EXPANDING THE CONCEPT OF PERCEIVED BURDENSOMENESS: THE RELATIONSHIP BETWEEN BURDEN, OSTRACISM, AND PAIN

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A Thesis

Presented to

The Faculty of the Department

of Psychology

University of Houston

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In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

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By

Angie S. LeRoy

December, 2015

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ABSTRACT

Perceived burdensomeness (PB) is a real or imagined perception of being a burden to others, and is related to several negative outcomes, such as pain, depression, and suicide ideation. However, very little research has addressed the possible link between PB and pain. In the current proposal, we take a multi-disciplinary approach to investigate whether and why PB leads to pain; we propose that anticipated ostracism may explain this link. 262 participants completed an online study in which they were asked to recall an experience in which they were either burdensome to others (burdensome condition) or contribute equally to others (control condition) during a group task. In general, participants in the burdensome condition experienced more perceived burdensomeness, social pain, negative affect, and depressive symptoms than participants in the control condition. We also found evidence to suggest anticipated ostracism may partially explain the relationship between PB and pain. In addition, individuals with highly interdependent self-construal were more likely to perceive themselves as burdensome to others. Anticipated ostracism may be a modifiable mechanism practitioners can target in order to reduce negative outcomes including pain. Future research should examine the intricacies of the pain experience for those who perceive themselves as burdensome to others.

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CHAPTER ONE: INTRODUCTION

Perceived burdensomeness is a real or imagined perception of being a burden to others. Individuals who perceive themselves as burdensome often feel that they fail to contribute to the group and are a liability to the group's well-being or safety (Joiner, 2005). Among the terminally ill, perceiving oneself as burdensome is positively correlated with pain and physical symptoms, psychological problems (i.e., depression, loss of interest, anxiety), and existential issues (i.e., feeling out of control, loss of dignity, and feeling hopeless). Furthermore, feeling burdensome is related to end-of-life decision making such as an increased likelihood of requesting assisted suicide (Sullivan, Hedberg, & Hopkins, 2001; Wilson et al., 2007). In fact, suicide ideation and suicide-related behavior is arguably the most damaging consequence of perceived burdensomeness that society faces. In a recent study using a chronic pain patient sample, researchers identified perceived burdensomeness as a predictor of suicide ideation independent of other risk factors such as age, gender, and depressive symptoms (Kanzler, Bryan, McGeary, & Morrow, 2012). Even outside the medical realm, perceived burdensomeness has been linked to suicide ideation among the mentally ill (Joiner, 2005), military personnel (Bryan, Clemans, & Hernandez, 2012), younger adults (Joiner et al., 2009), older adults (Cukrowicz, Cheavens, Van Orden, & Cook, 2011), and sufferers of childhood emotional abuse (Puzia, Kraines, Liu, & Kleiman, 2014).

Although the link between perceived burdensomeness and suicide is well established, researchers currently lack an understanding of what underlies the psychological process of perceiving and responding to feelings of being burdensome. Specifically, no current explanation exists for the relationship between perceived

burdensomeness and pain (Kowal, Wilson, McWilliams, Péloquin, & Duong, 2012). Drawing from multiple avenues of research, we propose a mechanism (i.e., anticipated ostracism) that may help explain this possible link. Understanding the intricacies of how perceived burdensomeness influences our psychological processes is imperative in order to develop effective suicide prevention strategies for the future.

The goal of this study is to experimentally manipulate perceived burdensomeness, test the impact of perceived burdensomeness on pain, and explore perceptions of one's possible future rejection from a group as a possible mechanism. To begin, I will define the constructs of interest and review the history of this line of research. First, I will discuss previous lines of research related to perceiving oneself as burdensome.

CHAPTER 2: LITERATURE REVIEW

Multiple Research Perspectives of Burden

In the current proposal, we consider research on how individuals feel when they are burdensome. Although the focus of this proposal is not on suicide, the majority of the early research on burden focused on its relation to suicide, so it is worthy of note here. In a qualitative study investigating the contents of suicide notes, researchers found perceived burdensomeness as a theme. In addition, they found that perceived burdensomeness was correlated with the completion of suicide as well as the lethality of the suicide method (Joiner, Pettit, Walker, Voelz, Cruz, Rudd, & Lester, 2002). Since then, perceived burdensomeness has consistently appeared as a theme in suicide research (e.g., Van Orden, Lynam, Hollar, & Joiner, 2006; Jahn, Cuckrowicz, Linton, & Prabhu, 2011; Puzia, Kraines, Liu, & Kleiman, 2014). He proposed that in order for an individual to develop suicide ideation, they also must perceive themselves as burdensome. Individuals who perceive themselves as burdensome feel that the group would be better off without them and that their presence causes others pain or distress.

Medical researchers and health psychologists also study perceived burdensomeness but instead, use the term “Self-Perceived Burden” which refers to perceived burdensomeness from the perspective of patients. Self-perceived burden (SPB) is defined as an “empathetic concern engendered from the impact on others of one’s illness and care needs, resulting in guilt, distress, feelings of responsibility, and diminished sense of self,” (McPherson, Wilson & Murray, 2007). Studies on SPB are the only existing work outside of the suicide literature that provide insight into the experience of perceiving oneself as burdensome. Most of the SPB literature has been

correlational in nature, and has been found to be associated with negative physical health outcomes (Kowal, Wilson, McWilliams, Péloquin, & Duong, 2012) and psychological problems (Suri et al., 2011). Interestingly, a few recent studies have data to suggest that patients can accurately identify when their caregiver perceives them as burdensome, suggesting that perceptions of being burdensome to others may sometimes be justified (Kowal, Wilson, McWilliams, Péloquin, & Duong, 2012).

Even research conducted among the general population reveals evidence that being burdensome to others yields negative consequences. The least studied, and most recently published line of research on burden has arisen in the social psychology literature surrounding ostracism (being excluded and ignored) and its related theories. These researchers contend that burden is one antecedent to being ostracized; when a group identifies a burdensome group member as a threat to the group's well-being, they will ostracize the burdensome group member as a consequence (Wesselmann, Wirth, Pryor, Reeder, Williams, 2013).

Applying the knowledge gained through research on ostracism behavior, we will explore the experience of the victim of ostracism – the burdensome group member. In the present proposal, we adopt Joiner's (2005) more general definition of perceived burdensomeness along with the current theories of ostracism to attempt to explain where feelings of burden originate, and how they affect the individual.

The Evolutionary Roots of Perceived Burdensomeness

Feeling that one is burdensome to their kin may wear down self-preservation instincts to the point of suicidality (DeCantanzaro, 1991). Taking an evolutionary-psychological view of suicide, Joiner (2005) developed the Interpersonal Theory of

Suicide (ITS) which posits that a desire to commit suicide stems from two factors: a thwarted need to belong, and perceived burdensomeness. Researchers describe the need to belong as a fundamental human need that may have evolved due to the importance of social bonds for survival (Baumeister & Leary, 1995). Characteristics of a thwarted need to belong include feeling a disconnection from others, perceiving oneself as isolated from a group (e.g., feeling lonely or alienated), and feeling as though one does not fit in with the rest of the group (Joiner, 2005; Lester & Gunn, 2012). The need to belong is deep-rooted; throughout human history, belonging to a group was evolutionarily adaptive as it aided survival and reproduction. Baumeister & Leary (1995) suggest that competition for limited resources (e.g., food, shelter, and mates) may have given humans a reason to form groups, such that sharing resources benefitted the group by keeping any one individual from perishing.

Seeing that living in groups and maintaining positive social connections was crucial for our ancestors' survival, humans should be able to analyze their personal contribution to the group (or lack thereof), and thus determine whether they are a liability to the group (i.e., burdensome). It appears that individuals can assess both whether they are part of a group (i.e., belong) or whether they fail to contribute to a group (i.e., are burdensome). Some questions that remain are 1) how do we detect when we are burdensome to others? and 2) what are the psychological and physiological consequences? To help us begin to answer these questions, we will draw from the ostracism literature regarding the role of burden in intergroup processes.

Ostracism as a Method to Eliminate Burdensome Group Members

Ostracism is the act of ignoring and excluding individuals or groups by individuals or groups (Williams, 2007). Ostracism has been used by groups as a means of social control; it is a means by which groups may punish their group members for non-normative behavior (Dijker & Koomen, 2007; Gruter & Masters, 1986). Removing burdensome group members enhances the group's fitness (Kurzban & Leary, 2001) and increases group cohesion (Gruters & Masters, 1986). Individuals may judge the contribution of a fellow group member based on what resources that member provides the group. According to Social Exchange Theory, a cost-benefit analysis of social situations drives behavior (Cosmides & Tooby, 1989, 1992). The ability to perform this analysis properly depends first, on understanding group norms. These generic exchange norms include communal sharing (Kameda, Takezawa, & Hastie, 2003) and reciprocity (Gouldner, 1960). If a group member violates these norms (e.g., is unable to share or reciprocate resources), this person may be labeled as burdensome, and thereby be ostracized from the group. A recent empirical study provided evidence to support that humans have the ability to detect when a burdensome person is present in a group, and subsequently, may ostracize that person as a consequence (Wesselmann, Wirth, Pryor, Reeder, Williams, 2013). Using the Cyberball paradigm (an online ball-tossing game), the researchers found that participants not only identified a player with impaired performance as burdensome, they also reported punitive motivations for ostracizing this player. In a replication study that followed, participants ostracized a burdensome group member by allowing them substantially less opportunities to play the game compared to an equally contributing group member (Wirth, LeRoy, & Bernstein, In Preparation).

