4%), moving away (.7%), others' divorce (.7%), and two essays classified as other (1.4%). (See Figure 3.2.)

Table 3.5 Descriptive Statistics for Essay Coding

Question coded for	Mean	SD	Skewness
Physical pain			
To what extent were others involved/was the experience linked to others?	1.80	1.25	1.38
How severe was the physical pain?	2.58	.98	-.29
Material pain			
How much did the description overlap with social pain?	1.21	.35	1.41
To what extent were others involved?	1.86	1.28	1.21
How important was the material object (i.e., its worth)?	2.85	.83	-.39

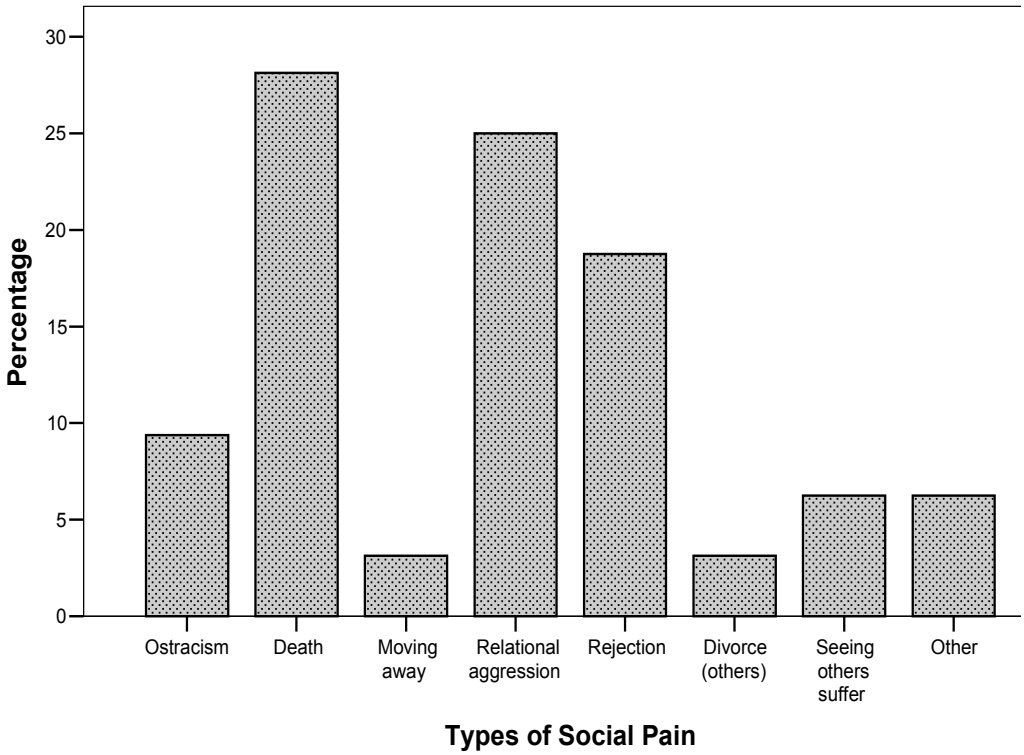


Figure 3.1 Percentages of Types of Social Pain in Written Essays

3.3 Analysis of Primary Hypotheses

A series of 2 (Sex of Participant) X 4 (Essay Type) ANOVAs were run to determine whether the groups were significantly different from one another. Following any overall differences (i.e., significant F-tests), planned comparisons were run. In other words, the social pain group was compared to all other groups. Tukey post hoc tests were also conducted. Unless stated otherwise, all p-values are less than .05.

As stated previously, my first four hypotheses examined reactions (e.g., pain, threatened needs) to different types of painful experiences (e.g., social and physical). It was expected that socially painful experiences would be associated with greater reports of pain, greater increases in negative affect, greater threatened needs, and greater

differences in linguistic style (e.g., more pain words) compared to the other three conditions (i.e., recollection of a mundane event or recollection of a sad event).

3.3.1. Is Reliving a Social Pain Associated with Greater Pain Levels (Hypothesis 1)?

Social pain was expected to be associated with the greatest level of pain. To assess pain, I used the Wong-Baker FACES Pain scale (time 1 and time 2) and the present pain intensity measure (McGill Pain Scale). To determine whether essay type and/or gender had an effect on threatened needs, a 2 (sex of participant) X 4 (type of essay) MANOVA was used with the measures of pain as the dependent measures. Wilk's lambda revealed a significant difference between essay types, $F(9, 309.24) = 1.93$, $\eta^2 = .04$. However, there was no difference associated with the sex of the participant ($F(3, 127) = .48$, *ns*).

Following the significant MANOVA effect for essay type, univariate analyses were performed. Significant differences were found for each measure of pain, Fs(3, 129) = 4.73, 3.36, 4.88), η^2s = .10, .07, .10 (for FACES1, FACES2, and PPI, respectively). Planned comparisons revealed a significant difference between social pain ($M = 1.38$, $SD = .95$) and physical pain ($M = .91$), $SD = 1.05$) for FACES1 ($p = .05$). No significant differences were found for FACES2. A similar difference was found between social ($M = 1.29$, $SD = .88$) and physical pain ($M = .88$, $SD = .84$) for PPI ($p = .06$). Tukey HSD post hoc analyses revealed a significant difference in FACES1 between re-experiencing social pain and Monday morning ($MD = .83$) and between material pain and Monday morning ($MD = .62$). For FACES2, a significant difference was only found between social pain and Monday morning ($MD = -.58$).

Tukey HSD post hoc analyses revealed significant differences in present pain intensity for those re-experiencing social pain and Monday morning (*MD* = .65) and material pain and Monday morning (*MD* = .65). (See Table 3.6.)

Table 3.6 Current Pain Levels by Essay Type

	Mean	SD	Skewness	F-value	Eta-squared
Overall				1.93*	.04
FACES (Time 1)				4.73**	.10
Social pain	1.38_{a}	.95	1.81		
Physical pain	$.97_{b}$	1.05	1.11		
Material pain	1.18_{ab}	1.14	1.59		
Monday morning	$.56_{b}$	.61	.59		
FACES (Time 2)				3.36*	.07
Social pain	1.03_{a}	.83	.61		
Physical pain	$.73_{ab}$	.84	1.24		
Material pain	$.91_{ab}$	1.00	1.59		
Monday morning	$.44_{b}$	.56	.75		
Present Pain Intensity				4.88**	.10
Social pain	1.30_{a}	.88	.56		
Physical pain	$.90_{ab}$	.84	.55		
Material pain	1.30_{ab}	.99	.83		
Monday morning	$.65_{b}$	.68	.52		

** $p < .01$, * $p < .05$; Significant differences between the groups are denoted with different subscripts.

3.3.2. Is Reliving Social Pain Associated with Increases in Negative Affect (Hypothesis 2)?

Second, individuals who wrote about social pain were expected to report greater increases in negative affect compared to the other three conditions. Negative affect was assessed as changes in (1) anger and (2) fear from pre-essay to post-essay. To determine whether essay type and/or gender had an effect on threatened needs, 2 (sex of participant) X 4 (type of essay) MANOVA were used with the two types of affect (i.e.,

fear, anger) as the dependent measures. Wilk's Lambda revealed a significant essay effect, $F(6, 256) = 2.40$, $\eta^2 = .05$. Univariate analyses were then performed. A significant essay effect was found for fear, $F(3, 129) = 2.86$, $\eta^2 = .06$ and anger, $F(3, 129) = 2.35$, $\eta^2 = .05$ ($p = .08$).

Next, planned comparisons were run. Persons re-experiencing social and physical pain reported significantly different levels of fear ($p = .01$) and anger ($p = .05$). There was also a significant difference in levels of fear between persons recalling social pain and those recalling material pain ($p = .03$). To further examine these differences, I ran paired-t-tests within the social pain condition. There were no differences between reported changes in fear and anger ($t(34) = .90$, *ns*), although the trend suggested that participants were more fearful than angry. (See Table 3.7 for means and standard deviations).

Table 3.7 Changes in Negative Affect by Essay Type

	Mean	**SD**	**Skewness**	**F-value**	**Eta-squared**
Overall				2.40**	.05
Fear				2.96**	.06
Social pain	$.43_a$	1.20	1.67		
Physical pain	$-.28_b$	.80	1.42		
Material pain	$-.12_b$	.82	-.10		
Monday morning	$-.03_{ab}$	.94	1.52		
Anger				2.35	.05
Social pain	.19	1.25	1.31		
Physical pain	-.27	1.01	2.06		
Material pain	.21	1.03	1.79		
Monday morning	-.13	.55	.90		

** $p < .05$; Significant differences between the groups are denoted with different subscripts.

Supplementary correlational analyses also revealed that fear and current pain (FACES – Time 1) were positively related in the social pain condition (r = .31, p < .07). However, pain and fear were not related in the physical pain (r = -.03), material loss (r = .06), or Monday Routine conditions (r = .10). Self-reported anger was not related to self-reported pain in any of the conditions (rs = .05, .24, -.13, and .05, for each condition, respectively).

3.3.3. Is Reliving Social Pain Associated with Increases in Threatened Needs (Hypothesis 3)?

Third, I anticipated that individuals would report greater threatened needs when writing about socially painful experiences than when writing about the other three experiences (Hypothesis 3). To determine whether essay type and/or gender had an effect on threatened needs, a 2 (sex of participant) X 4 (type of essay) MANOVA was used with the four types of threatened needs as the dependent measures. Wilk's Lambda revealed a significant difference between essay type, $F(12,331) = 4.11$, $\eta^2 = .12$. Indeed, the results indicated that recalling experiences of pain is taxing on various psychological needs (e.g., belongingness, self-esteem, control, meaningful existence; see Table 8). However, there was no difference associated with the sex of the participant $F(4,125) = 1.50$, $p = .21$).

Following the significant MANOVA effect for essay type, univariate analyses were performed. There were essay main effects for threatened belongingness, self-esteem, control, and meaningful existence, Fs(3, 128) = 7.28, 8.44, 7.98, and 8.95, η^2s= .15, .17, .16, .17, respectively. Planned comparisons examined differences between the social pain group and the three other groups. Individuals who re-experienced a social

pain reported greater threatened belonging and meaningful existence needs compared to the other three groups. In addition, threatened self-esteem and control needs were significantly different for those recalling social pain and mundane experiences (see Table 8).

Table 3.8 Statistics for Threatened Needs by Essay

	Mean	SD	Skewness	F-value	Eta-squared
Belonging				7.00**	.14
Social pain	14.41_a	5.61	5.61		
Physical pain	10.18_b	3.20	.61		
Material pain	11.94_b	3.09	-.08		
Monday morning	10.11_b	3.83	.89		
Self-esteem				8.72**	.17
Social pain	17.38_a	6.02	-.52		
Physical pain	15.85	4.85	-.09		
Material pain	17.06	5.14	-.87		
Monday morning	11.58_b	4.11	.53		
Control				8.00**	.16
Social pain	17.03_a	4.86	-.48		
Physical pain	16.55	3.86	-.14		
Material pain	16.62	3.92	-.50		
Monday morning	12.75_b	3.95	.25		
Meaningful existence				8.94**	.17
Social pain	14.06_a	5.40	.26		
Physical pain	11.24_b	2.95	.33		
Material pain	12.15_b	3.51	.72		
Monday morning	9.06_b	2.06	1.57		

** $p < .01$; Significant differences between the groups are denoted with different subscripts.

3.3.4. Is Reliving Social Pain Associated with Differences in Linguistic Style (Hypothesis 4)?

Finally, I predicted that the linguistic style of the essays in which socially painful experiences were recalled would differ significantly from the style of the essays of participants who recalled physically painful experiences (Hypothesis 4). To assess the use of pain words, a linguistic style variable for number of pain words used was created (see Appendix A for Pain Dictionary). In addition, the essays were subjected to the standard dictionaries that are part of LIWC.

First, I examined whether linguistic style was associated with self-reported pain (see Table 3.9). The use of *I* was negatively associated with the degree of pain reported. In contrast, the use of *W*e and *Other* pronouns was positively associated with pain. Negations and assents were also positively related to pain reports. Next, I found that the use of positive emotions and feelings were related to painful experiences. The relation between pain and positive emotions was still significant after controlling for negations (*pr* = .18).As anticipated, pain was positively related to words associated with social processes (communication, references to others, family, friends). Finally, the use of words related to metaphysical issues (e.g., death, physical) were related to current reported pain. However, the use of pain words was not related to current levels of pain. In sum, words associated with belongingness and meaningful existence were associated with current pain levels.

Table 3.9 Correlations between Pain Measures and Linguistic Analyses

	Exemplars	FACES1	FACES2	PPI
Word count		-.02	.06	.02
Pronouns	I, our, they	-.01	.01	.10
I	I, my, me	-.21**	-.17	-.12
We	we, our, us	.24**	.20**	.15
You	you, you'll	.80	-.20	.07
Other	She, their, them	.19**	.16	.12
Negate	no, never, not	.17**	.24*	.12
Assent	yes, ok	.26*	.27*	.26*
Affect/Emotional Processes	Happy, ugly, bitter	.08	.11	.04
Positive emotion	Happy, pretty, good	.18**	.15	.07
Positive feelings	Happy, joy, love	.13	.18**	.11
Negative emotion	Hate, worthless, enemy	.03	.05	.02
Social processes	Talk, us, friend	.36*	.30*	.27*
Communication	Talk, share	.13	.14	.17**
References to others		.27*	.23*	.20**
Friends	Pal, buddy, coworker	.19**	.23*	.15
Family	Mom, brother	.21**	.18**	.22**
Humans	Boy, woman, group	.17	.06	.05
Time	Hour, day	-.16	-.20**	-.18**
Metaphysical issues	God, heaven, coffin	.21**	.26*	.11
Religion	God, church, rabbi	.20**	.24*	.11
Physical	Ache, sleep	-.23*	-.23*	-.29*
Pain	Broken, crushed, ache	.02	.08	-.03

** $p < .05$ * $p < .05$; N = 132

Next, I examined whether there were differences in linguistic style by essay type using iterative sets of a 2 (sex of participant) X 4 (type of essay) ANOVAs. First, number of words used was not related to essay type, $F(3, 124) = 1.62$, $p = .19$. However, there was a significant difference in the number of pronouns used by participants, $F(3, 124) = 10.05$, $\eta^2 = ..20$. Specifically, an effect was found for the use of "we" and "other," $Fs(3, 124) = 3.95, 25.44,$, $\eta^2 = .10;.38$, respectively. There were no significant differences in the rate with which the pronouns "I," "self," and "you" were used (see Table 3.10).

Furthermore, participants differentially used more references to others across conditions, $F(3, 124) = 26.44$, $\eta^2 = .39$. Specifically, there was a significant difference for the number references to friends, family, and humans in general, $Fs(3, 124) = 11.3, 5.74, 5.19$, η^2s = .22, .12, .11, respectively. It was anticipated that persons recalling social pain would use more pain-related adjectives than would persons recalling physical pain. Contrary to expectations, persons recalling physical pain ($M = 1.85$, $SD = .99$) used more pain-related words than did persons recalling social pain ($M = .73$, $SD = .66$), $F(3, 124) = 51.92$, $\eta^2 = .56$.

Table 3.10 Descriptive Statistics for Linguistic Analyses by Essay Type

	Social	Physical	Material	Monday
Word count	439.94(225.70)	356.42(174.10)	340.82(191.61)	448.36(222.83)
Pronouns	17.31 (2.84)	15.34 (2.23)	18.15 (3.38)	14.98(2.51)
I	9.73 (3.00)	10.79 (2.47)	12.46 (2.84)	11.99(2.02)
We	1.16 (.97)	.45 (1.04)	.69 (1.08)	.36 (.64)
You	.13 (.29)	.17 (.40)	.08 (.25)	.02 (.07)
Other	4.43 (2.47)	1.07 (1.06)	1.55 (1.27)	1.32(1.73)
Negate	1.45 (.80)	1.04 (.67)	1.22 (.77)	.59 (.49)
Assent	.09 (.17)	.06 (.13)	.13 (.38)	.04 (1.46)
Affect/Emotional Processes	4.50 (1.56)	4.70 (1.44)	3.97 (1.64)	2.98(1.65)
Positive emotion	1.75 (.86)	1.18 (.68)	1.42 (.95)	1.61 (.85)
Positive feelings	.46 (.41)	.23 (.31)	.32 (.43)	.32 (.32)
Negative emotion	2.71 (1.37)	3.51 (1.45)	2.56 (1.54)	1.25(1.06)
Social processes	10.72 (3.42)	3.9 (2.62)	5.82 (3.23)	3.96(3.27)
Communication	1.60 (1.12)	.79 (.67)	1.30 (1.43)	1.34(1.10)
References to others	6.04 (2.82)	1.86 (1.61)	2.86 (2.04)	1.79(1.87)
Friends	.84 (.91)	.24 (.35)	.28 (.41)	.17 (.22)
Family	1.04 (1.20)	.32 (.60)	.63 (.82)	.30 (.54)
Humans	.69 (.80)	.35 (.55)	.32 (.40)	.23 (.38)
Time	6.12 (1.57)	5.90 (1.52)	4.89 (1.77)	7.36(2.18)
Metaphysical issues	.50 (.74)	.14 (.33)	.06 (1.9)	.09 (.29)
Religion	.28 (.51)	.10 (.32)	.04 (.16)	.08 (.29)
Physical	1.24 (.94)	4.63 (1.91)	.51 (.66)	4.52(3.25)
Pain	.73 (.66)	1.85 (.99)	.23 (.37)	.04 (.110)

N_{social} = 32; $N_{physical}$ = 33; $N_{material}$ = 34; N_{Monday} = 33 standard deviations are in parenthesizes

Planned comparisons revealed significant differences between social pain and physical pain recounts regarding the number of pronouns ($p < .01$), other-related pronouns ($p < .01$), articles ($p < .05$), sensory words ($p < .05$), words related to hearing ($p < .05$), feeling ($p < .01$), references to others ($p < .01$), friends ($p < .01$), family ($p < .01$), humans ($p < .01$), number of pain words ($p < .01$), use of we ($p = .01$). Significant differences were found between social pain and material pain essays in the number of first person singular pronouns ($p < .01$), first person plural ($p < .05$), number of sensory related words ($p < .05$), words related to feeling ($p < .01$), references to others ($p < .01$), to self ($p < .01$), to friends ($p < .01$), to humans ($p < .01$), and number of pain words ($p < .01$). Finally, significant differences were found between social pain and Monday morning accounts in terms of the number of pronouns used ($p < .01$), first person singular words ($p < .01$), first person plural words ($p < .01$), references to others ($p < .01$), friends ($p < .01$), family ($p < .01$), humans ($p < .01$), and pain words ($p < .01$).

3.3.4.1 Supplementary Analyses

To rule out some plausible alternative explanations, I examined whether it was more difficult to recall social pain versus the other three conditions. There was no evidence of an essay main effect for difficulty in recalling the experience, $F(1, 65) = 3.14$, $p = .08$. In addition, participants recalling social and physical pain also did not differ in the extent to which they remembered the actual experience as being very painful, $F(1, 65) = 2.95$, $p = .09$. Next, the frequency of similar events occurring was examined. Persons recalling social and physical pain did not differ in the degree to which recalled events occurring or the perceived likelihood of similar events occurring

in the future, *F*s (1, 65) = 1.77, 2.91, *p*s > .05. In addition, there was no significant difference in how long ago the event occurred, the number of people the event was discussed with, nor the number of times the event had been discussed, *F*s(1, 65) = .41, .81, .90, *p*s > .05. In other words, differences found between re-experiencing social pain and physical pain were due to something unique about the pain memory and not due to difficulty in recalling the experience, memories of initial pain, frequency of the event, how long ago the event occurred, the number of time the event was discussed, or the number of people the event was discussed with.

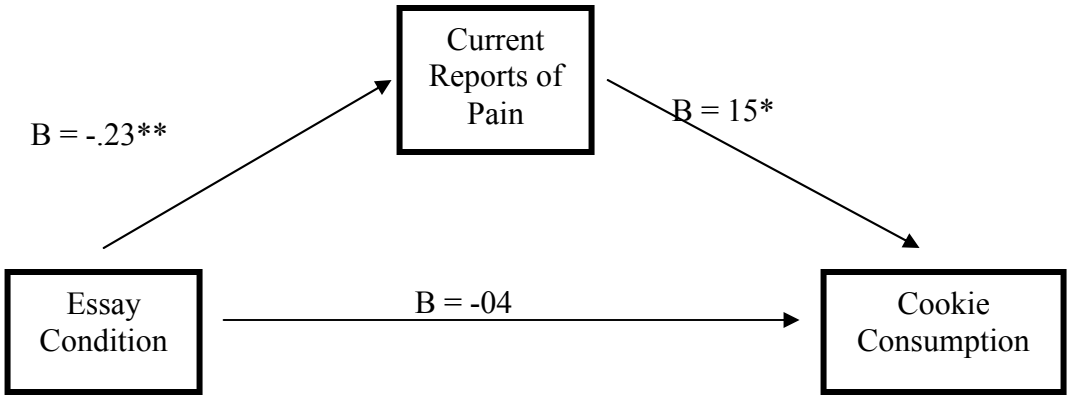
3.3.5. Does Social Pain Deplete Self-Regulatory Reserve (Hypothesis 5)?

My second set of hypotheses examined the relationship between social pain and self-regulatory depletion. That is, I examined how writing about and "re-experiencing" painful experiences would deplete the self-regulatory reserve. Measures of self-regulatory depletion were assessed by cookie consumption, changes in Stroop performance (both RT and PE), and self-reported rumination. It was anticipated that participants who recalled an experience of social pain would exhibit a greater impairment in self-regulation than would participants who recalled an experience of physical pain, a neutral non-painful experience, or a sad yet non-painful experience. Hypothesis 5 predicted that recalling social pain would deplete the self-regulatory reserve at a greater rate than recalling physical pain. To evaluate this hypothesis, a series of 2 (Sex of Participant) X 4 (Essay Type) ANOVAs were run followed by appropriate planned comparisons. To control for pre-essay Stroop performance, the

pre-essay Stroop was used as a covariate in all of these analyses (e.g., pre-RT or pre-PE).

Unexpectedly, there were no significant differences between groups on the number of cookies eaten, $F(3, 65) = .48$, $p = .49$. Further analyses probed the possibility that pain was indeed associated with cookie consumption. First, bivariate correlations between pain and cookie consumption were examined. Cookie consumption was indeed related with self-reported pain as assessed by FACES (time 1) ($r = .19$) and present pain intensity levels ($r = .23$). Note that FACES (time 2) came after cookie consumption.

Next, I examined whether current level of experienced pain mediated the link between essay type and cookie consumption. Following procedures outlined by Preacher and Hayes (2004), I tested the indirect effect of recalling memories on cookie consumption using bootstrapping procedures (i.e., sampling with replacement with 1000 bootstrap samples). Because 0 was not within the 95% confidence interval, the indirect effect was significant ($p < .05$) (see Figure 3.3). In other words, essay type predicted current pain levels, which, in turn, predicted cookie consumption. (See Figure 3.3.)



Note: 1 = Social pain; 2 = Physical pain; 3 = Material pain; 4 = Monday morning

Figure 3.2 Current Pain Mediates Relationship between Essay and Cookie Consumption

Next, I examined Stroop performance. Stroop dependent measures included reaction time and percent of errors on incongruent words while controlling for performance on congruent words. A series of ANCOVAs were performed. Pre-essay Stroop performance was used as a covariate to control for pre-essay performance differences. Reaction time on the post-essay Stroop task was not significantly different for participants recalling pain experiences, $F(3, 121) = 1.32$ ($M_{social} = .28$, $SD = 1.92$; $M_{physical} = .-.10$, $SD = .21$). Although this finding was not significant, the trend was in the expected direction. A two-way ANCOVA with percentage errors as the criterion measure showed that performance on the Stroop task was not significantly different across conditions, $F(3, 121) = 1.56$, ($M_{social} = -.27$, $SD = .13$; $M_{physical} = .18$, $SD = 1.21$).

Finally, I examined whether essay type influenced post-essay rumination by performing a two-way ANOVA. There was no evidence of rumination differences across the four types of essays, $F(3, 129) = 1.86$, *ns*. There were no differences between social pain and physical pain ($p = .22$) or social pain and material pain ($p = .67$). Social pain was significantly different from Monday morning ($p = .03$).

Supplementary correlational analyses further examined the associations between pain and self-regulatory depletion. When re-experiencing social pain, present pain intensity was positively related to the number of Stroop errors (r = .40) and rumination (r = .44). In addition, pain as assessed by FACES1 was positively related to the number of Stroop errors (r = .48) and rumination (r = .63). Finally, the number of Stroop errors was positively related to cookie consumption and rumination in the social pain condition (rs = .39, .54). No such relationship was found in the other three conditions (see Table 11).

Table 3.11 Correlations between Mood, Pain, and Self-Regulatory Tasks by Essay.

	PPI	**Faces1**	**Cookies**	**Post-essay rumination**
Stroop PE				
Social	.40**	.48***	.39**	.54***
Physical	.08	.07	-.00	.07
Material	-.10	.01	-.01	.31
Monday	.15	.19	.13	.18

* $p < .07$, ** $p < .05$, *** $p < .01$

3.3.6 Does Personality Moderate the Experience of Social Pain? (Hypothesis 6)

Finally, I examined whether rejection sensitivity, hurt proneness, and pain catastrophizing moderated the relation between social pain and self-regulatory depletion, threatened needs, and post-essay rumination (Hypothesis 6). I anticipated that

persons higher in these pain dimensions would re-experience greater social pain than would persons lower on these dimensions. I also anticipated that individual differences in these characteristics would moderate the association between social pain and self-regulatory depletion. For these analyses, only persons in the pain conditions were examined (i.e., the social and physical pain groups). To evaluate the personality hypotheses, iterative sets of moderated regression analyses were conducted using a personality (e.g., Rejection Sensitivity, Hurt Proneness, pain catastrophizing) X 2 (type of pain: social v. physical) general linear model (Aiken & West, 1991; Cohen, Cohen, West, & Aiken, 2003). Personality measures were treated as continuous variables and were centered (Cohen et al., 2003). Unweighted effects coding was used for the pain categorical variable (Aiken & West, 1991, pp. 129-130). Post hoc analyses followed procedures outlined by Aiken and West (1991) and Cohen, et al. (2003).

For each analysis, sex of participant, essay type, and one personality dimension were entered on the first step. Next, the two-way cross-products among sex, personality, and essay type were entered on the second step. Finally, the three-way interaction among the variables was examined. Criterion measures included pain (FACES - time 1), threatened needs (belongingness, self-esteem, meaningful existence, control), and self-control (cookie consumption, Stroop RT and PE, and self-reported rumination).

3.3.6.1 Hurt Proneness

It was anticipated that hurt proneness would strengthen the association between reliving social pain and depletion in self-control. First, there was an essay X hurt

proneness interaction for current pain level (i.e., FACES), $t(59) = -2.38$, $p < .02$. For the social pain condition, hurt proneness was positively related to current reported pain, B = .07, $t(30) = 2.11$, sr = .33. For the physical pain condition, there was no relation between hurt proneness and pain, $t(29) = -1.38$, *ns*.

Next, I examined whether essay type moderated the association between hurt proneness and threatened needs. First, hurt proneness was positively related to threatened meaningful existence, B = .28, $t(59) = 2.25$, sr = .23. There was also an essay X hurt proneness interaction, B = -.49, $t(59) = -4.00$, sr = -.41. For social pain, hurt proneness was positively related to threatened meaningful existence, B = .77, $t(30) = 4.28$, sr = .61. For physical pain, there was no relation between hurt proneness and threatened meaningful existence, B = -.22, $t(29) = -1.43$, ns. There was also an essay X hurt proneness interaction for belongingness, B = -43, $t(59) = -3.28$, sr = -.32. As anticipated, persons higher on hurt proneness reported greater threatened belongingness in the social pain condition, B = .73, $t(30) = 3.69$, sr = .56. For the physical pain condition there was no relation between hurt proneness and threatened belongingness, B = -.13, $t(29) = -.89$, ns. There was no evidence that hurt proneness was related to threatened control or self-esteem.

Persons higher on hurt proneness made more Stroop performance errors (PE), B = .06, $t(51) = 4.00$, sr = .29. There was also a significant hurt proneness X essay interaction, B = .06, $t(51) = 3.59$, sr = .26. This finding was qualified by a sex X hurt proneness X essay interaction, B = .05, $t(51) = 3.45$, sr = .25. For social pain, there was no sex X hurt proneness interaction, B = .00, $t(27) = .74$, ns. For physical pain, there

was a sex X hurt proneness interaction, B = 12, $t(23) = 3.28$. For women, there were no relation between hurt proneness and PE in the physical pain condition, B = -.00, $t(13) = -.50$. For men, hurt proneness was positively related to PE, B = .24, $t(9) = 2.46$, sr = .44. There was no evidence that hurt proneness was related to Stroop RT, rumination, or cookie consumption. (See Figures 3.3 – 3.6.)