Throughout evolutionary history, because ostracism eliminated an individual's access to group resources, being ostracized often meant death. Seeing that ostracism posed such a threat to survival, humans likely evolved the ability to detect when they might be ostracized from the group in order to perhaps, fix their poor social standing (Spoor & Williams, 2007). This evolved detection system is said to be hypersensitive in order to detect any threat to social inclusion. Researchers have proposed an array of social monitoring systems that function to detect social threats in the environment. The Sociometer hypothesis, for example, proposes that our fluctuating self-esteem states act as a measure of our current social standing (Leary, Tambor, Terdal & Downs, 1995). These researchers propose that state self-esteem (i.e., the "Sociometer") helps individuals avoid social exclusion by alerting them to their diminished social status, thereby motivating them to fix their poor social standing before they become social outcasts. Similar to the Sociometer hypothesis, Spoor & Williams (2007) claim that the ostracism detection system signals when someone may be ostracized by inducing a physiological response that includes experiencing pain. They propose that this social monitoring system is crude and hypersensitive to subtle threats of ostracism; being ostracized causes pain regardless of the context or extent of the social threat. Considering the hypersensitive nature of the detection system, it is likely that anticipating social exclusion could have the same detrimental effects as those of actively being excluded (Kerr & Levine, 2008), even subtle hints of social exclusion, such as averted eye gaze, can prompt feelings of ostracism (Wirth, Sacco, Hugenberg, & Williams, 2010).

It appears that individuals are able to identify when they are burdensome to others. In a recent study among chronic pain patients, researchers surveyed both the

patient and the caregiver on their perceived levels of burden. The patients gave ratings for how burdensome they perceived themselves to be to their caregiver, and the caregivers gave ratings for what level of caregiver burden they endured by having to care for the patient. The researchers found that patients' self-perceived burden scores were positively and significantly associated with caregiver burden, suggesting that the patients could sense when their caregivers were suffering because of the responsibilities involved with caring for them. These findings were consistent among similar investigations done with Amyotrophic Lateral Sclerosis (ALS) (Chio, Gaunthier, Calvo, Ghiglione, & Muntani, 2005) and stroke patients (McPherson, Wilson, & Murray, 2007b).

Thus far, we have reviewed evidence that suggests that burdensome group members tend to be ostracized for the betterment of the group (Kurzban & Leary, 2001; Wesselmann, Wirth, Pryor, Reeder, Williams, 2013). Moreover, we have reviewed types of social monitoring systems (e.g., Sociometer Theory, Leary, Tambor, Terdal & Downs, 1995; Ostracism Detection System, Spoor & Williams, 2007) presumed to function as social threat alert mechanisms, signaling when an individual may be ostracized. Accordingly, if burdensome individuals tend to be the target of ostracism, then they may also endure the negative consequences of feeling ostracized. It is also likely that burdensome individuals can sense when they are burdensome. Perhaps perceiving oneself as burdensome is the initiation of the ostracism experience. If this supposition is valid, then feeling burdensome should have similar outcomes to those of feeling ostracized.

Parallels between Feeling Burdensome and Feeling Ostracized

Ostracism has been observed in human and non-human social animals as well as across cultures. Based on the results of published diary studies, it appears that some form

of ostracism occurs on nearly a daily basis (Williams, Bernieri, Faulkner, Grahe, & Gada-Jain, 2000). An individual who is ostracized is likely to experience negative affect, worsened mood, thwarted basic needs (i.e., belonging, control, self-esteem, meaningful existence), and feelings of social pain (Williams, 2007). Those who deal with chronic ostracism or isolation often have severe negative outcomes such as depression, physical health issues, and mortality (Baumeister & Leary, 2005; Cacioppo & Patrick, 2008). Some victims of ostracism act out aggressively; motives behind some of the most infamous U.S. school shootings (e.g., Columbine High School) are evidenced to be rooted to revenge against those who ostracized the shooters (Leary, Kowalski, Smith, & Phillips, 2003).

Perceiving oneself as burdensome also has negative consequences. Research on Self-perceived Burden (SPB) investigates the outcomes and experiences of chronically ill individuals who feel burdensome to their caregiver (McPherson, Wilson, & Murray, 2007). Similar to the experience of being ostracized, individuals who perceived themselves as burdensome to their caregiver also experienced negative health consequences including (but not limited to) depression (Cohen-Mansfield, Droge, & Billig, 1992), physical symptoms (e.g., pain and weakness), and existential issues (e.g., loss of control, hopelessness; Wilson, Curran, & McPherson, 2005). Additionally, SPB can affect adherence to treatment (Cohen-Mansfield, Droge, & Billig, 1992), and end of life decision-making including an increased likelihood of requesting euthanasia (Wilson, Scott, & Graham, Kozak, Chater, Viola, et al., 2000). As discussed at length previously, those who feel burdensome may also act out aggressively, as they are more likely to

employ the most lethal methods of suicide (Joiner, Pettit, Walker, Voelz, Cruz, Rudd, & Lester, 2002).

Pain

Out of all the overlapping outcomes between feeling burdensome and feeling ostracized, pain is of most interest in the present proposal. Within the ostracism and rejection literature, researchers have paid particular attention to the overlap of how humans experience social and physical pain (MacDonald & Leary, 2005; Chen, Williams, Fitness, & Newton, 2008; DeWall et al., 2010; and others). Evolutionary theory suggests that social pain originated from the existing physical pain system to detect threats to inclusion. Signaling the presence of a threat in the environment is a major function of both physical pain and social pain. For physical pain, this threat may be the presence of physically threatening stimuli (e.g., feeling pain when touching a hot stove); for social pain this may be the presence of socially threatening stimuli (e.g., cues from a significant other that he or she wants to end the relationship). Neurological evidence also exists to support the social and physical pain overlap theory conceptually. Researchers found that when participants experienced ostracism in an online ball-tossing game, the Pre-Frontal Cortex (PFC) and the Dorsal Anterior Cingulate Cortex (dACC), parts of the brain previously associated with physical pain, were activated (Eisenberger, Lieberman, &Williams, 2003).

While extensive research exists on the link between ostracism and pain, little research has explored the link between perceived burdensomeness and pain. Perceived burdensomeness was a significant predictor of suicide ideation among a sample of chronic pain patients above and beyond depression and other established risk factors

(Kanzler, Bryan, McGeary, & Morrow, 2012). However, perceived burdensomeness was not associated with pain severity. In contrast, another study investigating the connection between burden and pain, found that pain intensity ratings were significantly and positively associated with self-perceived burden (Kowal, Wilson, McWilliams, Péloquin, & Duong, 2012). From this conflicting evidence, it is unclear how burden is related to pain. Could the process of assessing one's social standing and anticipating potential ostracism from a group, prompt the pain shared by both burden and ostracism? A central question of the current study is to examine the influence of perceived burden on pain and the underlying process.

Depression

Numerous studies have reported a positive relationship between depression and self-perceptions of burden (Joiner, 2005; Chochinov, Kristjanson, Hack, Hassard, McClement, & Harlos, 2007; Van Orden, Witte, Cukrowicz, Braithwaite, Selby, & Joiner, 2010; Dempsey, Karver, Labouliere, Zesiewicz, & De Nadai, 2012). In a recent study, self-perceived burden was a significant predictor of depression among a sample of individuals living with a mood disorder (Dempsey, Karver, Labouliere, Zesiewicz, & De Nadai, 2012). In the same study, these researchers also found that self-perceived burden mediated the relationship between functional impairment and depression suggesting that, in their proposed model, perceiving oneself as burdensome may prompt depressive symptoms. Ample evidence suggests that individuals with depression experience increased physical symptoms including pain (Ohayon & Schatzberg, 2003; Demyttenaere et al., 2007). Collectively, these findings give us reason to expect that individuals who perceive themselves as burdensome may also experience depressive symptoms. In

addition, depression is a negative health outcome of both ostracism (Baumeister & Leary, 1995) and burden (Cohen-Mansfield, Droge, & Billig, 1992). Thus, we also expect experimentally induced burden will increase depressive symptoms.

Individual Differences

The impact of perceived burden on health may also depend on individual differences. We will focus on two factors.

Fear of Social & Physical Threat. The possibility of being ostracized by others poses such a severe social threat that, ostracism has been referred to as "the kiss of social death," (Williams, 2007). If feeling burdensome leads to anticipating one's ostracism from the group, individuals who fear social or physical threat may experience a heightened negative response. During our evolutionary history, social cues that were consistently followed by exclusion may have become associated with anxiety responses (Kerr & Levine, 2008). Based on the Ostracism Detection System proposed by Spoor and Williams (2007), perception of social cues that hint toward the possibility of rejection will elicit an anxiety response (Kerr & Levine, 2008).

There is ample evidence in support of an overlap in how social and physical pain is experienced (e.g., Eisenberger, Lieberman, &Williams, 2003; MacDonald & Leary, 2005). The extent to which this overlap exists, however, is still under dispute (Iannetti, Salomons, Moayedi, Mouraux, & Davis, 2013). Because the experience of social pain may overlap with the experience of physical pain, it may be helpful to separate the two dimensions in order to gain a better understanding of each. Researchers have consistently found that fear of physical pain has strong predictive power of physical pain perception (George, Dannecker, & Robinson, 2006; Hirsch, George, Bialosky, & Robinson, 2008).

Similar to the findings that fear of physical pain predicts physical pain perception, researchers recently reported that fear of social threat exacerbated perceptions of social distress (Riva, Williams, & Gallucci, 2013). Specifically, these researchers found that those who reported higher levels of fear of social threat, were more likely to experience greater social distress when ostracized. In the current study, we will measure fear of social and physical threat as separate dimensions using the scale created by Riva, Williams, & Gallucci (2013), and will investigate how fear of social and physical threat may alter the effects of perceiving oneself as burdensome. In the current study, we expect fear of physical threat to strengthen the relationship between anticipated ostracism and physical pain. We expect fear of social threat to strengthen the relationship between perceived burdensomeness and anticipated ostracism, which will thereby lead to more social pain.

Ethnicity & Self-Construal. Understanding cultural differences in self-perceptions of burden is important for determining whether perceived burdensomeness and its negative impact are universal, or culturally specific. Both medical researchers and clinical psychologists have begun to explore whether perceived burdensomeness leads to the same negative outcomes in other cultures as it does in the US. Because the United States' ethnic minority population is rapidly increasing in size, further investigation of differences in the psychological experiences among ethnic groups is necessary (U.S. Department of Health & Human Services, 2001).

Psychologists have been successful at using self-construal to explain the role of culture in psychological processes and outcomes (Christopher & Skillman, 2009; Lam, 2005; Okazaki, 2000). In their seminal article, Markus & Kitayma (1991) differentiate

two views of the self: an independent self-construal, and an interdependent self-construal. An independent self-construal emphasizes the role of individuals as autonomous, while an interdependent self-construal defines the self in terms of interpersonal relationships with others. Markus & Kitayama (1991) proposed that, consistent with their culture's emphasis on maintaining harmony, people from collectivist cultures (such as Asian cultures) tend to acquire an interdependent self-construal. Likewise, consistent with their culture's emphasis on independence from others, people from Western cultures tend to acquire independent self-construals.