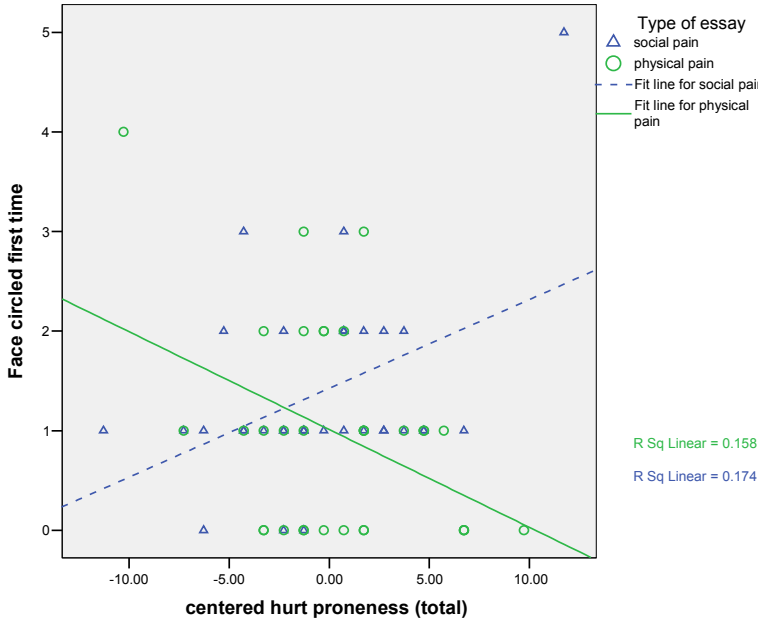


Figure 3.3 Hurt Proneness Moderates Link between Essay and Pain

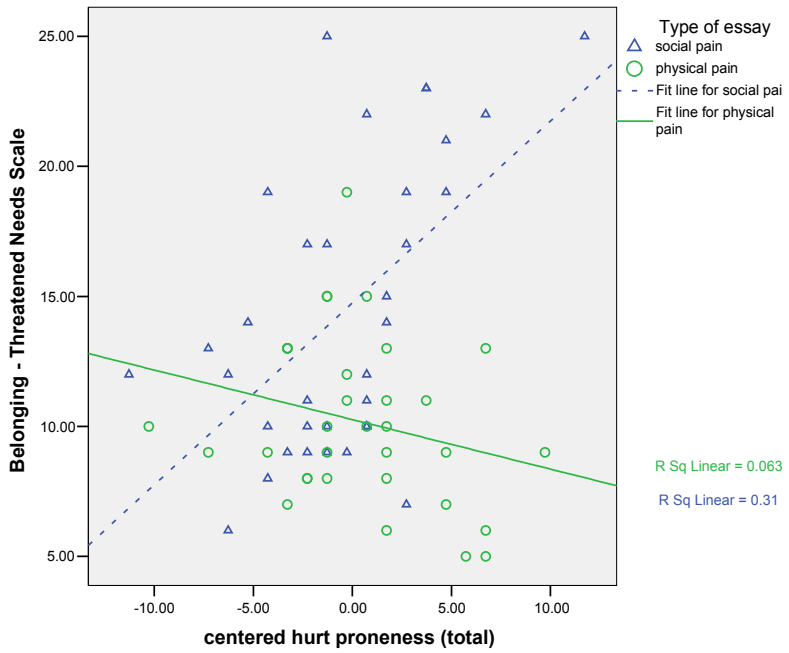


Figure 3.4 Hurt Proneness Moderates Link between Essay and Belongingness

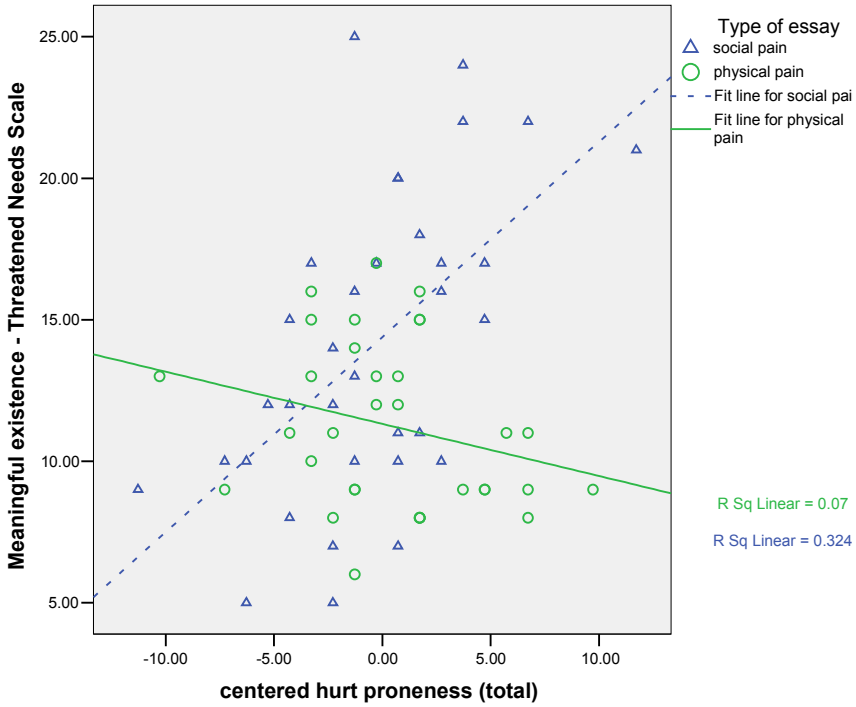


Figure 3.5 Hurt Proneness Moderates Link between Essay and Meaningful Existence

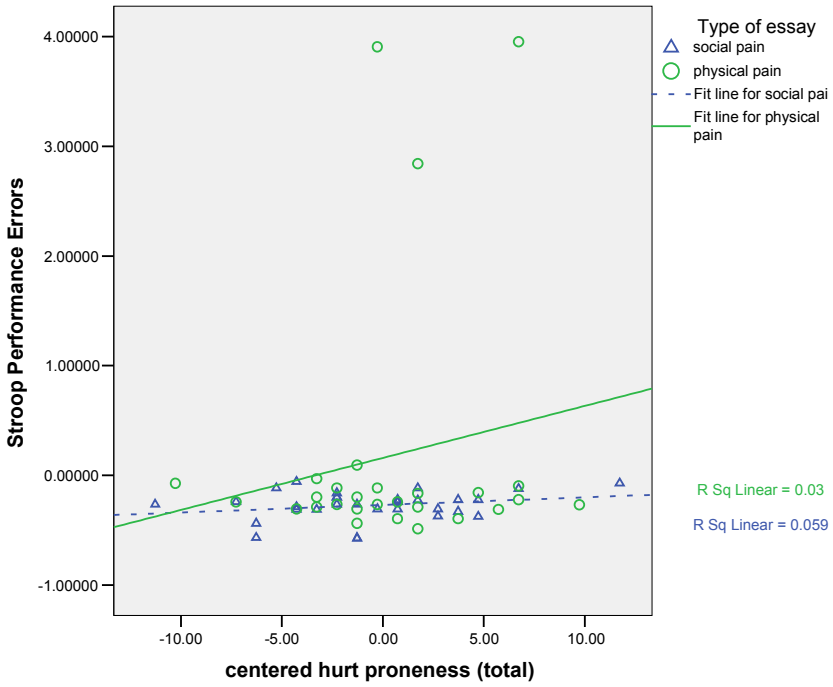


Figure 3.6 Hurt Proneness Moderates Link between Essay and Stroop Performance Error

Further supplementary analyses examined the possible indirect influence of hurt proneness on self-control when reliving social pain. That is, the current level of pain may mediate the association between hurt proneness and self-control in the social pain condition. Again, using procedures outlined by Preacher and Hayes (2004), I examined this possible indirect relationship using the Sobel test. There was a significant indirect effect for Stroop performance errors, $Z = 1.75$, $p < .08$. Using bootstrapping procedures, I also found that 0 was not within the 95% confidence interval ($p < .05$). In other words, hurt proneness predicted current pain levels (FACES1) ($B = .09$, $p < .01$), which, in turn, predicted Stroop percentage errors ($B = .06$, $p < .02$). There was no such mediation for Stroop RT or cookie consumption.

3.3.6.2 Rejection Sensitivity

Next, the association between rejection sensitivity and pain was examined. There was an essay X rejection sensitivity interaction for pain, B = -.07, $t(59) = -1.70$, sr = -.20. For social pain, rejection sensitivity was positively related to self-reported current pain, B = .10, $t(30) = 1.85$, $p < .08$, sr = .29. For physical pain, there was no relation between rejection sensitivity and self-reported pain, B = -.04, $t(29) = -.63$, ns.

Next, I found that re-experiencing social pain moderated the association between rejection sensitivity and threatened needs. There was also a significant essay X rejection sensitivity interaction for threatened meaningful existence, B = -.42, $t(59) = -2.36$, sr = -.27. As expected, for social pain, rejection sensitivity was positively related to threatened meaningful existence, B = .71, $t(30) = 2.16$, sr = .37. For physical pain, there was no evidence that rejection sensitivity was related to threatened meaningful existence, B = -.14, $t(29) = -.84$, ns. Second, there was an essay X rejection sensitivity interaction for threatened control, B = -.40, $t(59) = -2.34$, sr = -.27. Rejection sensitivity was positively related to threatened control in the social pain condition, B = .95, $t(30) = 3.62$, sr = .55. Conversely, rejection sensitivity was not related to control in the physical pain condition, B = .15, $t(29) = .67$, ns. Third, there was an essay X rejection sensitivity interaction for self-esteem, B = -.65, $t(59) = -3.01$, sr = -.35. Again, rejection sensitivity was related to threatened self-esteem, but only in the social pain condition, Bs = 1.02, -.27, *t*s = 3.10, -.98, dfs = 30, 29, sr = .48, -.18, for social and physical pain respectively. Finally, essay type moderated the association between rejection sensitivity and belongingness, B = -.55, $t(59) = -3.05$, sr = -.32. Rejection

sensitivity was positively related to threatened belongingness when re-experiencing social pain, B = .80, *t*(30) = 2.42, sr = .40. Conversely, rejection sensitivity was negatively related to threatened belongingness when re-experiencing physical pain, B = -.29, *t*(29) -1.83, p = .08, sr = -.29. (See Figures 3.7 – 3.11.)

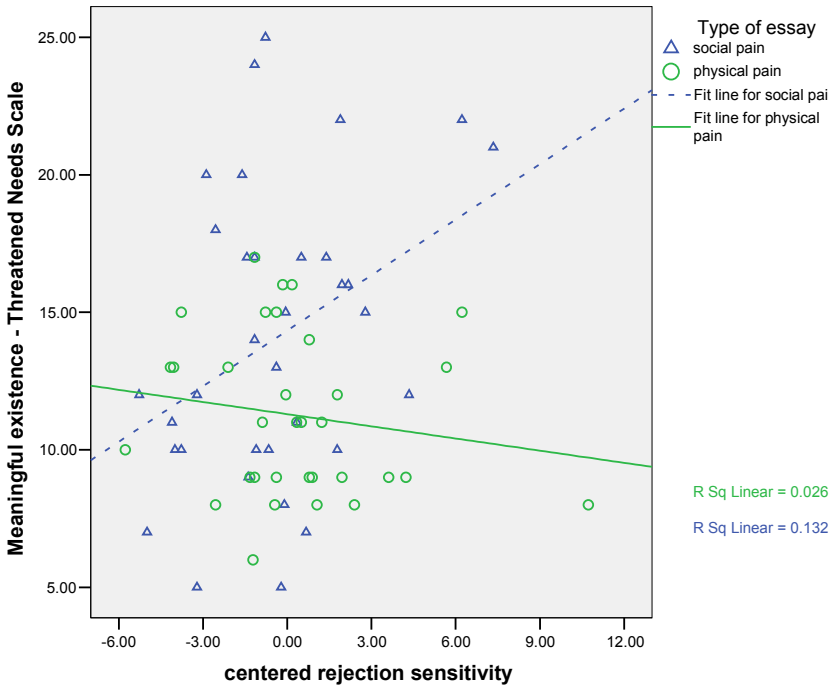


Figure 3.7 Rejection Sensitivity Moderates Link between Essay and Meaningful Existence

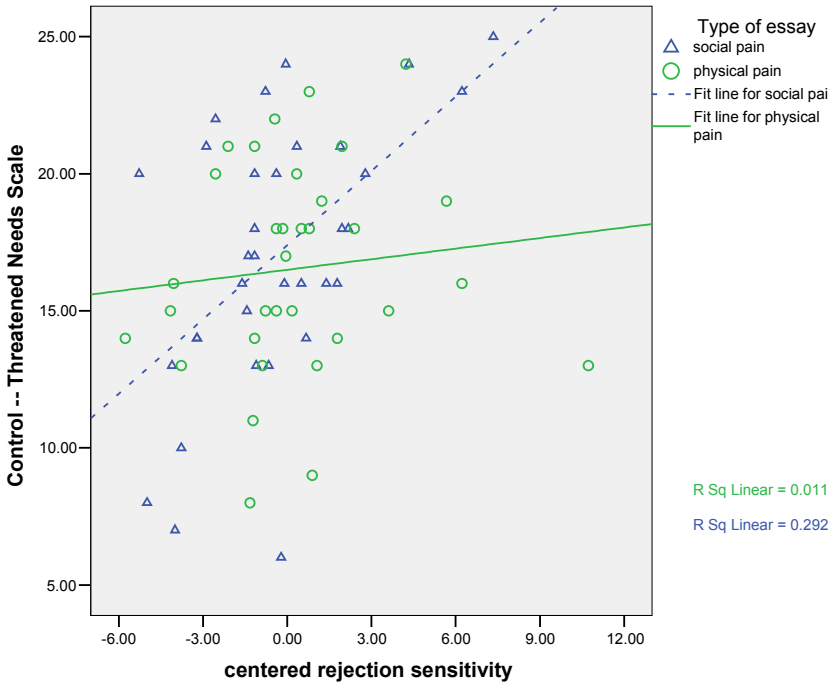


Figure 3.8 Rejection Sensitivity Moderates Link between Essay and Control

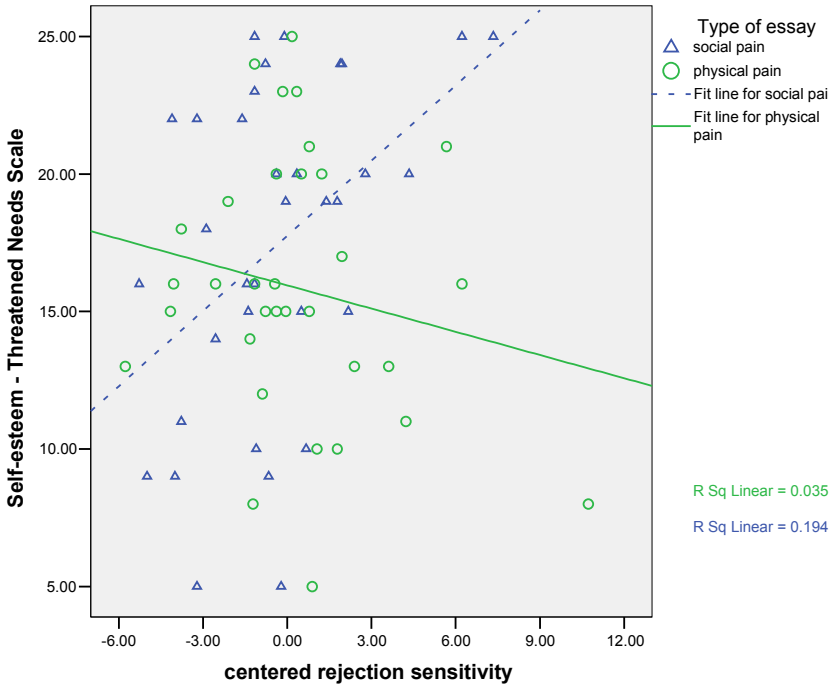


Figure 3.9 Rejection Sensitivity Moderates Link between Essay and Self-Esteem

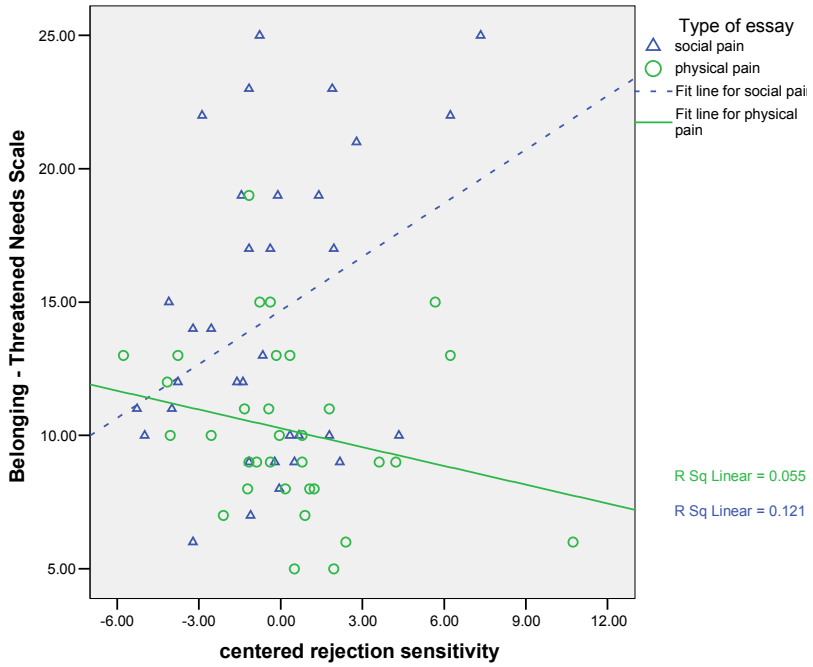


Figure 3.10 Rejection Sensitivity Moderates Link between Essay and Belongingness

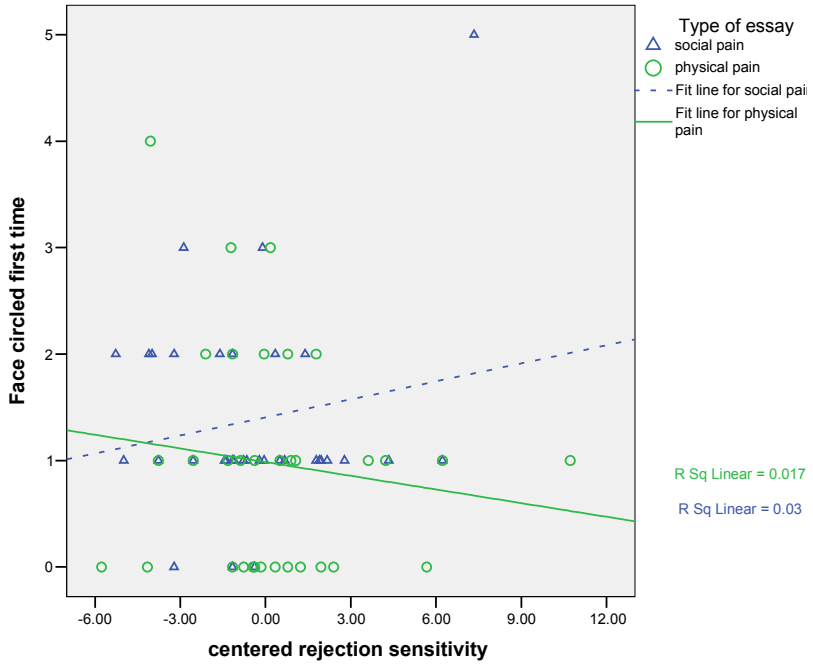


Figure 3.11 Rejection Sensitivity Moderates Link between Essay and Pain

Next, I examined whether pain type moderated the association between rejection sensitivity and self-control. There was no evidence that rejection sensitivity

was related to rumination, Stroop RT and PE, and cookie consumption. There was also no evidence than pain mediated this association in the social pain condition.

3.3.6.3 Pain Magnification

Next, I examined whether pain magnification was associated with current self-reported levels of pain. First, pain magnification was positively related with self-reported pain, B = .18, *t*(59) = 2.41, sr = 27. There was an essay X pain magnification interaction, B = -.23, *t*(59) = -3.06, sr = -.35. Interestingly, *general* pain magnification predicted self-reported pain, but only in the social pain condition, B = .41, *t*(30) 3.80, sr = .57. There was no relation between pain magnification and self-reported pain in the physical pain condition, B = -.05, *t*(29) = -.51, ns.

Next, I found that re-experiencing social pain moderated the association between pain magnification and threatened needs. Pain magnification was positively related to threatened meaningful existence, B = .71, *t*(59) = 2.06, sr = .24. There was also an essay X pain magnification interaction, B = -.92, *t*(59) = -2.67, sr = -.31. For social pain, pain magnification was related to threatened meaningful existence, B = 1.63, *t*(30) = 2.36, sr = .40. There was no relation between pain magnification and threatened meaningful existence for physical pain, B = -.21, *t*(29) = -.76. Persons higher on pain magnification reported greater threatened control regardless of condition than persons who scored low, B = .82, *t*(59) = 2.42, sr = .30. There was no pain magnification X essay interaction, B = -.67, *t*(59) = -1.90, *p* = .06, sr = -.23. For threatened self-esteem, there was an essay X pain magnification interaction, B = -1.23, *t*(59) = -2.87, sr = -.34. Again, pain magnification was related to threatened self-

esteem, but only in the social pain condition, B = 1.88, *t*(30) = 2.54, sr = .41 (for physical pain, B = -.58, *t*(29) = -1.26, *ns*). Finally, pain magnification was positively related to threatened belongingness, B = .95, *t*(59) = 2.75, sr = .29. This relationship was qualified by a pain magnification X essay interaction, B = -1.03, *t*(59) = -2.98, sr = -.31. When re-experiencing social pain, persons higher on pain magnification reported greater threatened belongingness, B = 2.00, *t*(30) = 2.87, sr = .46 (for physical pain, B = -.08, *t*(29) = -.28, *ns*). (See Figures 3.12 – 3.15.)

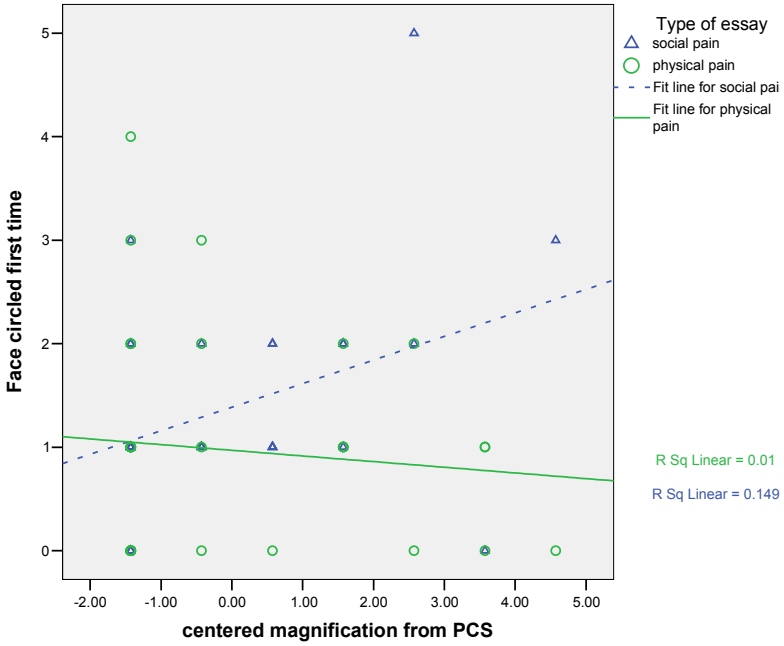


Figure 3.12 Pain Magnification Moderates Link between Essay and Pain

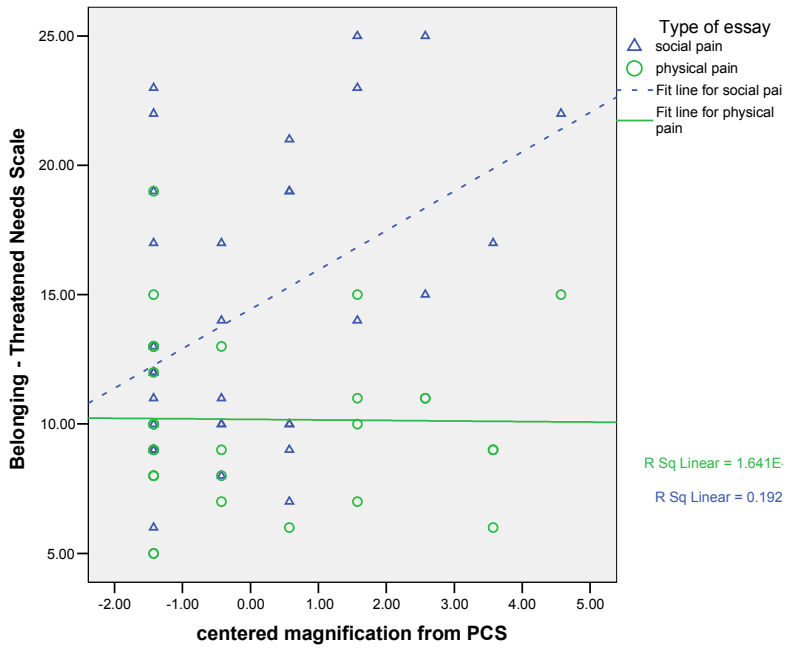


Figure 3.13 Pain Magnification Moderates Link between Essay and Belongingness

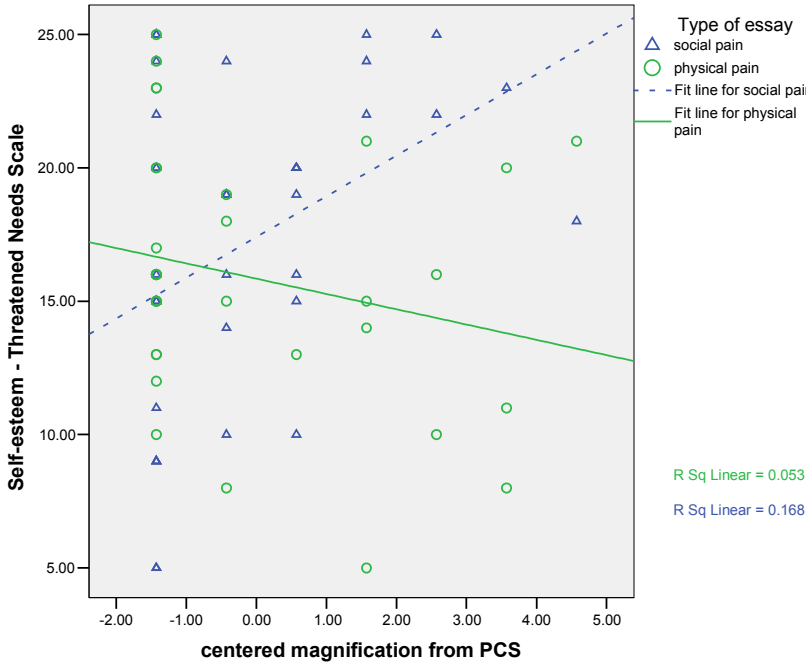


Figure 3.14 Pain Magnification Moderates Link between Essay and Self-Esteem

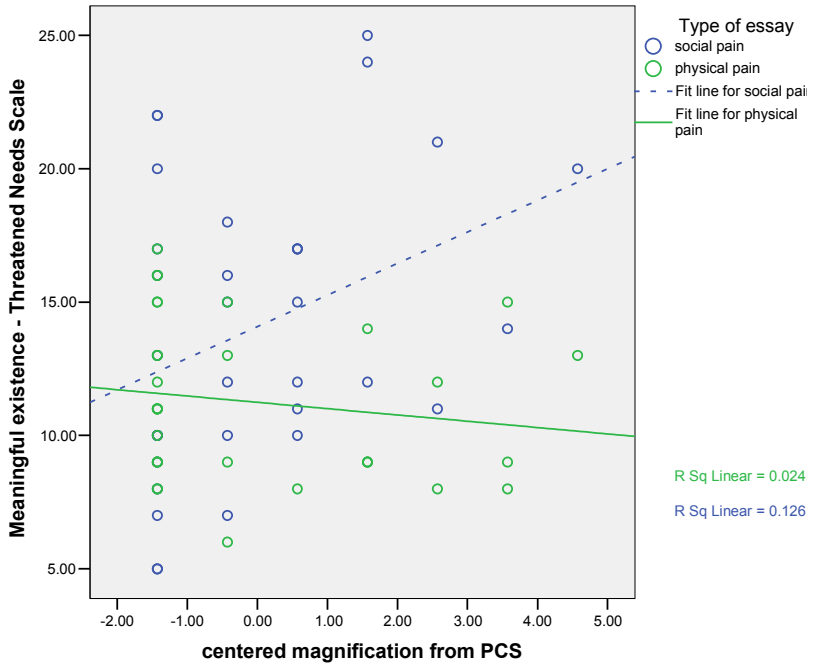


Figure 3.15 Pain Magnification Moderates Link between Essay and Meaningful Existence

Next, I examined whether pain magnification was related to self-control. Pain magnification was positively related to self-reported rumination, B = .73, $t(59) = 2.12$, sr = .26. There was no evidence that essay type moderated this relationship. In addition, pain magnification was not related to Stroop RT and PE or cookie consumption.

Further supplementary analyses again examined the possible indirect influence of pain magnification on self-control when reliving social pain. Again, using procedures outlined by Preacher and Hayes (2004), I found a marginally significant indirect effect for Stroop performance errors, $Z = 1.67$, $p < .09$. In other words, pain magnification predicted current pain levels (FACES1) (B = .24, $p < .02$), which, in turn,

predicted Stroop percentage errors (B = .06, p < .02). There was no such mediation for Stroop RT or cookie consumption.

3.3.6.4 Pain Helplessness

Next, I examined whether pain helplessness was associated with current self-reported levels of pain. There was no evidence that pain helplessness was associated with reported levels of current pain. I then examined whether re-experiencing pain moderated the link between pain helplessness and threatened needs. Indeed, an essay X pain helplessness interaction was found, B = -.48, *t*(59) = -2.92, sr = -.30. As expected, social pain was positively related to threatened belongingness, B = .76, *t*(30) = 2.72, sr = .44. No significant effect was found for physical pain, B = -.20, *t*(29) = -1.21, *ns*. For threatened self-esteem, a significant essay X helplessness interaction was found, B = -.48, *t*(59) = -2.36, sr = -2.8. As anticipated, social pain was significantly moderated by threatened self-esteem, B = .68, *t*(30) = 2.27, sr = .36. No effect was fond for physical pain, B = -.28, *t*(29) = -1.03, sr = -.19. For threatened control, an essay X helplessness effect was found, B = -.35, *t*(59) = -2.04, sr = -.25. Again, when re-experiencing social pain persons reported greater threatened control, B = .53, *t*(30) = 2.04, sr = .35. Persons re-experiencing physical pain did not report greater threatened control, B = -.17, *t*(29) = -.77, *ns*. (See Figures 3.16 – 3.17.)