Because individuals with interdependent construals of the self tend to emphasize the importance of social bonds, their ostracism detection system (Spoor & Williams, 2007) may be more sensitive. Accordingly, they may also experience more pain when they perceive themselves as burdensome. However, a recent study by Wong, Koo, Tran, Chiu, and Mok (2011) reported that both interdependent and independent self-construals buffered the negative effect of self-perceived burden on suicide ideation among their Asian college-aged sample. This study suggests the impact of perceived burden on suicide ideation may depend on self-construal, however, it is unclear how self-construal may moderate the impact of perceived burden on pain. Furthermore, because this study sample consisted of only Asian participants, it is necessary to test how self-construal would change the impact of burden for various cultural groups. In the present proposal, we intend to explore how the results of the experimental paradigm vary as a function of self-construal.

Current Study

The current proposal considers burden as a key factor in the ostracism detection system. Specifically, we suspect that identifying oneself as burdensome prompts feelings of anticipated ostracism which thereby lead to feelings of pain. To investigate this, we will manipulate perceived burdensomeness by asking participants to re-experience a time in which they were either burdensome to a group or contributed equally to a group. We will use individual difference measures including fear of social and physical threat and self-construal.

Anticipatory and Experienced Ostracism. Based on ostracism detection theory (Spoor & Williams, 2007) and past research findings (humans ostracize burdensome group members; Wesselmann, Wirth, Pryor, Reeder, & Williams, 2013), we expect participants who recall a time in which they were burdensome to the group will also report having anticipated being ostracized from the group. However, because past research tells us that burdensome group members are often ostracized, it may occur that some participants recall a time when they were not only burdensome to the group, but were also ostracized from the group altogether. Participants who recall a time that involved actually being ostracized may experience greater pain than those who were burdensome to the group but were spared the pain of full ostracism. Further, in a recent study, individuals felt relief when they expected to be rejected from the group, but were instead, included (Wirth, Bernstein, Wesselmann, & LeRoy, Under Revision). Although this study did not measure participants' pain levels, it is possible that individuals' experience of pain may also be impacted if they expect ostracism, but are instead, included in the group. Because we cannot control the possibility that our participants will

recall a time they were both burdensome to the group and ostracized from the group, which may influence pain ratings, we will measure anticipated ostracism and actual ostracism separately in the current study.

Aim 1: To experimentally manipulate perceived burdensomeness.

Hypothesis 1.1: Participants who re-live an experience in which they were burdensome to the group (burdensome condition), will report feeling more burdensome to the group during the reliving task, compared to those who re-live an experience where they contributed equally to the group (control condition).

Aim 2: To investigate the link between perceived burdensomeness, ostracism, and pain

Hypothesis 2.1: Participants in the burdensome condition will report significantly more pain than participants in the control condition.

Hypothesis 2.2: Participants in the burdensome condition will report experiencing more anticipatory or actual ostracism than participants in the control condition.

Hypothesis 2.3: More specifically, we expect anticipated ostracism to mediate the link between perceived burdensomeness and self-reported pain, even when controlling for negative affect.

Aim 3: To investigate the impact of perceived burdensomeness on depressive symptoms and negative affect.

Hypothesis 3.1: Participants in the burdensome condition will report more depressive symptoms than those in the control condition, post-manipulation.

Hypothesis 3.2: Participants in the burdensome condition will report more negative affect than those in the control condition, post-manipulation.

Aim 4: To investigate how the consequences of the re-living burden paradigm depend on individual differences (moderation effect).

Hypothesis 4.1a: In the burden condition, participants who have a higher fear of social threat will report more social pain than those with lower fear of social threat; we expect no differences in the control condition.

Hypothesis 4.1b: We expect fear of physical threat to strengthen the relationship between anticipated ostracism and physical pain.

Hypothesis 4.1c: We expect fear of social threat to strengthen the relationship between perceived burdensomeness and anticipated ostracism

Hypothesis 4.1d: In the burden condition, participants who are high in fear of physical threat will report more physical pain than those who report lower levels; we expect no differences in the control condition.

Hypothesis 4.2a: Individuals with higher levels of interdependent self-construal will be more sensitive to the re-living burden paradigm such that they will report higher levels of perceived burdensomeness than individuals with lower levels of interdependent self-construal in the burdensome condition; we expect no differences between individuals with higher levels of interdependent self-construal and lower levels of interdependent self-construal in the control condition.

Hypothesis 4.2b: Individuals with higher levels of interdependent self-construal will report higher levels of anticipated ostracism than individuals with lower levels of

interdependent self-construal in the burdensome condition; we expect no differences between individuals with higher levels of interdependent self-construal and lower levels of interdependent self-construal in the control condition.

Hypothesis 4.2c: Individuals with higher levels of interdependent self-construal will report higher levels of pain than individuals with lower levels of interdependent self-construal in the burdensome condition; we expect no differences between individuals with higher levels of interdependent self-construal and lower levels of interdependent self-construal in the control condition.

CHAPTER THREE: METHOD

Participants and Design

An a priori power analysis indicated a minimum of 139 participants for each condition (278 total participants) was required in order to have 80% power for detecting a small sized effect when employing the traditional .05 criterion of statistical significance. Therefore, 319 participants were recruited from an Undergraduate participant pool at the University of Houston. We collected data using the Qualtrics survey system. Participants self-selected to participate in the study after logging into their SONA account. The only requirement was that participants be 18 years or older to participate. Using a simple two group between-participants design, participants were randomly assigned to one of two conditions: Burdensome or Control (i.e., Equal contribution).

We removed 20 from the data file after discovering that these were repeat participants who took the survey twice; for repeat participants, we used only their first responses for data analysis. In addition, we removed 37 participants because they did not complete the study (e.g., consented to the study and then did not complete any questions, or dropped out half way through the study) or because they did not complete the re-living manipulation. Our final sample consisted of 262 participants who were on average 22.31 years old and predominantly female (79.8%); the final sample was ethnically diverse: 26.7% Caucasian, 13% Black or African American, 22.9% Asian, 22.9% Latino, 14.5% other or unknown.

Measures were presented to participants in the order in which they were presented in this proposal, with the exception of basic demographics which were assessed at the end of the baseline measures, but before the manipulation. Assessing demographics at this

time point was required in order for Qualtrics to use stratified randomization based on gender and ethnicity when randomizing participants into experimental groups. Items within each scale were randomized.

Baseline Measures

Negative Affect. The PANAS has been used by researchers in a variety of populations and has adequate psychometric properties (Watson, Clark, & Tellegen, 1988). It contains 10 items that comprise the negative affect composite score and 10 items that comprise the positive affect composite score. For the purposes of this project, we are most interested in negative affect. In the state version of the PANAS, participants are asked to rate the degree to which they feel each emotion ‘‘right now’’ on a scale from 1 to 5 (1 = very slightly or not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely). Sample items from the PANAS are ‘‘enthusiastic’’ (positive) and ‘‘ashamed’’ (negative). The negative affect items on the PANAS had adequate reliability in this sample ($\propto = 0.90$)(Appendix A).

Fear of Social and Physical Threat. To measure individual differences in fear of social and physical threat, we used the recently validated Fear of Social and Physical Threat scale (Riva, Williams, & Galluci, 2013) (Appendix B). Using a scale of 1 (*Not at all*) to 7 (*Extremely*), participants indicated how fearful they were of experiencing the pain of different hypothetical situations relevant to social and physical pain respectively. For example, for fear of social threat, participants indicated whether they were fearful of “being betrayed by your partner”; for fear of physical threat, participants indicated whether they were fearful of “having a blood sample drawn with a hypodermic needle.”

The fear of social threat items ($\propto = 0.94$) and fear of physical threat items ($\propto = 0.85$) had adequate reliability in the current sample.

Self-Construal Scale. We assessed individual differences in self-construal using the self-construal scale developed by Singelis (1994) (Appendix C). This scale measures self-construal as two separate dimensions: independent and interdependent. Participants rated their agreement with 24 items using a 1 (*Strongly disagree*) to 7 (*Strongly agree*) scale. Items reflecting interdependent self-construal include, "It is important for me to maintain harmony and my group," and "I will sacrifice my self-interest for the benefit of the group I am in." Items reflecting independent self-construal include, "My personal identity is independent of others," and "Being able to take care of myself is a primary concern for me." This scale demonstrates acceptable reliability and validity in previous research (Singelis, 1994), and the dimension of interest, interdependent self-construal, demonstrated adequate reliability in the current sample ($\propto = 0.71$). Only the results from the interdependent self-construal scale were reported.

*Other Baseline Variables***.** Participants used the Physical Symptoms Checklist (PSC) (Pennebaker, 1982) to identify symptoms they have experienced during the seven days leading up to their participation in the study (Appendix D). Last of the baseline measures, participants listed any specific medical illnesses they may have had including problems with chronic pain (also Appendix D). These measures were used to examine whether there were group differences. Demographic variables such as age, ethnicity, and gender were also measured (Appendix E).

Perceived Burdensomeness Manipulation

To manipulate perceived burdensomeness, we used a re-living paradigm. Participants were randomly assigned to one of two conditions: burdensome or equal contribution. Specifically, participants read either of the two prompts: "Recall a time when you worked in a group to complete a task and *you were burdensome to the group*," (burdensome condition) or "Recall a time when you worked in a group to complete a task and *you contributed equally to the group*," (control condition). In both conditions, we specified that this group could have contained only one other partner, or contained a larger number of group members. Then, participants were prompted to "type what happened and describe the group interaction you just thought of (step-by step, in order as it happened). Take your time when explaining what happened." Participants were also asked to describe how they felt during the interaction, using as much time as they need to completely describe their experience (Appendix F). This method has been used successfully in past research to prompt the re-experience of social and physical pain (Bernstein, Sacco, Brown, Young, & Claypool, 2010; Chen, Williams, Fitness, & Newton, 2008; Klages & Wirth, 2014; Riva, Wirth, & Williams, 2011). Because we believe that feeling burdensome to others may be similar to experiencing social and/or physical pain, this method was appropriate for our research question. This paradigm was also chosen because it provided qualitative data with which we can conduct exploratory analyses. To gain insight for future research, we were interested to see in what contexts participants recalled feeling burdensome to others.

Post-Manipulation Measures

Manipulation Check. Participants also completed a modified version of the Interpersonal Needs Questionnaire (INQ; Van Orden, Cuckrowicz, Witte, & Joiner, 2011) which we used as a manipulation check. Derived from the Interpersonal Theory of Suicide, researchers developed the Interpersonal Needs Questionnaire which includes items assessing both thwarted belongingness (nine items) and perceived burdensomeness (14 items) measured using a 1 (*Not at all true for me*) to 7 (*Very true for me*) scale (see Appendix G). We used the 14 items measuring perceived burdensomeness as the manipulation check. These items were re-framed logically to fit the context of our study. For example, we changed the item, "These days the people in my life would be better off if I were gone," to "During the experience I just recalled, I felt the group would have been better off without me." We removed two items that were not relevant to the group task: "these days, I think my death would be a relief to the people in my life," and "these days, I have at least one satisfying interaction every day." Scores were coded such that higher numbers reflect higher levels of each construct. The perceived burdensomeness items of the INQ demonstrated exceptional reliability in the current sample ($\propto = 0.96$).

Post-manipulation Outcomes and Mediating Variables

Pain Measures. Participants completed an adapted version of the Numerical Rating Scale-11 (NRS-11; Hartrick, Kovan, & Shapiro, 2003) to report how much pain they experienced during the time they just recalled. The only modification was a change in wording to be context specific. The NRS-11 is one of the most commonly used measures of physical pain (Miro, Castarlenas, & Huguet, 2009), and demonstrates reliability and validity (Bijur, Latimer & Gallagher, 2003; Hollen, Gralla, Kris, McCoy,

Donaldson, & Moinpour, 2005; Williamson & Hoggart, 2005). This measure has also been used by researchers to measure social pain (Riva, Wirth, & Williams, 2011). The NRS-11 contains 2 items: one item assesses the magnitude of pain on a 0 (*No pain sensation*) to 10 (*Most intense pain sensation*) scale, and the other assesses the unpleasantness of pain on a 0 (*Not at all unpleasant*) to 10 (*Most unpleasant imaginable*) scale.

Participants completed the Pain Faces Scale, a single-item measure traditionally used for measuring children's acute physical pain levels in medical settings (Wong & Baker, 1988; Bieri, Reeve, Champion, & Addicoat, 1990). Participants rated their pain levels "right now" on a scale of 0-10: 0 is "No Hurt," 2 is "Hurts little bit," 4 is "Hurts little more," 6 is "Hurts even more," 8 is "Hurts whole lot," and 10 is "Hurts Worse." This measure has been used in past social psychological research as a measure of social pain (Chen, Williams, Fitness, & Newton, 2008) as well as a measure of physical pain (Chen, Poon, Bernstein, & Tang, 2014).

Adopting the 0 (*No pain sensation*) to 10 (*Most intense pain sensation*) scale from the NRS-11, we created two additional items to differentiate feelings of social (i.e., emotional) pain from physical pain (See Appendix H for all pain measures).

Anticipated Ostracism. Based on measures of ostracism used in past research, (e.g., Wirth, Sacco, Hugenberg, & Williams, 2010; Wesselmann, Wirth, Pryor, Reeder, & Williams, 2013; Smith & Williams, 2004), we created a novel measure of anticipated ostracism ($\propto = 0.95$). Using a 1 (*Not at all*) to 5 (*Extremely*) scale, participants rated how much they agreed with each of the five statements to indicate whether they anticipated

being ostracized while interacting with the group they recalled. For example, “During the time I just recalled, I was worried that the group was going to exclude me.”

Experienced Ostracism. Using two items commonly used in ostracism research, participants indicated whether they were actually ostracized during the time they recalled (See Appendix I for all ostracism measures); ($\propto = 0.89$).

Depressive Symptoms. Participants completed a measure of Depression, the Center for Epidemiologic Studies Depression Scale (CES-D). The measure was modified from the original version to be relevant to the re-living paradigm. For example, instead of “Please indicate how often you have felt this way during the last week...” participants read the modified sentence: “Please indicate how often you felt this way during the time you just recalled.” The scale was also altered to remove the time periods associated with each answer option so that only the general descriptors were left (e.g., “Rarely or none of the time,”) (Appendix J). This self-report measure has been validated for use among the general population (Radloff, 1977). Each answer option held a particular value (from 0 to 3) which allowed us to compute a sum total score (Radloff, 1977) for each participant ($\propto = 0.91$).

Negative Affect. Participants took the PANAS again post-manipulation, but with modified wording (Appendix K). For example, instead of rating the degree to which they felt each emotion ‘‘right now,’’ they answered the questions based on how they felt “during the experience you just recalled.” The negative affect items measured post-manipulation also demonstrated adequate reliability ($\propto = 0.89$).

Additional Re-living Task-related questions. Lastly, participants completed a series of questions relevant to the re-living manipulation (Appendix L).

CHAPTER FOUR: RESULTS

Preliminary Analyses

Prior to testing our hypotheses, we looked for differences between the experimental groups for each of the demographic variables (e.g., age, gender, ethnicity) to determine whether to include covariates in the analyses. To check that the stratified randomization based on gender and ethnicity functioned as we intended, we ran a one-variable Chi-Square test with equal expected values for gender and ethnicity (respectively). Results indicated no significant differences in the gender χ^2 (2) = 0.964 p= 0.618 or ethnicity χ^2 (6) = 2.09, p= 0.911 composition of each condition. In addition, we also ran a Chi-Square test to check the distribution of participants who reported experiencing pain on a regular basis (categorized by "yes" or "no") and found no significant differences between conditions χ^2 (1) = 0.497 p= 0.481. There were also no significant differences in age between the burdensome condition (M = 21.88, SD = 4.77) and the control condition (M = 22.69, SD = 6.48) with ages ranging from 18 to 64 years old, t(2,255) = 1.12, p = 0.171. Please see Table 1 for bivariate correlations between the variables of interest.

Aim 1: To experimentally manipulate perceived burdensomeness

Manipulation Check- INQ Interpersonal Needs Questionnaire. Aim 1 of this study was to experimentally manipulate perceived burdensomeness. We conducted a simple linear regression to test the effectiveness of the reliving manipulation on participants' levels of perceived burdensomeness (Hypothesis 1.1). Condition was entered into the model as a dummy coded variable, and is consistently coded (0= Control condition, 1= Burdensome condition) throughout the analyses. Results indicated that

reliving an experience in which you were burdensome to others predicted the degree to which participants felt burdensome, such that participants in the burdensome condition (M = 3.80, SD = 1.58) felt more burdensome than those in the control condition (M = 2.06, SD = 0.95), $F(1,257) = 118.92$, $p<.001$.

Additional Re-living Task-related questions. There were no significant differences between experimental groups in how much time had passed since the event occurred (M = 14.81 months, SD = 25.34 months), $t(1,250) = -1.69$, $p = 0.092$. There were, however, significant differences between experimental groups in how close participants felt to their group members during the group experience they recalled $t(1,257) = 3.24$, $p = 0.001$. Even when we included this variable in the model, the pattern of results for our main dependent variables of interest (i.e., burden, ostracism, and pain) remained the same. One finding worth noting, however, is that participant's perceptions of burden appear to depend in part, on how close they were to the other group members (b= -0.31), $t(2,255) = -4.57$, $p < 0.001$. Specifically, the more participants felt closer to their other group members, the less they perceived themselves a burdensome. Also following this pattern, how close participants felt to the other group members was negatively related to how much they anticipated being ostracized from the group (b= -0.19), $t(2,255) = -3.61$, $p < 0.001$, such that the closer the felt, the less they expected to be ostracized. Feeling close to the other group members was also negatively related to ratings of social pain (b= -0.29, $t(2,256) = -2.42$, $p = 0.01$) and participants rating of pain on the Pain Faces Scale (b= -0.12, $t(2,256) = -2.02$, $p = 0.045$) (although no other pain variables were significant), such that the closer participants felt to the other group members, the less pain they experienced (as indicated by the PFS and social pain item). Lastly, there were no

differences between experimental conditions in the number of group members that were part of the social experience participants were asked to recall (M = 4.93, SD = 5.04), $t(1,251) = -1.16$, $p = 0.249$.

Aim 2: To investigate the link between perceived burdensomeness, ostracism, and pain

Analysis Strategy for Pain Measures. Before performing any analyses involving the pain variables, we ran a bivariate correlation between the physical pain item and the social pain item and found a positive association such that physical pain was significantly correlated with social pain (r =0.33, p<.001). However, we had proposed that if the physical pain item and social pain items are highly correlated (as defined in the proposal as r≥0.7), we would combine the items to create one pain score; otherwise, we proposed to treat these variables as separate throughout the analyses. Since the correlation did not exceed the pre-determined threshold, we ran social pain and physical pain in separate models and report the two items in which we differentiated these two types of pain as our main pain outcomes in this report. For the sake of completeness, we also report the standardized measures of pain in which the type of pain was not specified (Numerical Rating Scale & Pain Faces Scale).

Standardized Pain Measures. Perceived burdensomeness was positively related to participant's scores on the Numerical Rating Scale (NRS) such that those in the burdensome condition reported more pain (M = 3.04, SD = 2.67) than those in the control condition (M = 1.94, SD = 2.19); $F(1,201)=10.23$, p=.002. This effect persisted even when controlling for negative affect $F(2,200)=8.77$, p<0.001. Likewise, perceived burdensomeness also predicted participant's scores on the Pain Faces Scale (PFS) such

that those in the burdensome condition reported more pain (M = 2.74, SD = 1.39) than those in the control condition (M = 1.86, SD = 1.08); $F(1,260)=33.58$, $p<0.001$. This effect persisted even when controlling for negative affect $F(2,259)=22.18$, $p<0.001$.[1]

Physical Pain & Social Pain. We conducted a simple linear regression to test whether participants in the burdensome condition experienced significantly more physical pain than those in the control condition (Hypothesis 2.1). Results indicated that perceived burdensomeness was not associated with physical pain $F(1,260)= 0.19$, $p=.668$); participants in the burdensome condition (M = 1.04, SD = 2.29) did not significantly differ from participants in the control condition (M = 0.93, SD = 1.93) on their report of physical pain. When we added social pain to the model, although the overall model was significant $F(2,259)=16.51$, $p<0.001$, Condition still was not a significant predictor ($b= -0.22$, $p= 0.394$).