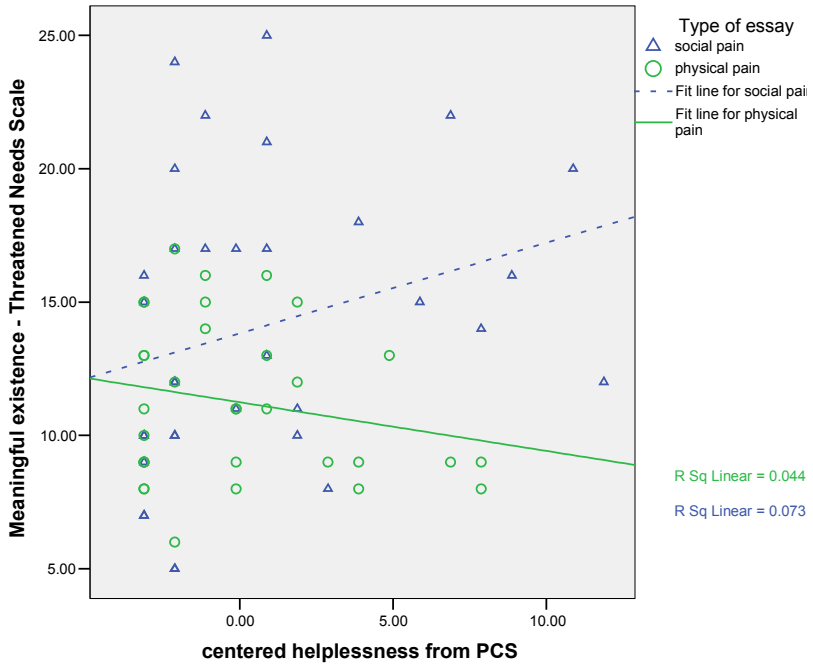


Figure 3.16 Pain Helplessness Moderates Link between Essay and Meaningful Existence

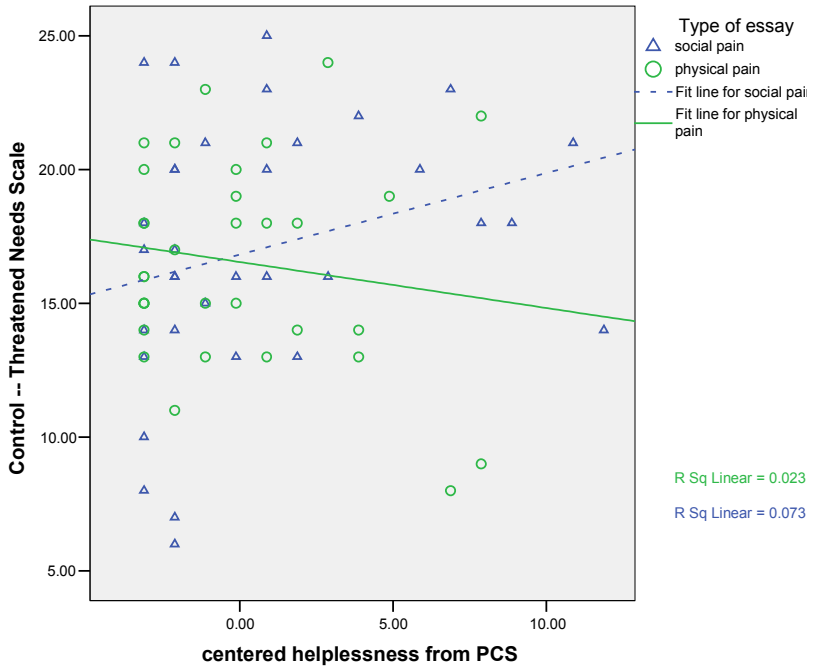


Figure 3.17 Pain Helplessness Moderates Link between Essay and Control

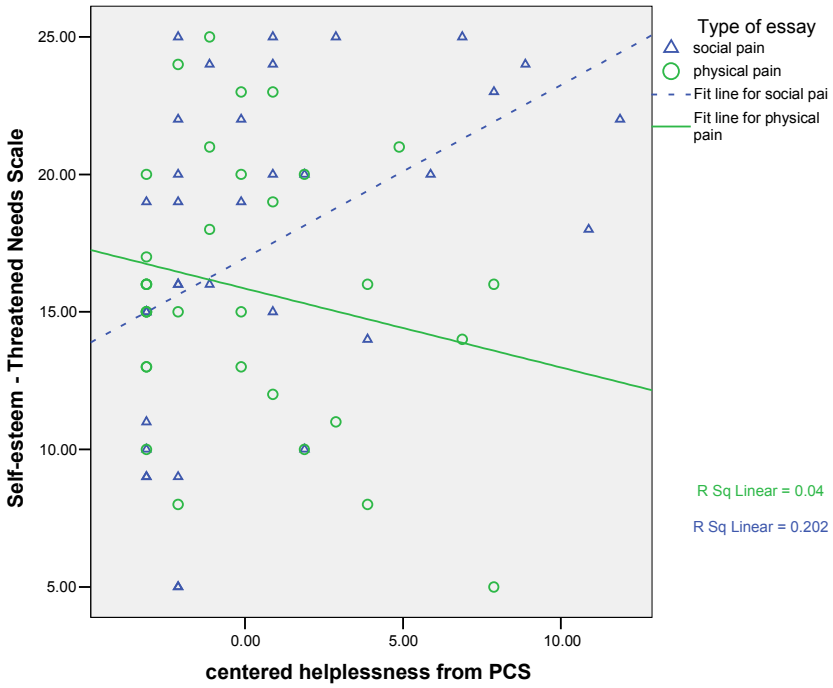


Figure 3.18 Pain Helplessness Moderates Link between Essay and Self-Esteem

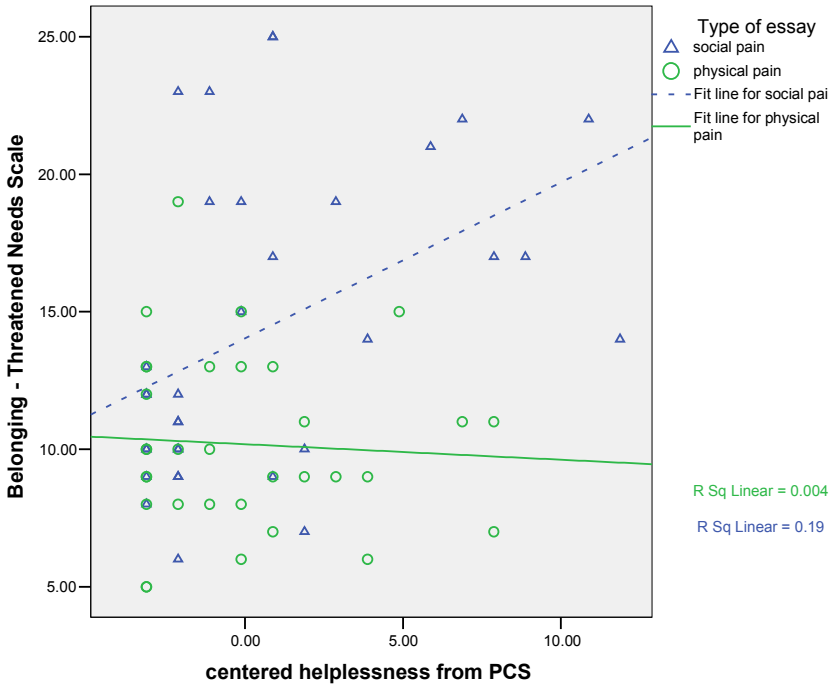


Figure 3.19 Pain Helplessness Moderates Link between Essay and Belongingness

In addition, I examined whether re-experiencing pain moderated the link between pain helplessness and self-control. Pain helplessness was related to self-reported rumination, B = .32, *t*(59) = 1.93, sr = .24. However, this relation was not moderated by essay type. There was no evidence that pain helplessness was related to cookie consumption and Stroop PE or RT. There was also no evidence than pain mediated this association in the social pain condition.

3.3.6.5 Pain Rumination

First, the relationship between pain rumination and current self-reports of pain were examined. There was no evidence that pain rumination was associated with current pain levels. Next, it was examined whether re-experiencing pain moderated the link between pain rumination and threatened needs. A significant essay X rumination interaction was found for threatened belongingness, B = -.38, *t*(59) = -2.26, sr = -.24. As anticipated, pain rumination was related to belongingness, but only in the social condition, B = -.38, *t*(59) = -2.26, sr = -.24 (for physical pain, B = -.07, *t*(29) = -.36, *ns*). A significant essay X rumination interaction was found for threatened self-esteem, B = -.42, *t*(59) = -2.04, sr = -.24. As expected, pain rumination was related to threatened self-esteem for persons in the social condition only, B = .71, *t*(30) = 2.72, sr = .43 (for physical pain, B = -.13, *t*(29) = -.43, sr = -.08. In addition, an essay X pain rumination interaction was found for threatened meaningful existence. Again, pain rumination was related to threatened meaningful existence only in the social pain condition, B = .70, *t*(30) = 2.95, sr = .47 (for physical pain, B = -.19, *t*(29) = -1.02, sr = -.18). No significant effects were found for threatened control. (See Figures 3.20 – 3.22.)

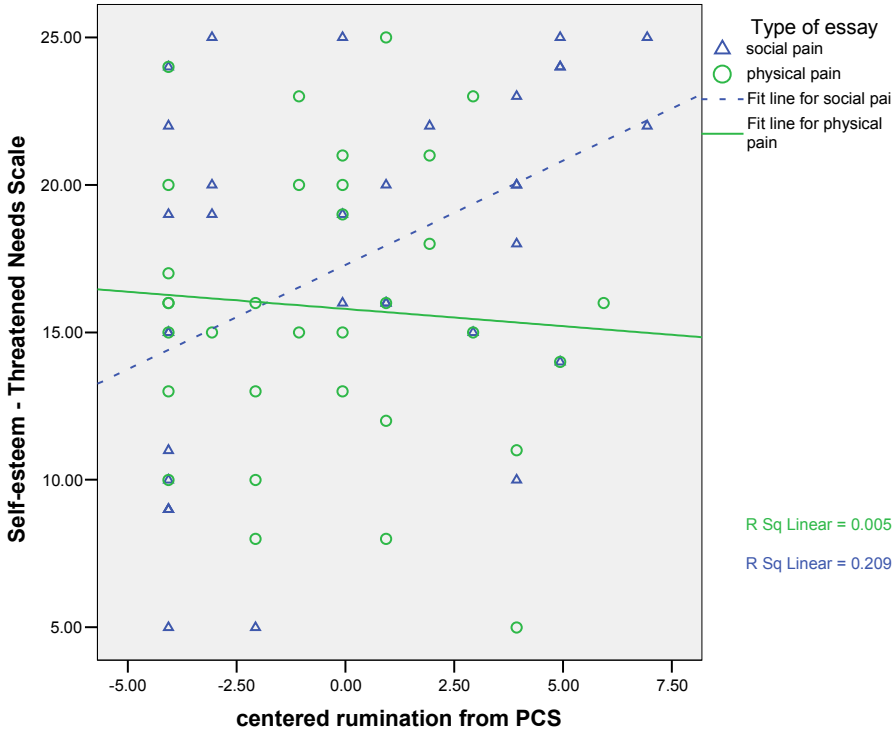


Figure 3.20 Pain Rumination Moderates Link between Essay and Self-Esteem

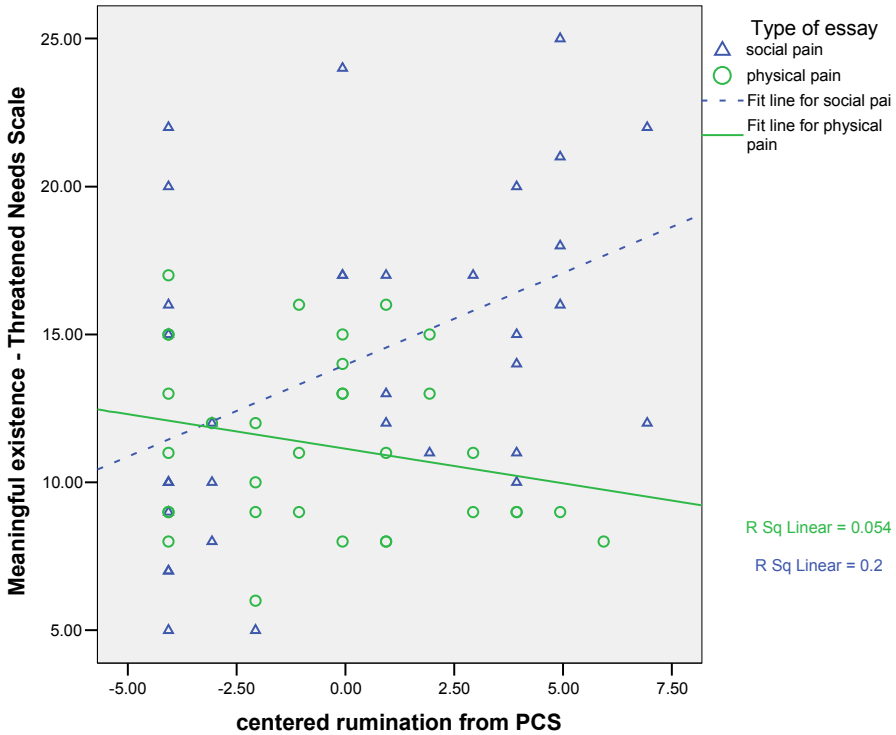


Figure 3.21 Pain Rumination Moderates Link between Essay and Meaningful Existence

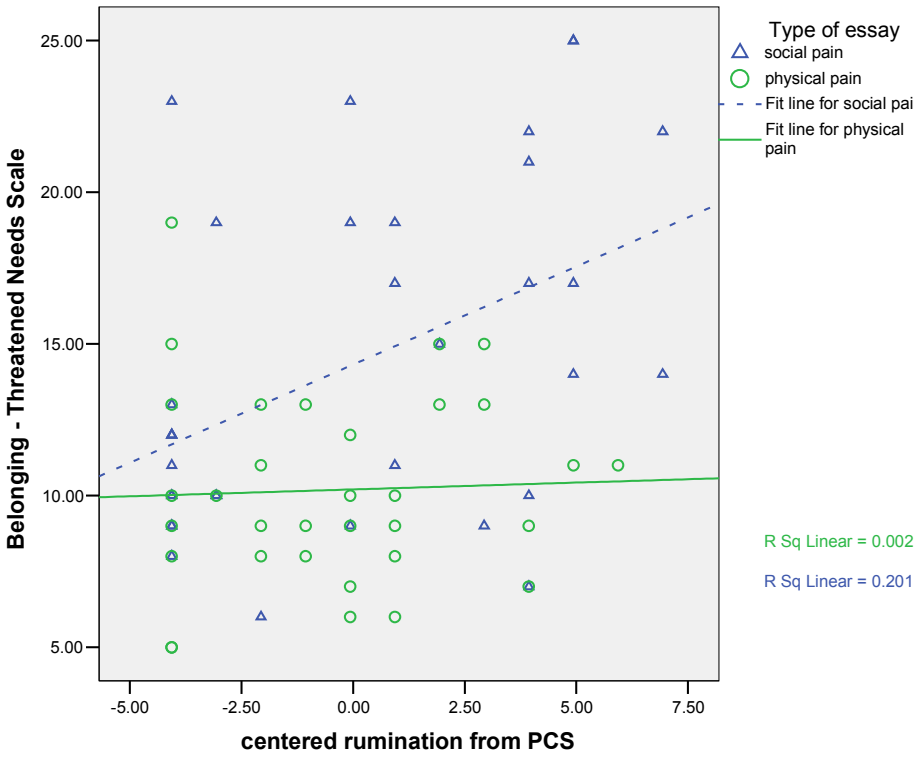


Figure 3.22 Pain Rumination Moderates Link between Essay and Belongingness

Finally, it was examined whether re-experiencing pain moderated the link between pain rumination and self-control. There was no evidence that pain rumination was related to cookie consumption, Stroop PE or RT, or self-reported rumination during the experimental session. There was also no evidence that current self-reported pain mediated this association in the social pain condition.