In contrast, perceived burdensomeness was a significant predictor of social pain such that participants in the burdensome condition experienced more social pain (M = 3.19, SD = 2.81) than those in the control condition (M = 2.01, SD = 2.30); $F(1,260)=14.063$, $p<.001$. This effect persisted even when controlling for physical pain and negative affect $F(2,259)= 24.29$, $p<0.001$. [2]

In summary, we found evidence to support our hypothesis (Hypothesis 2.1) that perceived burdensomeness leads to pain, but when we ran separate models for social and physical pain, we found that social pain was a significant outcome even when controlling for physical pain, but physical pain was non-significant regardless of whether we controlled for social pain[3].

Analysis Strategy for Ostracism Measures. Similar to our analysis strategy for pain, before performing any analyses on the ostracism variables, we ran a bivariate correlation between the anticipated ostracism composite variable and the experienced ostracism composite variable and found a significant positive correlation (r =0.67, p<.001). However, we had proposed that we would only combine the items if they were highly correlated defined as r≥0.7); hence, because the correlation did not exceed the pre-determined threshold, we ran anticipated ostracism and experienced ostracism in separate models.

In support of Hypothesis 2.2, we found perceived burdensomeness significantly predicted anticipated ostracism such that participants who relived a time when they were burdensome to others anticipated being ostracized from the group significantly more (M = 2.39, SD = 1.39) than those who relived a time when they equally contributed to a group (M = 1.39, SD = 0.68); F(1,260)= 24.29, p<0.001, p<0.001. In addition, we found the same effect for experienced ostracism; participants in the burdensome condition reported actually being ostracized from the group significantly more (M = 1.88, SD = 1.20) than participants in the control condition (M = 1.18, SD = 0.46); F(1,260)= 40.92, p<0.001.

Mediation Analytic Strategy. We used Barron & Kenny's (1986) four step regression approach to establish mediation. First, the initial variable (i.e., Perceived Burdensomeness) should be associated with the outcome (i.e., Pain). Second, the initial variable (i.e., Perceived Burdensomeness) should be associated with the mediator (Anticipated Ostracism). Third, the mediatory variable (Anticipated ostracism) should be associated with the outcome (i.e., Pain). Fourth, the association between the initial

variable (i.e., Perceived Burdensomeness) and the outcome variable (i.e., Pain) should be reduced when the mediator is added to the model with the initial variable (i.e., Perceived burdensomeness). Subsequent research on mediation revealed that only steps 2 and 3 are essential for partial mediation to exist as long as there is a significant mediated effect (MacKinnon & Fairchild, 2009). To test whether there was a significant mediated effect (indirect effect), we employed bias-correct bootstrap estimates (10,000) to obtain a confidence interval and corresponding p-value. Bias-correct bootstrapping is superior to the traditional sobel test for testing indirect effects (MacKinnon, Lockwood, & Williams, 2004).

Social & Physical Pain as Separate Outcomes. Having established a relationship between condition and social pain, we wanted to determine if each of the ostracism measures (anticipated & experienced) reduced the strength of this direct effect. To test this possibility, we conducted a series of mediation tests using a bootstrap procedure based on the SPSS macro created by Preacher and Hayes (Preacher & Hayes, 2004, 2008). We conducted two separate meditational tests for each measure of ostracism, using a bias correction and conducting 10,000 iterations. Consistent with Hypothesis 2.3, anticipated ostracism (95%CI=[1.03, 1.95]) was a significant mediator as the 95% confidence interval for the indirect path coefficient did not include zero (Model 1; see Figure 1a). Because individuals who are burdensome to others tend to be ostracized (Wesselmann, Wirth, Pryor, Reeder, Williams, 2013), we were concerned that many of the participants who relived an experience where they were burdensome to a group, would have also experienced explicit ostracism. Because of this, we followed up with a second mediation model (Model 2; see Figure 2a) with experienced ostracism as the

mediator; we found that experienced ostracism was also a significant mediator (95%CI=[0.62, 1.34]) between condition and social pain. To ensure that the indirect effect in Model 1 was not merely due to experienced ostracism, we ran Model 1 again, but this time added experienced ostracism as a control variable (see Figure 1b). In support of our hypothesis, anticipatory ostracism remained a mediator of condition and social pain even when controlling for experienced ostracism (95%CI=[0.29, 0.97]); it also continued to be a mediator when we controlled for negative affect alone (95%CI=[0.37, 0.97]) (Figure 1c) and when we controlled for both experienced ostracism and negative affect (95%CI=[0.14, 0.58]) (Figure 1d). Interestingly, experienced ostracism was also significant when controlling for negative affect (95%CI=[0.16, 0.63]) (Figure 2b), but it was no longer a significant mediator in when controlling for both negative affect and *anticipated* ostracism (95%CI=[-0.01, 0.16]) (Figure 2c).

Although we found no significant direct effect between condition and physical pain, we still needed to test the mediation (indirect effect) Hypothesis 2.3 for physical pain. We again conducted two separate meditational tests for each measure of ostracism (anticipated & experienced), using a bias correction and conducting 10,000 iterations. In support of our hypothesis, anticipated ostracism (95%CI=[0.14, 0.67]) was a significant mediator of condition and physical pain (Model 3; Figure 3a). However, when controlling for negative affect, anticipated ostracism was no longer a significant mediator (95%CI=[-0.15, 0.39]) (Figure 3b). Consistent with the previous analysis, experienced ostracism was a significant mediator (95%CI=[-0.0009, 0.42]) between condition and physical pain (Model 4; Figure 4a), but not when controlling for negative affect (95%CI=[-0.18, 0.16]) (Figure 4b).

Standardized Pain Measures. We then tested the mediation hypothesis on the standardized pain measures. Anticipated ostracism significantly mediated the relationship between condition and participants' scores on the Numerical Rating Scale (95%CI=[0.56, 1.40]) (Model 5; Figure 5a), and continued to be significant even when we controlled for negative affect (95%CI=[0.08, 0.73]) (Figure 5b). However, when both negative affect and experienced ostracism were entered as control variables, the effect was no longer significant (95%CI=[-0.04, 0.44]) (Figure 5c). We found the same pattern with experienced ostracism as the mediator (Model 6); the model without controlling variables was significant (95%CI=[0.34, 0.98]) (Figure 6a), and continued to be significant when controlling for negative affect (95%CI=[0.07, 0.50]) (Figure 6b), but not when controlling for both negative affect and anticipated ostracism (95%CI=[-0.03, 0.17]) (Figure 6c).

Consistent with the pattern of results for social pain, anticipated ostracism was a significant mediator between condition and the Pain Faces Scale (95%CI=[0.35, 0.76]) (Model 7; Figure 7a) even when controlling for negative affect (95%CI=[0.06, 0.35]) (Figure 7b) and both negative affect and experienced ostracism (95%CI=[0.01, 0.21]) (Figure 7c). Also consistent with social pain, experienced ostracism was a significant mediator of condition and the PFS alone (95%CI=[0.23, 0.54]) (Model 8; Figure 8a) and when controlling for negative affect (95%CI=[0.02, 0.23]) (Figure 8b), but the effect was no longer significant when controlling for both negative affect and anticipated ostracism (95%CI=[-0.01, 0.07]) (Figure 8c).

In summary, the mediation results indicate that anticipated ostracism was consistently a significant mediator of condition and pain overall. Experienced ostracism

was significant for all models except for when physical pain was the outcome. The social pain results were most consistent with the models using the Pain Faces Scale, a standardized pain measure that consists of six round drawn faces ranging from a positive smiling face to a negative face depictive of crying. In contrast, the physical pain results were most consistent with the models using the NRS as an outcome. However, physical pain was only significant when anticipated ostracism was the mediator and no control variables were entered into the model, whereas the NRS was significant for both anticipated and experienced ostracism models, until both negative affect and the opposing dimension of ostracism was controlled for.

Aim 3: To investigate the impact of perceived burdensomeness on depressive symptoms and negative affect.

Depressive Symptoms. In support of Hypothesis 3.1, we found perceived burdensomeness significantly predicted depressive symptoms such that participants who relived a time when they were burdensome to others reported greater depressive symptoms (M = 1.86, SD = 0.59) compared to the control group (M = 1.59, SD = 0.41); b = 0.27, p<0.001).

Negative Affect. Because we measured negative affect pre- and post-manipulation, we were able to control for participant's baseline levels of negative affect when testing Hypothesis 3.2. Before running a hierarchical multiple regression, we checked for multicollinearity by examining the correlations between the independent variables (negative affect pre-manipulation & condition), and found them to be non-significantly correlated (r = -0.10). A two stage hierarchical multiple linear regression was conducted with negative affect as the dependent variable. Baseline negative affect was entered as a

control variable at Stage one of the regression, and Condition was added at Stage two. The analysis revealed that at Stage one, baseline levels of negative affect contributed significantly to the model, F (1,258) = 46.79, p = < 0.001, and accounted for 15.4% of the variation in post-manipulation negative affect. Introducing Condition (perceived burdensomeness) to the model explained an additional 23.4% of the variation in post-manipulation negative affect and this change in R^2 was significant, F (1,257) = 26.91, p < 0.001. These findings support our Hypothesis (3.2) that perceived burdensomeness would predict negative affect post-manipulation when controlling for baseline levels.

Aim 4: To investigate how the consequences of the re-living burden paradigm depend on individual differences (moderation effects).

Moderation Analyses. To test our moderation hypotheses (Hypothesis 4), we used the approach recommended by Aiken & West (1991). First, we centered the independent variables around the mean. Then, we created an interaction term by multiplying each of the individual difference variables and the dummy coded condition variable. We then used that product term in a multiple regression model to test the moderation.

Compared to participants in the control condition, we expected participants in the burdensome condition who also had a higher fear of social threat to experience more social pain than those with lower fear of social threat (Hypothesis 4.1a). The multiple regression model with both predictors and the interaction term produced R^2= 0.063, F (3,258) = 5.83, p = .001. However, the coefficient for the Condition by Fear of Social Threat interaction was not significant indicating that the interaction term did not significantly contribute to the regression model (b = .161, p= 0.477); having a higher fear

of social threat did not influence participants in the burdensome condition's report of social pain (see Table 2).

We expected fear of physical threat to strengthen the relationship between anticipated ostracism and physical pain (Hypothesis 4.1b). The overall model was, once again, significant R^2= 0.05, F (3,258) = 4.51, p = .004, but there was no significant Anticipated Ostracism × Fear of Physical Threat interaction indicating that the interaction term did not significantly contribute to the regression model (b = -0.141, p= 0.07). Specifically, the relationship between participant reports of anticipating their ostracism from the group and feeling physical pain did not differ based on whether participants had a high fear of physical threat (see Table 3).

We expected fear of social threat to strengthen the relationship between perceived burdensomeness and anticipated ostracism (Hypothesis 4.1c). Although the overall model was significant R^2= 0.20, F (3,258) = 21.57, p < .001, there was no significant Condition × Fear of Social Threat interaction in predicting anticipated ostracism (b = 0.15, p= 0.126) indicating that the change in participants report of anticipated ostracism between experimental conditions was not affected by participant's fear of social threat (see Table 4).

We hypothesized that participants in the burdensome condition who also had a high fear of physical threat would report more physical pain than those who had a lower level of fear of physical threat (Hypothesis 4.1d). The overall model was not significant R^2= 0.006, F (3,258) = 0.523, p = .667, nor was the Condition by Fear of Physical Threat interaction, in its relationship to physical pain (b = -0.22, p= 0.263). For participants in

the burdensome condition, a heightened fear of physical threat did not change the relationship between condition and physical pain (see Table 5).

In addition to fear of social and physical threat, we also wanted to investigate self-construal as an individual difference variable. We expected individuals with higher levels of interdependent self-construal would be more sensitive to the re-living burden paradigm such that they would report higher levels of perceived burdensomeness (Hypothesis 4.2a), greater anticipated ostracism (Hypothesis 4.2b), and more pain (Hypothesis 4.2c) than individuals with lower levels of interdependent self-construal in the burdensome condition. For Hypothesis 4.2a, although the overall model was significant R^2= 0.33, F (3,258) = 41.12, p < .001, there was no significant Condition × Interdependent Self-Construal interaction in predicting participants reports of perceived burdensomeness (b = 0.40, p= 0.08) suggesting that having an interdependent construal of the self, did not affect how burdensome participants in the burdensome condition perceived themselves to be compared to the control condition (See Table 6). In contrast to the analyses on perceived burdensomeness, when testing Hypothesis 4.2b, we found the Condition × Interdependent Self-Construal interaction was significant for anticipated ostracism. We followed up this significant interaction with a simple slopes analysis. The simple slopes analysis indicated that the change in participant's pain ratings between the control condition and the burdensome condition was significant for both those with high (b = 1.30, p< 0.001) and those with high low (b= 0.77, p< 0.001) interdependent self-construal (see Figure 9), with those highly interdependent reporting slightly more anticipated ostracism than those less interdependent.

In addition, we expected individuals with higher levels of interdependent self-construal would report higher levels of pain than individuals with lower levels of interdependent self-construal in the burdensome condition (Hypothesis 4.2c). Our hypothesis was only partially supported; we found no significant interaction when using the NRS (b = 0.61, p= 0.212) or physical pain (b = -0.003, p= 0.994) as dependent variables. We did, however, find a significant interaction between the burdensome condition and interdependent self-construal for the Pain Faces Scale (b = 0.50, p= 0.02) and social pain (b = 1.16, p= 0.009) (See Table 7). In support of our hypotheses, participants in the burdensome condition who were also high in interdependent self-construal reported more pain on the Pain Faces Scale than those with low interdependent self-construal. However, the change in participant's pain ratings between the control condition and the burdensome condition was significant for both those with high (b = 1.27, p< 0.001) and those with high low (b= 0.55, p= 0.01) interdependent self-construal (see Figure 10). Consistent with our hypotheses, feeling burdensome was more strongly associated with participants' ratings of social pain among individuals with high Interdependent Self-construal (b = 2.08, p< 0.001) compared to those with low Interdependent Self-construal (b = 0.43, p= 0.327) (See Figure 11).

CHAPTER FIVE: DISCUSSION

Maintaining social relationships with others is essential for survival. Accordingly, humans have developed social monitoring systems to detect social threats (e.g., Ostracism Detection System; Spoor & Williams, 2007). These detection systems may be activated when individuals assess their personal contribution to the group as lacking; perceiving oneself as burdensome to others may lead individuals to fear whether they will continue to be accepted by others (i.e., included in the group), prompting pain responses similar to that of ostracism. In support of this logic, we found that participants who recalled a time when they were burdensome to a group reported anticipating being ostracized from the group, and experienced greater pain, negative affect, and depressive symptoms. However, when we asked participants to specify whether they experienced social or physical pain, they only reported feeling significantly more social pain, not physical pain, as a consequence of perceiving themselves as burdensome to others.

In past research, participants who reported perceiving themselves as burdensome to others also experienced higher levels of pain (Kowal, Wilson, McWilliams, Péloquin, & Duong, 2012); the current study aimed to explain this connection. It appears that individuals who perceive themselves as burdensome, may not only feel as though they fail to contribute (Joiner, 2005), but also may anticipate being ostracized by others, which thereby signals a pain response. Specifically, we found support for anticipated ostracism as one reason why individuals who perceive themselves as burdensome also tend to experience pain. Interestingly, based on how participants responded to the separate social and physical pain items, it appears as though this pain may be more similar to social pain rather than physical pain. Our mediation results suggest that anticipated ostracism could

partially explain why greater perceived burdensomeness was related to more social pain, regardless of both negative affect and whether the participant was actually ostracized during the group experience they recalled. The Pain Faces Scale (PFS), although traditionally a pediatric measure of physical pain, performed similarly to social pain in that it remained a significant outcome regardless of negative affect and experienced ostracism. At first glance, the parallel findings between these two measures may not be surprising considering the visual affective component of the scale, which includes faces portraying various emotions ranging from a positive smiling face to a negative face depictive of crying (see Appendix H). What is surprising, however, is that anticipated ostracism continued to partially explain the relationship between perceived burdensomeness and scores on the PFS even when participant's negative affect was taken into account; this eliminates the possibility that negative affect is driving the effect rather than merely the affective component of pain.

However, we found perceived burdensomeness alone was not related to physical pain, unless anticipated ostracism was considered; feeling burdensome may only hurt when an individual perceives that they may also be ostracized from the group. When we included physical pain as an outcome, we found that anticipated ostracism could no longer explain the relationship between perceived burdensomeness and physical pain once negative affect was taken into account, suggesting that negative affect played an important role in this relationship. The Numerical Rating Scale (NRS), a standardized measure of physical pain, performed similarly in that it was no longer significant when negative affect and experienced ostracism was accounted for.

Whether participants actually experienced ostracism may also partially explain the relationship between perceived burdensomeness and pain. However, when we explicitly asked participants to rate their physical pain, we found no evidence to support that actually being ostracized may explain the relationship between perceived burdensomeness and physical pain.

We did not find support for any of our moderation hypotheses; fear of social threat did not affect participant's experience of social pain and fear of physical threat did not change the relationship between anticipated ostracism and physical pain. Researchers (Riva, Williams, & Gallucci, 2013) found that a combination of high physical threat-related fears, increased physical pain perception, and a tendency toward avoidance are likely to lead to chronic physical pain. They also posit a similar cycle for social threat in that a combination of high fear, increased distress perception, and avoidance tendencies may be related to long-term social exclusion. We may not have found similar results because we did not measure distress tolerance or avoidance tendencies, or because our participants did not experience prolonged social exclusion.

We proposed that because individuals with interdependent self-construal tend to emphasize the importance of social bonds, their ostracism detection system may be more sensitive. Although we did not find that those with high levels of interdependent self-construal felt more burdensome in the burdensome condition, we did find that they reported higher levels of social pain and higher levels of pain using the Pain Faces Scale. We also found that the degree to which an individual anticipated their ostracism from the group when re-living a time when they were burdensome to others depended, in part, on their self-construal. These findings suggest, that those with a highly interdependent

construal of the self may have a tendency to anticipate their ostracism and experience more social pain than those with a less interdependent construal of the self. Perhaps those with highly interdependent self-construal are more likely to perceive themselves as burdensome, but once they detect that they have become a burden to the group they may overcompensate for their previous shortcomings, which may relieve their feelings of perceived burdensomeness. This question is beyond the scope of current investigation but should be considered in future research..

Implications

This study was unique to previous research in that it is the first to experimentally manipulate perceived burdensomeness. Not only does this study manipulate perceived burdensomeness for the first time, but it also provides a theoretical framework for continuing research on perceived burdensomeness. Participants wrote about a wide array of social situations in which they had felt burdensome to others. The most common contexts reported by the current sample were 1) a group project for school, 2) a group task or common goal related to an extracurricular activity (e.g., dance, sports, theatre), 3) a group task or common goal in the workplace or military, 4) a social event, and 5) personal injury or illness. It appears as though perceived burdensomeness is a part of daily life, and may be experienced even by those without psychopathology. This research provides preliminary insight into the different contexts in which individuals experience perceived burdensomeness.

Anticipated ostracism may be a modifiable mechanism through which practitioners can target in order to reduce negative outcomes including pain. For example, reversing the aversive responses associated with anticipating one's ostracism may be

accomplished by finding ways of enhancing the basic needs ostracism thwarts (i.e., belonging, control, self-esteem, meaningful existence). Continuing research to foster our understanding of how feelings of perceived burdensomeness develop, and the subsequent cognitive, psychological, and physiological responses that follow, will be important for preventing the negative outcomes associated with perceiving oneself as burdensome. Targeted populations that may benefit from these types of interventions may include those with chronic illness. In a recent study, patients' reports of self-perceived burden to their caregiver was highly correlated with caregiver burden reported by their partner, suggesting that can accurately identify when their caregiver perceives them as burdensome (Kowal, Wilson, McWilliams, Péloquin, & Duong, 2012). Future research should examine the interpersonal factors that may interplay (e.g., relationship satisfaction prior to illness) to produce the painful effects associated with both self-perceived burden and caring for a loved one who cannot take care of themselves.