3.3.6.6 Supplementary Analysis

I also examined whether there was potential for the personality measures to load onto similar factors. To explore this possibility, a factor analysis was conducted using Maximum Likelihood and Varimax rotation. Two factors emerged, namely Social Pain catastrophizing and General Pain catastrophizing. The Social Pain catastrophizing factor

explained 28.40% of the variance whereas the General Pain catastrophizing factor explained 45.91% of the variance. The three components of pain catastrophizing, namely pain rumination, pain magnification, and pain helplessness loaded on the physical pain factor. Hurt proneness and rejection sensitivity loaded on the social pain factor.

3.3.6.7 Conclusion

Hypothesis 6 sought to determine whether rejection sensitivity, hurt proneness, and components of pain catastrophizing moderated the relation between social pain and self-regulatory depletion, threatened needs, and current reports of pain. Indeed, results showed evidence that individual differences in personality do moderate these relationships. Hurt proneness uniquely moderated the link between social pain and performance errors on the Stroop task. Hurt proneness, rejection sensitivity, and pain magnification each moderated the link between social pain and current reports of pain as assessed by FACES. In addition, rejection sensitivity and pain helplessness moderated the link between social pain and each of the threatened needs (e.g., meaningful existence, self-esteem, control, belongingness). Furthermore, pain magnification and pain rumination each moderated the relationship between social pain and three threatened needs, namely meaningful existence, self-esteem, and belongingness. Finally, hurt proneness moderated the relationship between social pain and the threatened needs of meaningful existence and belongingness.

CHAPTER 4

DISCUSSION

The goal of this study was three-fold. First, this study examined self-reported pain reactions and how psychological needs were threatened during different pain experiences. Second, the current study investigated whether re-experiencing social pain depletes the self-regulatory reserve. Finally, this study sought to determine whether personality dimensions moderate the social pain experience. The predicted theoretical model (see Figure 1) hypothesized that the type of painful experience and individual differences in personality would influence how persons re-experienced the pain experience. The model predicted that the re-experience of social pain would be more painful and would activate the ACC and PFC to a greater degree than the re-experience of physical pain, material pain, or mundane experiences thus leading to depletions in neural resources for future self-regulatory tasks. As a result, it was expected that persons who recalled social pain would have poorer performance on self-regulatory tasks and have greater reports of current pain and threatened needs.

Thus, it was expected that persons re-experiencing social pain would report higher levels of current pain and greater threatened needs than persons re-experiencing physical pain, material pain, or mundane experiences. In addition, it was predicted that social pain would uniquely lower one's ability to self-regulate. Finally, it was hypothesized that individual differences in hurt proneness, rejection sensitivity, and

pain catastrophizing would moderate the experience of social pain. Specifically, it was expected that individuals higher on these dimensions would evidence greater reports of current pain, greater threatened needs, and greater depletion of the self-regulatory reserve than individuals low on these dimensions.

4.1 Examining Reactions after Recalling Different Pain Experiences

Indeed, the results showed that re-experiencing a social pain as compared to re-experiencing a physical pain does differentially influence self-reported pain (i.e., FACES1, PPI), psychological needs, self-reported fear, and linguistic style. Furthermore, these differences were not moderated by gender. Similar to the work of Williams and colleagues (e.g., Zadro, Williams, & Richardson, 2004), the current study found that psychological needs were differentially threatened depending on the type of experience that was recalled. The psychological needs of belongingness and meaningful existence were threatened to a greater extent when persons re-experienced social pain as compared to physical pain, material pain, or mundane experiences. Persons re-experiencing social pain reported that their levels of self-esteem and control were threatened significantly more than persons re-experiencing their Monday morning.

Furthermore, the difference in threatened psychological needs between types of pain experiences was not due to the frequency with which the recalled event occurred, the perceived likelihood with which the event would occur again, the number of times the event had been discussed, the number of people the event was discussed with, the difficulty in recalling the pain experience, or the memory of how painful the initial pain

experience was. The lack of significant findings on these dimensions between social and physical pain recounts rules out a number of alternative hypotheses.

In addition, persons recalling a social pain experience reported greater increases in fear levels after writing about their experience than persons recalling a physical pain experience. Notably, change in fear for persons recalling social pain was related to current pain reports as assessed by FACES at time one. This relationship between current pain reports and fear was not found for persons recalling physical pain, material loss, or mundane experiences. No significant essay effects were found for overall negative affect or anger. Thus, it appears that there is something unique about recalling social pain that increases participants' reports of fear and that this increase in fear is associated with current pain reports.

Furthermore, the linguistic styles of essays written by participants recalling social and physical pain were significantly different. According to Pennebaker and colleagues (e.g., Pennebaker, 2002; Pennebaker & Graybeal, 2001; Pennebaker & King, 1999; Campbell & Pennebaker, 2003; Pennebaker, Mehl, & Niederhoffer, 2003), linguistic analyses allow for the assessment of underlying psychological processes that are occurring. Specifically, Pennebaker and colleagues examine linguistic style and word use (e.g., the number of pronouns, negations, references to positive emotions that are used). Current results from linguistic analyses suggest that the underlying psychological processes are different when recalling social and physical pain. For example, the use of specific pronouns was significantly related to current reports of pain. Specifically, the use of *I* was negatively related with current pain levels whereas

the use of *we* and *other* were positively related to current pain levels. This finding matches research by Pennebaker and colleagues (e.g., Pennebaker & Lay, 2002) which demonstrated a decrease in the use of *I* words and a decrease in the number of *we* and *other* words after persons experience a trauma.

Furthermore, the use of negations and positive emotions and feelings were positively related to current pain reports. Surprisingly, positive emotions and feelings were still significantly related to reports of pain when the number of negations was controlled for. Interestingly, although the number of pain words used was not significantly different between persons re-experiencing social versus physical pain, persons re-experiencing social pain reported greater levels of current pain as compared to persons re-experiencing physical pain. This finding further suggests that there is a unique aspect of re-experiencing social pain as compared to re-experiencing physical pain that differentially affects the current pain reports.

In sum, recalling social pain experiences led to very different reactions than recalling physical pain, material loss, or mundane experiences. Persons recalling social pain report higher levels of current pain, heightened threat to the psychological needs of belongingness and meaningful existence, and greater levels of fear after recalling the experiences. Furthermore, the linguistic style in which social pain is recalled is notably different from the three other experiences and involved more negations and words linked with social processes.

4.2 Does Social Pain Deplete the Self-Regulatory Reserve?

Next, the current study investigated whether re-experiencing social pain depleted the self-regulatory reserve at a greater rate than did re-experiencing physical pain, material pain, or mundane experiences. The results for this hypothesis were mixed. There was no direct relation between re-living a painful experience and self-regulatory depletion. However, there were some potentially important indirect relationships. First, a partial mediation model revealed that current reports of pain mediated the link between the recalled experience and the number of cookies eaten (Preacher & Hayes, 2004). In other words, it was found that persons re-experiencing social pain reported higher levels of current pain and in turn consumed a greater number of cookies than persons re-experiencing other events.

In addition, it was found that both FACES at time one and present pain intensity reports were correlated with the number of performance errors in the Stroop task, but only when reliving social pain. Moreover, for persons recalling social pain experiences, current pain reports (i.e., FACES1, PPI) were correlated with post-essay rumination. High post-essay rumination levels are potential evidence of a break-down in self-regulatory ability. Indeed, previous research has found an association between self-regulatory processes associated with executive function such as focusing mental attention, alternating tasks, and inhibiting responses (Baddeley, 1996; Baddeley, 2003; Barkley, 2001; Schmeichel & Baumeister, 2004). Rumination clearly falls within these self-regulatory activities as it evidences an inability to refocus attention from recalling an experience to performing other experimental tasks. As such, post-essay rumination is

another measure of self-regulation. Interestingly, only persons recalling social pain experiences evidenced a deficit in self-regulatory ability (i.e., Stroop performance errors, post-essay rumination scores). Notably, the number of Stroop performance errors was positively correlated with both self-regulatory measures of cookie consumption and post-essay rumination.

Furthermore, the personality trait of hurt proneness moderated the number of performance errors on the Stroop task. In other words, persons with higher levels of hurt proneness who re-experienced social pain made significantly more performance errors on the post-essay Stroop task. Again, this finding suggests that there is something about the relational aspect of social pain that depletes the self-regulatory ability to a greater extent than recalling other experiences. Although a significant effect was not found between essay condition and post-essay Stroop reaction times, the trend is in the expected direction. In other words, persons who re-experienced social pain were responding slower than persons who re-experienced physical pain. With a larger sample size, it is likely that this trend would be significant.

In addition to moderating effects, indirect effects of personality traits were found to influence self-control. Specifically, current reports of pain (i.e., FACES at time one) mediated the link between individual differences in hurt proneness and Stroop performance errors. Likewise, current pain levels mediated the link between individual differences in pain magnification and Stroop performance errors. Again, these mediational findings suggest that there is something unique about the relational aspect of pain experiences that reduces individuals' ability to self-regulate.

In sum, there is some evidence that re-experiencing social pain depletes the self-regulatory reserve. This evidence comes in the form of a mediation model in which current pain reports mediate the relationship between essay and cookie consumption. In addition, current pain reports were correlated with both Stroop performance errors and post-essay rumination, but only when reliving social pain. Furthermore, it was found that the association between hurt proneness and pain magnification to self-control, namely performance errors, was mediated by pain levels in the social pain condition.

4.4 Personality Moderates the Experience of Social Pain

This study also extended the work of Williams and colleagues (e.g., Zadro, Williams, & Richardson, 2004) by examining whether individual differences in pain reactions moderate the link between re-experiencing pain and whether psychological needs were threatened. For example, all four psychological needs were more threatened for individuals who were more sensitive to rejection or who reported being higher on pain helplessness. Individual differences in pain magnification and pain rumination moderated the link between re-experiencing pain and the threatened needs of meaningful existence, self-esteem, and belongingness. Finally, individuals higher in hurt proneness reported greater levels of threatened meaningful existence and belongingness compared with individuals lower in hurt proneness.

4.5 Alternative Explanations

This study examined a number of possible alternative explanations. No differences were found between groups on degree of difficulty in recalling the experience or the extent to which the initial event was remembered as being painful. In

addition, there were no differences in participants' reports of how frequently similar events occur or the amount of time that had passed since the event occurred. Furthermore, no differences emerged between the groups regarding the number of times the event had been discussed or the number of people with whom participants had discussed the event. While the null hypothesis cannot be confirmed, differences between groups did emerge on other analyses and thus rules out alternative hypotheses such as the difficulty of recalling the event, how painful the initial event was, frequency of similar events, time elapsed since the event, and how often the event had been discussed. As such, there does seem to be something unique about the pain memory itself that leads to the observed differences between social pain and physical pain memories.

Although not in opposition to the theoretical model, one possible explanation could stem from the different perspectives of the pain experiences. Physical pain is commonly perceived as an expected part of life. Furthermore, the wound from a physical injury is visible to others whereas the effects from a social injury are often unseen to others. Physical pain is often accompanied with a timeframe for healing and recovery. Indeed, recovery from a physical injury is closely related to the healing of the physical wound. Social pain injuries do not come with a comparable recovery timeframe. It may be possible that effects of social pains persist due to a lack of closure. As such, persons may continue to ruminate over the event thus holding the event in their memory.

Another possible explanation could be that social pains may have more complexities than physical pains. For example, social pains may be complicated by whether or not forgiveness occurs between involved parties. Again, this explanation is not necessarily in opposition to the theoretical model tested in the current study.

4.6 General Conclusions

Overall, the tested theoretical model received support (See Figure 1). Indeed, the type of painful experience that was recalled differentially influenced how the pain experience was relived. Specifically, recalling social pain as compared to recalling physical pain, material loss, or mundane experiences led to higher current reports of pain, a greater threat to psychological needs, and differences in how the pain experience was recalled. Individual differences were found to moderate the pain experience. It appears that the increase in threat to psychological needs, in reported fear, and in current reports of pain tap into the overall neurological pain subsystem (Eisenberger & Lieberman, 2004; Eisenberger, Lieberman, Williams, 2003; MacDonald & Leary, 2005).

4.7 Future Directions

Although there are many strengths to the current study, there are several possible limitations as well. First, the current study had a relatively small sample size. Many of the trends were in the expected direction (i.e., Stroop reaction times); however, with only roughly 30 participants per group, there may not have been enough power to detect certain effects. This may have been particularly important when trying to understand possible indirect influences that were not initially proposed.

Another limitation is the type of tasks that were used to assess self-control. Self-regulation is seen as both an active and a passive system. For example, self-control can be broken into withdrawal/inhibition (e.g., selective attention, cognitive suppression, response inhibition) abilities as well as approach/activation abilities (e.g., switching tasks, utilizing strategies) (Baddeley, 1996; Dagenbach & Carr, 1994). All the self-regulatory tasks in the current study required participants to inhibit responses. For example, in the Stroop task, participants must inhibit the dominant response (i.e., the word color as it is read) in order to respond with the subdominant response (i.e., the ink color of the word). In addition, participants were required to inhibit any desires to consume cookies. Likewise, post-essay rumination is a measure of cognitive suppression. In other words, this study only examined the inhibition component of self-regulation. Future studies should also examine the approach/activation component of self-regulation.

Furthermore, future studies should carefully choose self-regulatory tasks that equally tap into the self-regulatory reserve for both men and women and are more challenging to self-control abilities. For example, one idea might be to combine the cookie task in this study with the cookie task used by Baumeister, DeWall, Ciarocco, & Twenge (2005). The Baumeister, et al. version of the cookie task required participants to complete a taste test. The number of cookies eaten in order to complete the taste test served as their measure of self-regulatory ability. Future studies might have participants complete a taste test but tell them that the researchers are running out of cookies and need some for later participants. Run this way, the cookie task might be a cleaner

measure of self-regulatory ability as it would require participants to inhibit the number of cookies eaten, but would require all participants to eat at least one cookie. Likewise, the cookie task could be altered to include other food items to increase the generalizability of the findings. For example, tasting non-alcoholic beer (which is assumed to be alcoholic beer) might be particularly appealing to college students and would thus serve as a good measure of self-regulation.

In addition, future studies should directly examine whether re-experiencing different types of pain do in fact differentially activate the ACC and PFC. Future research can further examine how personality traits (i.e., hurt proneness) moderate the link between re-experiencing social pain and Stroop performance errors. Specifically, future research should examine whether individuals higher in hurt proneness have greater activation in the ACC and PFC than individuals lower in hurt proneness when reliving socially painful experiences compared to physically painful ones.