The results from this study may also provide new information and produce valuable research questions about how perceived burdensomeness may influence dangerous behavior such as suicide. Pain produces an avoidance or escape behavior (Yamada & Decety, 2009) to alleviate pain by removing the source. Does anticipating being ostracized by others prompt pain avoidance and escape behavior like suicide? Individuals who perceive themselves as burdensome often feel as though the group would be better off without them. Eliminating burdensome group members from groups enhances the group's fitness (Kurzban & Leary, 2001) and increases group cohesion (Gruters & Masters, 1986). In the cases of suicide, does the instinct to protect the group

(by eliminating the burden you perceive yourself as causing others) outweigh self-preservation instincts?

Limitations & Future Directions

The current study includes limitations that can be addressed in future research. Individuals can accurately recall both their physical and social pain experiences (Erskine, Morley, & Pearce, 1990; Morley, 1993). In particular, memories about socially and physically traumatic experiences maintain much of their original vividness and sensory components (Porter & Peace, 1997). However, when it comes to actually re-*experiencing* the pain, participants may not experience it in the same way that it was experienced at the time of the event. In addition, individuals are more likely to recall parts of an experience that were extreme or highly emotional (Schwarz, Groves, & Schuman, 1998). It may also be difficult to re-experience physical pain (Morley, 1993). Re-experiencing physical pain is not only more difficult than re-experiencing social pain, but also less painful; participants who recalled a past experience involving physical pain reported lower levels of re-experienced pain compared to participants who recalled a socially painful experience (Chen, Williams, Fitness & Newton, 2008). Worthy of note, participants in the Chen et al. (2008) study used a visual analogue scale similar to that of the NRS used in the current study. These discrepancies in re-experiencing pain may be due to the fact that although both social and physical pain can be agonizing, physical pain is usually short-lived, whereas social pain which can last forever. Accordingly, although our findings suggest that physical pain may not exclusively be related to feeling burdensome to others, this may have been due to our perceived burdensomeness manipulation.

In the current paper, we have discussed our conclusions based on data from both the standardized measures of physical pain, as well as one individual social and one physical pain item. However, we are unsure how participants conceptualized "social pain," which could greatly affect interpretation of the findings. Participants may not define social pain as MacDonald & Leary (2005) have (i.e., pain caused by a threat or actual loss of a social connection). The pain participants reported during the reliving task may, instead, fall under the category of "mental pain," defined as, "an adaptation that functions to force assessment of the circumstances surrounding social problems in the lives of individual humans," (Thornhill & Thornhill, 1989, p. 73). This issue was unavoidable in our attempt to investigate the overlap in how social and physical pain is experienced. There is ample evidence to support the notion that social and physical pain overlap in that they have a common neural circuitry and may also be similarly experienced. For example, being ostracized activates similar affect-related regions of the brain such as the dACC (Eisenberger, Leiberman, & Williams, 2003), as well as the somatosensory region of the brain (Kross, Berman, Mischel, Smith & Wager, 2001) commonly associated with physical pain. In addition, Acetaminophen, a drug which acts on the physical pain system, reduces similar behavioral and neural responses associated with social pain (DeWall, MacDonald, & Webster, 2010). To what extent social and physical pain overlap, however, is still up for debate. Using multivariate pattern analysis, researchers recently identified what may be fine-grained differences in the spatial patterns of fMRI activity that are associated with each type of pain (Wager et. al., 2013). We are beginning to develop technology and research methods that may enable us to determine to what extent social and physical pain overlap, and to what extent they are

separate constructs; future research must utilize biologically based measures as they may provide more insight then self-report alone.

Just as it was difficult to disentangle the effects of the social and physical pain overlap, it was also difficult to differentiate the effects of anticipated ostracism vs. experienced ostracism, presenting a possible confound. Seeing that ostracism posed such a threat to survival, humans likely evolved the ability to detect when they might be ostracized from the group in order to perhaps, fix their poor social standing (Spoor & Williams, 2007). So that humans did not miss an important social cue that may lead to their exclusion from the group, this evolved detection system is said to be hypersensitive in order to detect any threat to social inclusion. Because many participants in the current sample were also ostracized (likely as a consequence of being burdensome), we were not able to determine whether it was specifically anticipated ostracism that was causing pain, or whether it was merely part of the negative effects of actually being ostracized. Future research should employ a paradigm in which participants are equally included in a group task to tease apart the effects of anticipated ostracism vs. actual experienced ostracism.

In addition, because participants took post-manipulation measures retrospectively at one time point, we could not establish temporal precedence of the proposed psychological process; specifically, we cannot know for certain that feeling burdensome is followed by feelings of anticipated ostracism which then prompt feelings of pain, in this order. Future research on perceived burdensomeness should employ experimental designs that will allow researchers to better establish temporal precedence and directionality of each of the effects found in the current investigation.

Lastly, we operationally defined being burdensome as failing to contribute equally to a group on a group task, based on Social Exchange Theory (Cosmides & Tooby, 1992) and evolutionary theories of group cooperation (e.g., Gruter & Masters, 1986). Within the Clinical Psychology literature (e.g., Joiner, 2005) perceived burdensomeness is believed to also encompass elements such as feeling as though others would be better off without them, and that their presence causes others pain and distress. It is unclear whether those with mental illness experience perceived burdensomeness and subsequent pain in the same way as non-clinical populations. Based on participants' responses to the reliving manipulation in the current study, it does appear that non-clinical populations (i.e., undergraduates) experience some degree of perceive burdensomeness. Researchers may consider using multiple methods to continue to research perceived burdensomeness- for example, using a daily diary method. Perceived burdensomeness may, to some extent, occur in individuals' every-day lives and may not always be accompanied by mental illness. Perceived burdensomeness may also appear regularly throughout daily life and to differing degrees depending on individual differences. A repeated measures approach may help researchers investigate these nuances.

Conclusion

In the current research, we found evidence to support that anticipated ostracism may be one explanation as to why individuals express greater feelings of pain when they perceive themselves as burdensome to others. In general, participants experienced more perceived burdensomeness, social pain, negative affect, and depressive symptoms after they recalled a time when they were burdensome to others compared to those who

recalled a time they contributed equally to a group. When participants specified whether they felt social or physical pain, we found slightly different effects suggesting that although social and physical pain may overlap, they should not be considered as identical phenomena (Chen, Williams, Fitness & Newton, 2008). Although the experimental paradigm we employed presents limitations, it uniquely contributes to previous research in that it is the first experimental manipulation of perceived burdensomeness.

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FOOTNOTES

[1] We decided to control for negative affect after finding that participants' negative affect post-manipulation was significantly associated with their pain ratings on the NRS ($F(1,201)=4.26$, $p<0.001$) and the PFS ($F(1,260)=5.51$, $p=0.02$).

[2] We found that negative affect had a significant positive association with social pain but not physical pain, so we only controlled for negative affect in the model using social pain as the outcome.

[3] Prior to running any analyses on the pain variables, we tested whether participants in each experimental group differed on their report of physical symptoms at baseline since this could have influenced their pain ratings. We found no significant differences between groups $t(1,260)= 0.26$, $p= 0.80$, Hence, we did not use this as a covariate in any of the analyses.

Table 1. *Bivariate correlations between variables of interest.*

	1	2	3	4	5	6	7	8	9	10	11
1. Condition	--										
2. Perceived Burdensomeness	.643***	--									
Pain											
3. NRS	.303	.510**	--								
4. PFS	.273	.526*	.622**	--							
5. Social Pain	.160	.433*	.270	.676***	--						
6. Physical Pain	-.080	.171	.499**	.580***	.172	--					
Ostracism											
7. Anticipated	.283	.612***	.462*	.508**	.660***	.075	--				
8. Experienced	.297	.573***	.431*	.510**	.710***	.090	.594***	--			
9. Depression	.221	.712***	.585**	.652***	.555**	.409*	.644***	.564**	--		
10. Negative Affect	.009	.244	.144	.086	.192	-.036	.277	.130	.171	--	
11. Interdependent Self-Construal	-.067	.054	.167	.348*	.080	.138	.019	-.026	.131	.222	--

* $p < .05$. ** $p < .01$ *** $p < .001$

Table 2. *Regression Results for Hypothesis 4.1a.*

	b	*SE*	*t*	Sig
Constant	2.99	0.21	13.96	< 0.001
Condition	1.24	0.32	3.92	< 0.001
Fear of Social Threat	0.11	0.16	6.94	0.489
Condition × Fear of Social Threat	0.16	0.23	0.71	0.48

Table 3. *Regression Results for Hypothesis 4.1b.*

	b	*SE*	*t*	Sig
Constant	1.001	0.13	7.84	< 0.001
Anticipated Ostracism	0.37	0.11	3.40	0.001
Fear of Physical Threat	-0.07	0.10	-0.71	0.481
Anticipated Ostracism × Fear of Physical Threat	-0.14	0.08	-1.79	0.076

Table 4. *Regression Results for Hypothesis 4.1c.*

	b	*SE*	*t*	Sig
Constant	1.39	0.90	15.54	< 0.001
Condition	1.03	0.13	7.83	< 0.001
Fear of Social Threat	0.02	0.07	0.31	0.755
Condition × Fear of Social Threat	0.15	0.09	1.54	0.126

Table 5. *Regression Results for Hypothesis 4.1d.*

	b	*SE*	*t*	Sig
Constant	0.93	0.18	5.24	< 0.001
Condition	0.11	0.26	0.41	0.684
Fear of Physical Threat	0.07	0.13	0.50	0.617
Condition × Fear of Physical Threat	-0.22	0.20	-1.12	0.263

Table 6. *Regression Results for Hypothesis 4.2a.*

	b	*SE*	*t*	Sig
Constant	2.07	0.11	19.30	< 0.001
Condition	1.75	0.16	10.98	< 0.001
Interdependent Self-Construal	-0.10	0.15	-0.64	0.520
Condition × Interdependent Self-Construal	0.40	0.23	1.77	0.079

Table 7. *Regression Results for Hypothesis 4.2c.*

Pain Measure	*b*	*SE*	*t*	Sig
Numerical Rating Scale (NRS)				
Constant	1.94	0.24	8.00	< 0.001
Condition	1.16	0.34	3.41	0.001
Interdependent Self-Construal	0.20	0.35	0.58	0.47
Condition × Interdependent Self-Construal	0.61	0.48	1.25	0.212
Physical Pain				
Constant	0.92	0.18	5.19	< 0.001
Condition	0.13	0.26	0.48	0.632
Interdependent Self-Construal	0.11	0.25	0.42	0.68
Condition × Interdependent Self-Construal	-0.003	0.37	-0.01	0.994
Pain Faces Scale (PFS)				
Constant	1.86	0.10	18.21	< 0.001
Condition	0.91	0.15	6.01	< 0.001
Interdependent Self-Construal	-0.068	0.15	-0.47	0.64
Condition × Interdependent Self-Construal	0.50	0.21	2.34	0.02*
Social Pain				
Constant	2.02	0.21	9.54	< 0.001
Condition	1.254	0.31	4.01	< 0.001
Interdependent Self-Construal	-0.122	0.30	-.407	0.684
Condition × Interdependent Self-Construal	1.16	0.44	2.62	0.009**

* $p < .05$. ** $p < .01$. Significance is denoted only for the interactions of interest in Hypothesis 4.2c.