Even with these limitations, the outcomes here suggest that although there are similarities between physical and social pain (MacDonald & Leary, 2005), there are also notable differences between these two types of pain. Indeed, these results highlight the importance of social relationships in examining reactions to pain (e.g., change in affect, psychological needs, current pain reports). Specifically, the current study suggests that while social pain may share the same underlying neurological subsystem as physical pain, there is something unique about re-experiencing social pain that re-activates this neural substrate (e.g., heightened levels of fear, greater threat to psychological needs). Current results suggest that this re-activation may increase

current pain levels thereby depleting the self-regulatory reserve. In turn, there appears to be a lack of resources to effectively engage in future self-regulatory abilities. The current research thus provides further evidence of the importance in understanding the similarities and differences between social and physical pain experiences.

APPENDIX A

PAIN WORDS USED IN DICTIONARY

pain
hurt
broke
crush
cut
scar
wound
injure
harm
heart
rip
worry
suffer
damage
mar
impair
spoil
sore
sting
ache
throb
discomfort
die
death
biting
slap

APPENDIX B

QUESTIONS FOR CODING ESSAYS

Social pain

What type of social pain was experienced?

1 ostracism/exclusion
2 death
3 moving away
4 relational aggression (i.e., cold shoulder, stabbed-in-back)
5 rejection (i.e., own divorce, peer rejection)
6 divorce (other; i.e., parents)
7 seeing others suffer
8 other

Physical pain

To what extent were others involved (i.e., was the experience linked to others)?

1 (not at all; 0%) 2 (25%) 3 (moderately; 50%) 4 (75%) 5 (totally; 100%)

How severe was the physical pain?

1 (not severe) 2 3 4 5 (very/extremely severe)

Material pain

How much did their material pain description overlap with social pain?

1 (not at all; 0%) 2 (25%) 3 (moderately; 50%) 4 (75%) 5 (totally; 100%)

To what extent were others involved?

1 (not at all; 0%) 2 (25%) 3 (moderately; 50%) 4 (75%) 5 (totally; 100%)

How important was the material object (i.e., its worth)?

1 (not very) 5 (very)

APPENDIX C

GRID OF CONDITIONS

Essay Recalled	Social Pain	Physical Pain	Nonsocial Pain	Monday Morning
Females	21	20	21	22
Males	12	13	13	14
TOTAL	34	33	34	36

N = **137**

APPENDIX D

MEASURES

Rejection Sensitivity

Each of the items below describes things college students sometimes ask of other people. Please imagine that you are in each situation. You will be asked to answer the following questions:

1) How concerned or anxious would you be about how the other person would respond?
2) How do you think the other person would be likely to respond?

You ask someone in class if you can borrow his/her notes.

1. How concerned or anxious would you be over whether or not the person would want to lend you his/her notes?

very unconcerned very concerned
A B C D E

2. I would expect that the person would willingly give me his/her notes.

very unlikely very likely
A B C D E

You ask your boyfriend/girlfriend to move in with you.

3. How concerned or anxious would you be over whether or not he/she also would want to move in with you?

very unconcerned very concerned
A B C D E

4. I would expect that he/she would want to move in with me.

very unlikely very likely
A B C D E

You ask your parents for help in deciding what programs to apply to.

5. How concerned or anxious would you be over whether or not your parents would want to help you?

very unconcerned very concerned
A B C D E

6. I would expect that they would want to help me.

very unlikely very likely
A B C D E

You ask someone you don't know well out on a date.

7. How concerned or anxious would you be over whether or not the person would want to go out with you?

very unconcerned very concerned
A B C D E

8. I would expect that the person would want to go out on a date with me.

very unlikely very likely
A B C D E

Your boyfriend/girlfriend has plans to go out with friends tonight, but you really want to spend the evening with him/her, and you tell him/her so.

9. How concerned or anxious would you be over whether or not your boyfriend/girlfriend would decide to stay in?

very unconcerned very concerned
A B C D E

10. I would expect that he/she would willingly choose to stay in with me.

very unlikely very likely
A B C D E

You ask your parents for extra money to cover living expenses.

11. How concerned or anxious would you be over whether or not your parents would help you out?

very unconcerned very concerned
A B C D E

12. I would expect that my parents would not mind helping me out.

very unlikely very likely
A B C D E

After class, you tell your professor that you have been having some trouble with a section of the course and ask if he/she can give you some extra help.

13. How concerned or anxious would you be over whether or not your professor would want to help you out?

very unconcerned very concerned
A B C D E

14. I would expect that the professor would want to help me.

very unlikely very likely
A B C D E

You approach a close friend to talk after doing or saying something that seriously upset him/her.

15. How concerned or anxious would you be over whether or not your friend would want to talk with you?

very unconcerned very concerned

A B C D E

16. I would expect that he/she would want to talk with me to try to work things out.

very unlikely very likely

A B C D E

You ask someone in one of your classes to coffee.

17. How concerned or anxious would you be over whether or not the person would want to go?

very unconcerned very concerned

A B C D E

18. I would expect that he/she would want to go with me.

very unlikely very likely

A B C D E

After graduation you can't find a job and you ask your parents if you can live at home for a while.

19. How concerned or anxious would you be over whether or not your parents would want you to come home?

very unconcerned very concerned

A B C D E

20. I would expect that I would be welcome at home.

very unlikely very likely

A B C D E

You ask your friend to go on vacation with you over Spring Break.

21. How concerned or anxious would you be over whether or not your friend would want to go with you?

very unconcerned very concerned

A B C D E

22. I would expect that he/she would want to go with me.

very unlikely very likely

A B C D E

You call your boyfriend/girlfriend after a bitter argument and tell him/her you want to see him/her.

23. How concerned or anxious would you be over whether or not your boyfriend/girlfriend would want to see you?

very unconcerned very concerned
A B C D E

24. I would expect that he/she would want to see me.
very unlikely very likely
A B C D E

You ask a friend if you can borrow something of his/hers.

25. How concerned or anxious would you be over whether or not your friend would want to loan it to you?

very unconcerned very concerned
A B C D E

26. I would expect that he/she would willingly loan me it.
very unlikely very likely
A B C D E

You ask your parents to come to an occasion important to you.

27. How concerned or anxious would you be over whether or not your parents would want to come?
very unconcerned very concerned
A B C D E

28. I would expect that they would want to come.
very unlikely very likely
A B C D E

You ask a friend to do you a big favor.

29. How concerned or anxious would you be over whether or not your friend would want to help you out?
very unconcerned very concerned
A B C D E

30. I would expect that he/she would willingly agree to help me out.
very unlikely very likely
A B C D E

You ask your boyfriend/girlfriend if he/she really loves you.

32. How concerned or anxious would you be over whether or not your boyfriend/girlfriend would say yes?
very unconcerned very concerned
A B C D E

33. I would expect that he/she would answer yes sincerely.
very unlikely very likely
A B C D E

You go to a party and notice someone on the other side of the room, and then you ask them to dance.

34. How concerned would you be over whether or not the person would want to dance with you?

very unconcerned very concerned

A B C D E

35. I would expect that he/she would want to dance with me.

very unlikely very likely

A B C D E

You ask your boyfriend/girlfriend to come home to meet your parents.

36. How concerned would you be about whether or not your boyfriend/girlfriend would want to meet your parents?

very unconcerned very concerned

A B C D E

37. I would expect that he/she would want to meet my parents.

very unlikely very likely

A B C D E

The Hurt Proneness Scale
(Leary & Springer, 2001)

Please rate the degree to which each statement is true or characteristic of you on a 5-point scale, where 1= not at all, 2= slightly, 3= moderately, 4= very, and 5= extremely characteristic of me.

Q1 My feelings are hurt easily.

Q2 I am a sensitive person.

Q3 I am "thick-skinned."

Q4 I take criticism well.

Q5 Being teased hurts my feelings.

Q6 I rarely feel hurt by what other people do or say to me.

EAQ

Directions: To what extent do the following words describe your ***current feelings***? Please circle the number that best fits your response.

I feel:

1. Angry

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

2. Enthusiastic

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

3. Attentive

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

4. Agitated

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

5. Afraid

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

6. Active

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

7. Jittery

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

8. Annoyed

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

9. Alert

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

10. Inspired

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

11. In a Good Mood

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

12. Hostile

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

13. Nervous

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

14. Proud

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

15. Determined

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

16. Interested

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

17. Bad

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

18. Scared

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

19. Frustrated

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

20. Strong

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

21. Uplifted

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

22. Irritable

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

23. Excited

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

24. Happy

1……..…….2…….……3……4……5
Very Slightly Slightly Neutral Somewhat Extremely
or not at all

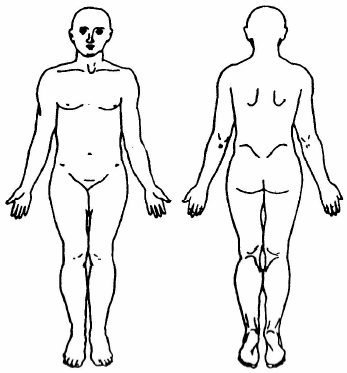
McGill Pain Questionnaire

Patient's Name _____ Date _____ Time _____ am/pm

PRI: S _____ A _____ E _____ M _____ PRI(T) _____ PPI _____
(1-10) (11-15) (16) (17-20) (1-20)

1 FLICKERING	11 TIRING	
QUIVERING	EXHAUSTING	
PULSING		
THROBBING	12 SICKENING	
BEATING	SUFFOCATING	
POUNDING		
2 JUMPING	13 FEARFUL	
FLASHING	FRIGHTFUL	
SHOOTING	TERRIFYING	
3 PRICKING	14 PUNISHING	
BORING	GRUELLING	
DRILLING	CRUEL	
STABBING	VICIOUS	
LANCINATING	KILLING	
4 SHARP	15 WRETCHED	
CUTTING	BLINDING	
LACERATING		
5 PINCHING	16 ANNOYING	
PRESSING	TROUBLESOME	
GNAWING	MISERABLE	
CRAMPING	INTENSE	
CRUSHING	UNBEARABLE	
6 TUGGING	17 SPREADING	
PULLING	RADIATING	
WRENCHING	PENETRATING	
7 HOT	PIERCING	
BURNING	18 TIGHT	
SCALDING	NUMB	
SEARING	DRAWING	
8 TINGLING	SQUEEZING	
ITCHY	TEARING	
SMARTING	19 COOL	
STINGING	COLD	
9 DULL	FREEZING	
SORE	20 NAGGING	
HURTING	NAUSEATING	
ACHING	AGONIZING	
HEAVY	DREADFUL	
10 TENDER	TORTURING	
TAUT	PPI	
RASPING	0 NO PAIN	
SPLITTING	1 MILD	
	2 DISCOMFORTING	
	3 DISTRESSING	
	4 HORRIBLE	
	5 EXCRUCIATING	

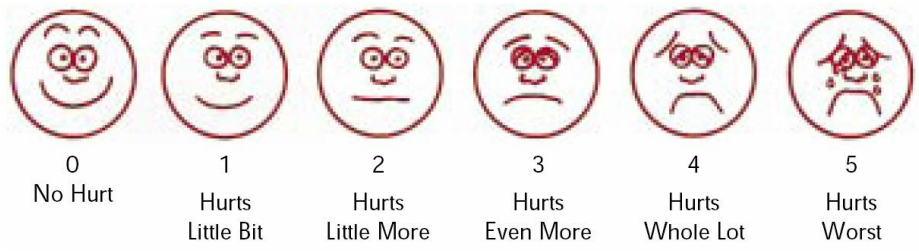
BRIEF	RHYTHMIC	CONTINUOUS
MOMENTARY	PERIODIC	STEADY
TRANSIENT	INTERMITTENT	CONSTANT



E = EXTERNAL
I = INTERNAL

COMMENTS:

Wong-Baker FACES Pain Slide



Instructions to type for personal recall

(These instructions go in the actual space where they will write their response.)

Physical Pain Condition:

1. Please recall the WORST time in the last five years of your life when you suffered PHYSICAL pain. In the space below, type in what happened (step-by-step, in order as it happened) taking as much time as you need.

2. How did you FEEL when you experienced this physical pain? Please try to be as specific as possible. Take as much time as you wish.

3. Spend a moment trying as hard as you can to relive this experience, not just to remember it. Are you actually feeling the pain again now?

Social Pain Condition:

1. Please recall the WORST time in the last five years of your life when you suffered from a SOCIAL pain (i.e. you were betrayed, left out, someone close to you passed away, you felt rejected, etc.). In the space below, type in what happened (step-by-step, in order as it happened) taking as much time as you need.

2. How did you FEEL when you experienced this social pain? Please try to be as specific as possible. Take as much time as you wish.

3. Spend a moment trying as hard as you can to relive this experience, not just to remember it. Are you actually feeling the pain again now?

Monday Morning Condition (neutral):

1. Please recall your typical Monday morning. In the space below, type in what happened (step-by-step, in order as it happened) taking as much time as you need.

2. How did you FEEL as you experienced the events of your Monday morning? Please try to be as specific as possible. Take as much time as you wish.

3. Spend a moment trying as hard as you can to relive this experience, not just to remember it. Are you actually feeling the emotions of the day now?

Lost Possession Condition (nonsocial pain):

1. Please recall a time in the last five years when you lost a material possession that was very important to you. (Please think of a time when you lost something that is not connected to another person – i.e. you lost your keys.) In the space below, type in what happened (step-by-step, in order as it happened) taking as much time as you need.

2. How did you FEEL when you experienced this loss? Please try to be as specific as possible. Take as much time as you wish.

3. Spend a moment trying as hard as you can to relive this experience, not just to remember it. Are you actually feeling the emotions you felt when you lost your possession now?

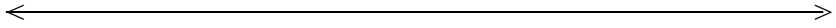
Essay Recall Questionnaire

Directions: Please answer the following questions about the recall of your personal experience ***as honestly and accurately as possible***. Bubble in the number that best matches your response.

1) To what degree did you actually **relive** the experience (i.e. you were actually having the experience again)?

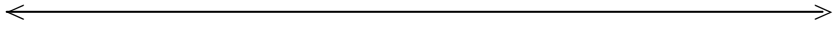
1	2	3	4	5
Not at all	Hardly	Neutral	Somewhat	Completely

2) To what degree did you simply **recall** the experience (i.e. you were simply retelling the story without being in the experience again)?



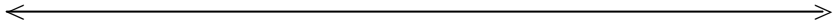
1	2	3	4	5
Not at all	Hardly	Neutral	Somewhat	Completely

3) How intensely did you re-experience the emotions of the initial experience?



1	2	3	4	5
Not at all	Hardly	Neutral	Somewhat	Very

4) How difficult was it for you to recall the experience and write about it?

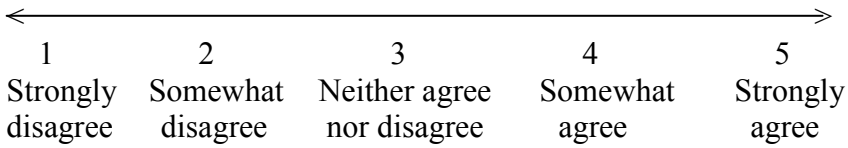


1	2	3	4	5
Not at all	Hardly	Neutral	Somewhat	Very

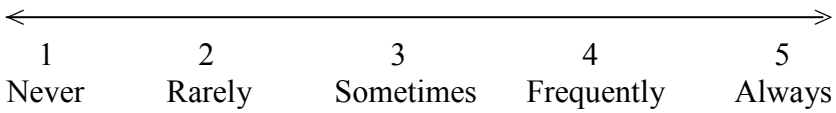
5) I could see the experience playing out in front of my eyes as I recalled it.

1	2	3	4	5
Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree

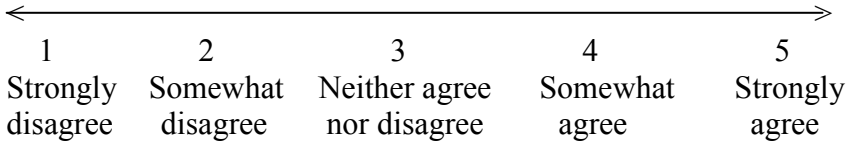
6) I remember the actual experience as being very painful.



7) Similar types of events described in my essay occur frequently in my life.



8) I believe that the type of events described in my essay will likely occur again in my future.



9) Approximately how long ago did the event/experience take place?

_____

10) Approximately how many people have you discussed the event/experience with?

___

11) Approximately how many times have you discussed the event/experience?

_____

12) About what were you to write your essay? _____

13) Which would describe your experience more (choose one)?

- □ I was reliving the events as I wrote the essay
- □ I was only retelling the past events as I wrote the essay

Pain Catastrophizing Scale

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

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

0: not at all 1: to a slight degree 2: to a moderate degree 3: to a great degree 4: all the time

When I'm in pain…

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

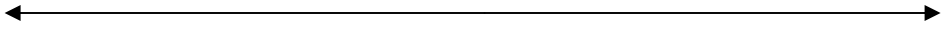
PCS Scoring Information:

Rumination = sum of items 8, 9, 10, 11
Magnification = sum of items 6, 7, 13
Helplessness = sum of items 1, 2, 3, 4, 5, 12

Mean (SD): Total = 28.2 (12.3); rumination = 10.1 (4.3); magnification = 4.8 (2.8); helplessness = 13.3 (6.1)
Values are drawn from Sullivan et al., 1998

Rumination Questions

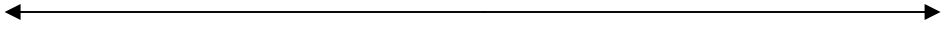
1) During the time you worked on the tasks (after you wrote about a personal experience/event), to what extent did the experience/event you wrote about intrude your thoughts?



0 1 2 3 4

Not at all a slight degree a moderate degree a great degree all the time

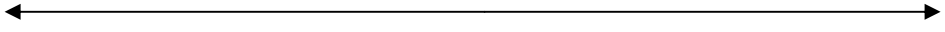
2) After writing my essay, I anxiously thought about the experience/event I had recalled.



0 1 2 3 4

Not at all a slight degree a moderate degree a great degree all the time

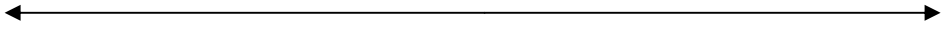
3) I could not seem to get the experience/event that I recalled in my essay out of my mind even when I was doing other tasks during the remainder of the study.



0 1 2 3 4

Not at all a slight degree a moderate degree a great degree all the time

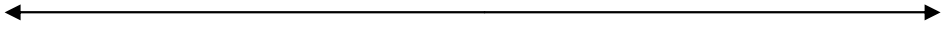
4) I wish I could stop thinking about the experience/event I recalled in my essay.



0 1 2 3 4

Not at all a slight degree a moderate degree a great degree all the time

5) After I finished writing and answering questions about my personal experience/event, I did not think about it again during the remainder of the study.



0 1 2 3 4

Not at all a slight degree a moderate degree a great degree all the time

Need Threat Scale

*For each question, please circle the number to the right that best represents the **feelings** you were experiencing **while reliving/retelling your experience**.*	Not at all				Extremely
Belonging					
1. I felt "disconnected"	1	2	3	4	5
2. I felt rejected	1	2	3	4	5
3. I felt like an outsider	1	2	3	4	5
4. I felt like a I belonged	1	2	3	4	5
5. I felt connected to others	1	2	3	4	5
Self esteem					
6. I felt good about myself	1	2	3	4	5
7. My self-esteem was high	1	2	3	4	5
8. I felt liked	1	2	3	4	5
9. I felt insecure	1	2	3	4	5
10. I felt satisfied	1	2	3	4	5
Control					
11. I felt powerful	1	2	3	4	5
12. I felt I had control	1	2	3	4	5
13. I felt I had the ability to significantly alter events	1	2	3	4	5
14. I felt I was unable to influence the action of others	1	2	3	4	5
15. I felt that others decided everything	1	2	3	4	5
Meaningful existence					
16. I felt invisible	1	2	3	4	5
17. I felt meaningless	1	2	3	4	5
18. I felt non-existent	1	2	3	4	5
19. I felt important	1	2	3	4	5
20. I felt useful					
MOOD					
21. Good	1	2	3	4	5
22. Bad	1	2	3	4	5
23. Friendly	1	2	3	4	5
24. Unfriendly	1	2	3	4	5
25. Angry	1	2	3	4	5
26. Pleasant	1	2	3	4	5
27. Happy	1	2	3	4	5
28. Sad	1	2	3	4	5

APPENDIX E

DEBRIEFING STATEMENT

Debriefing Participant

- All participants MUST undergo the debriefing session.
- This is the script that is to be used. All major points below must be covered. However, the actual information/flow of the debriefing might vary from participant to participant based on how the participant responds to each question.
- Our debriefing process follows the guidelines described in the chapter on laboratory experiments in *The Handbook of Social Psychology* (Aronson & Carlsmith, 1968). This identifies three goals to accomplish during debriefing: (1) Ensure the participant is in a good frame of mind, (2) Ensure that the experimental process is an educational experience for all research participants, and (3) Use the participant's inputs to gain valuable information about the experimentation process. We use these goals as the basis for our debriefing session. We will first ask the participants very general questions about what they thought of the experiment, explain the design in detail, and then ask if they had any questions. Allow the participant the opportunity to answer each question. It helps them express their feelings and may provide us with valuable insight into ways we can improve the study.
- We want to be sensitive to the research participant's feelings. We should let them "discover" and discuss the experimental process. We do not want any research participant to feel bad about his/her self. **It is very important that no research participant leave the study feeling worse about him/her self than when he/she started the session.**

Questions to ask RP in debriefing:

- *"What did you think about this experiment?"*
- *"What did you think about writing the essay? Did writing the essay bother you?*
- *"What did you think of the tasks you were asked to perform today?"*
- *"Do you think writing the essay may have influenced the way you responded to the tasks?"*
- *"If so, how do you think it influenced your performance?"*
- *"What did you think about the questions we asked you? Did you have any questions about why we asked you those questions?"*

- *"I glad you noticed those things. Before you leave, I thought you might like to know a little more about this study. The purpose of this study is to examine how recalling different types of painful experiences affect our ability to self-regulate or control our behaviors. We looked at two types of pain: physical pain (like breaking an arm) and social pain (like losing a loved one). We are expecting that there is something unique about recalling social pain that causes a significant reduction in one's self-regulatory ability because it is still painful to recall (again, self-regulation is the ability to control one's behavior). Some participants were asked to recall a time when they experienced a type of social pain (i.e. when someone betrayed them, they felt left out, someone they loved passed away, etc.). Others were asked to recall a time when they experienced physical pain (i.e. they broke a bone, had a bad sprain, etc.). In addition to recalling painful experiences, we also had some participants recall a time when they lost an important material possession (this is a sad, yet non-painful memory) and others recalled their typical Monday morning routine (a neutral and non-painful memory).*

  The pain questionnaires that you filled out will give us information about the pain that you were re-experiencing. We are especially interested in the comparison of how participants who recalled social pain and physical pain reported the pain.

  All of the tasks you completed involved some type of self-regulation. For example, the Stroop task (the color naming task) is a traditional measure that has been used in past studies to measure people's ability to inhibit a common response (read the word) in order to produce a less common response (say the color of the ink) For example, when you saw "blue" in red ink, the common response is to say "blue" and the less common response is to say "red". If you remember, we had you complete the Stroop task twice – once before writing the essay and once after. By having you complete the Stroop before writing your essay, we were able to collect a baseline measure of your self-regulatory ability that can be used as a comparison for the Stroop you completed later.

  We also had you take part in a cookie taste pre-test where you completed a survey for us that we told you would be used in future studies. The cookie taste pre-test was actually another measure of self-regulation. Research has shown that people who have a depleted self-regulatory reserve will eat more cookies in order to complete the survey than people whose self-regulatory reserve has not been depleted. There really is not a future study that will use the information from the cookie taste pre-test. We did not tell you this ahead of time because sometimes when people know why they are doing a particular task, they try to "help" the researcher. If you had known what we were really interested in, you might have purposely eaten more or less cookies. We couldn't tell you the true nature of the cookie taste test before because it could have affected your natural actions and behavior. ***Do you understand why we couldn't tell you why you were really doing the taste test?***

  In between these two tasks we had you proofread your essay and answer a few questions relating to it. We had you re-look at your essay because we wanted to make sure that the experience was still fresh in your head when you completed the second self-regulatory measure (the Stroop). By having you read over your essay we could be more certain that any differences seen in the Stroop could be

attributed to the recall of the experience. The questions you answered will provide us with information about the degree to which you re-experienced the event versus recalled the event. It is designed to give us information about how well our manipulation worked.

Because we were having some participants recall painful and potentially sad experiences, we wanted to make sure that negative mood is not what is playing a role in any differences we find among the behavioral tasks. That's why we had you complete the EAQ so many times (remember they're filling it out three times). *By having you complete the EAQ we can determine whether or not mood is playing a role in self-regulatory depletion (or the lose of some self-control). . . . I also want to remind you that you have the right to withdraw at any time."*

- *Do you have any questions or concerns that were not answered today?*
- *Before you leave, we also wanted to provide you with some information on Counseling services at UTA. Participating in a study about Social and Physical Pain may highlight emotional, behavioral, or relationship problems that you might want to discuss with a professional. Information about obtaining individual and group counseling at the University of Texas at Arlington is provided on this pamphlet. Counseling Services are free to UTA students.*
- *Before you leave, we also wanted to thank you very much for participating. We also ask you not to tell anyone about the true nature of our study. Can you help with this request?*
- Be sure to give participants a copy of the attached Counseling services that are available at UTA.

- Be sure the participant takes their copy of the signed consent form.

UTA Counseling Services Department

Participating in a study about Social and Physical Pain may highlight emotional, behavioral, or relationship problems that you might want to discuss with a professional. Information about obtaining individual and group counseling at the University of Texas at Arlington is provided below. ***Counseling Services are free to UTA students***.

Information from the UTA Counseling Services Department Website:

Phone Number: (817) 272-3671

Individual personal counseling:

A student can meet with a counselor for personal, emotional, behavioral, or relationship problems. Students also often seek personal counseling when they are having difficulties adjusting to college or juggling obligations (like attending college while working or raising a family). Counseling sessions are made by appointment, or a student may meet with the walk-in counselor without an appointment on a first-come, first-served basis. Information revealed in counseling will be treated with the utmost respect to your privacy and confidentiality; all records or communications will be kept confidential to the full extent of the law and professional ethics (see below for more information).

Each counselor has his or her own counseling approach and style. The counseling goal is to help you resolve your concerns and reach your goals in the pursuit of more satisfying, fulfilling life circumstances. UTA Counseling Services generally adheres to short-term, goal-oriented counseling approaches. The exact type of assistance you receive will be based on a collaboration between your counselor and yourself. Individuals will be informed when we are unable to provide the services you require. In such cases, we will assist you as much as possible in the referral process so that you can get in touch with someone who can meet your needs. Counseling Services are free to UTA students.

Be sure to check out our seminars also.

Group Counseling:

Many students may benefit from various forms of group counseling. In the past, Counseling Services has been able to offer groups focusing on intensive relaxation training techniques, women and self-esteem, and general group counseling. General group counseling is often helpful for people who experience relationship problems, high social anxiety, depression, and a variety of other concerns.

Limits to confidentiality:

The law mandates that parents of minor students (seventeen years old or younger) have the right to view counseling records and must give their consent to treatment, with some exceptions in extreme cases. We are also mandated by law to report to authorities when we have reasonable information that a minor (or an adult unable to protect him/herself) is in danger of abuse or neglect or when such abuse or neglect has occurred. Legal and ethical standards also permit reporting to appropriate authorities when a person poses an immediate threat to oneself or others. Professional codes of ethics set the protection of life as the highest priority.

Contacts:

Kenneth L. Farr, Director (817) 272-3671
Kenneth L.Farr, Ph.D., Licensed Psychologist-Director of Counseling Services Dr. Farr's training and background is in Clinical Psychology. He has served as a psychologist at UTA since 1995 and became the Director of Counseling Services in September 2001. His areas of expertise and interest include crisis intervention; counseling and psychotherapy; consultation; and working with emotional, behavioral, and interpersonal problems.

Cynthia Bing, Associate Director (817)272-3671
Cynthia Bing, M.A., L.P.C., N.C.C. - Associate Director. Ms. Bing has 15 years experience, ten years at UTA. Her areas of expertise include personal counseling, career counseling, study skills, and academic problems.

Ellen Myers, Counseling Specialist III (817)272-3671
Ellen Myers, M.S., L.P.C. - Counseling Specialist III. Ms. Myers has a wide range of experience in teaching, academic advising, and general counseling and has worked at UTA since 1997. Her areas of expertise include stress management/relaxation training, study skills, and academic counseling.

Rhonda Triana, Counseling Specialist IV (817)272-3671
Rhonda Triana, MSSW, LMSW-ACP- Counseling Specialist IV. A graduate of UTA, Ms. Triana has over seven years of experience as a therapist. Her areas of expertise include depression, anxiety, relationships, and career guidance.

Janette H. Keen, Counseling Specialist (817)272-3671
Janette H. Keen, M.A. - Counseling Specialist. Ms. Keen has 10 years of experience in residence life, academic advising and freshman programs. About to complete her sixth year at UTA, she currently assists students with study skills and college adjustment issues through the EDUC 1131 course.

Lori Leach, Counseling Specialist III 817-272-3671
Lori Leach, M.Ed., L.P.C. - Counseling Specialist III. Ms. Leach has 10 years of advising and counseling experience, 3 at UTA. Her areas of expertise include personal counseling, career counseling, and academic counseling.

LeeAnne Harker, (817) 272-3671
LeeAnne Harker, Ph.D. - Counseling Specialist-IV. Licensed Psychologist in California. Dr. Harker's training and background are in Clinical and Personality Psychology. Her areas of expertise and interest include psychotherapy and counseling, depression, life-span development, relationships, and emotion.

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BIOGRAPHICAL INFORMATION

Jennifer Knack completed her undergraduate work at Saint Bonaventure University in upstate New York. With this thesis, she is earning a masters of science degree from The University of Texas at Arlington. She is pursuing a doctoral degree from The University of Texas at Arlington. Jennifer's research interests center around the construct of social pain (e.g., social ostracism, effects of victimizations, etc). She is especially interested in examining the differences and similarities between social pain and physical pain. In addition, her research examines self-regulatory processes. Jennifer has been involved in a number of research projects including an fMRI project examining neurological mechanisms involved in social pain experiences. She also collected data examining self-regulatory abilities in adolescents. Jennifer plans to continue her current line of research to gain a clearer understanding of mechanisms involved in social pain and self-regulation.