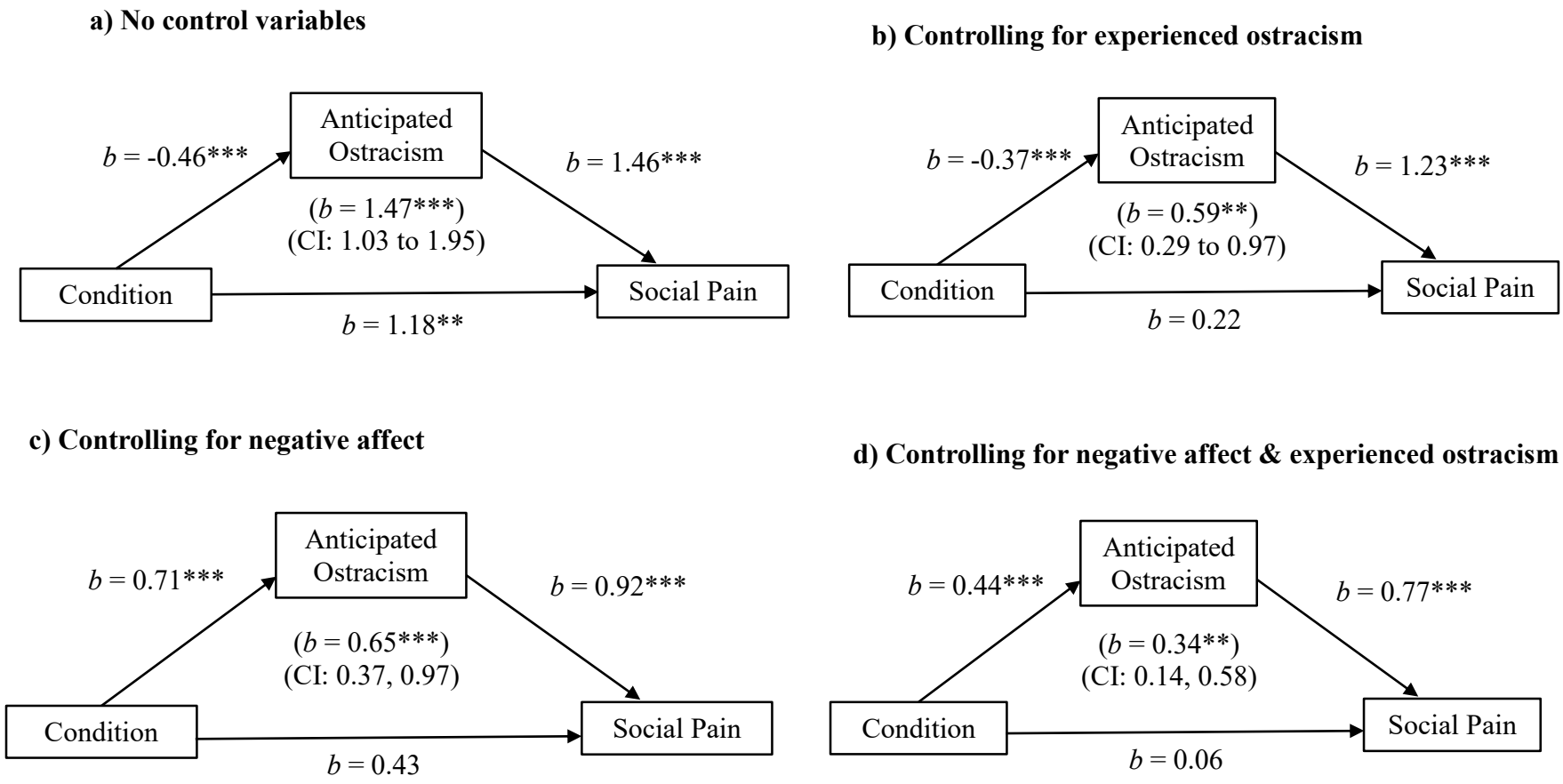
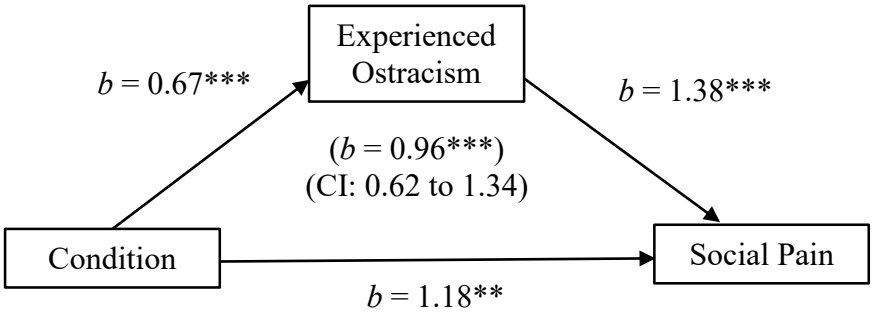
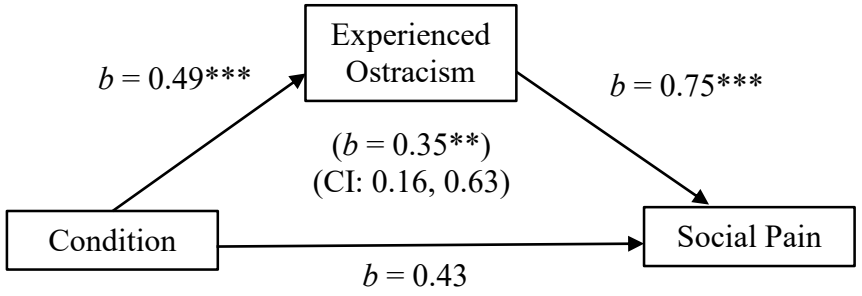


Figure 1(a-d). Anticipated ostracism mediates the effect of condition on social pain (Model 1). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

a) No control variables



b) Controlling for negative affect



c) Controlling for negative affect & anticipated ostracism

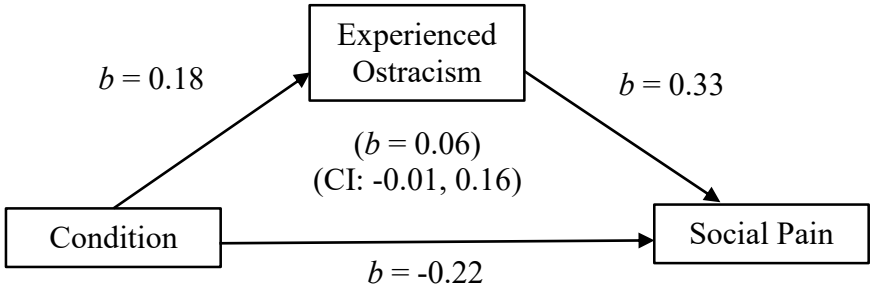


Figure 2 (a-c). Experienced ostracism mediates the effect of condition on social pain (Model 2). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

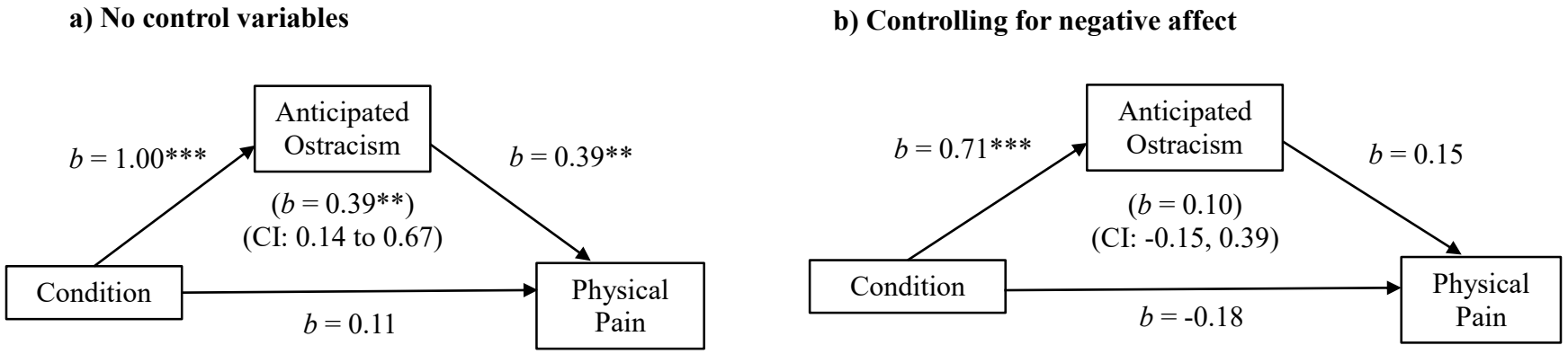


Figure 3 (a-b). Anticipated ostracism mediates the effect of condition on physical pain (Model 3). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

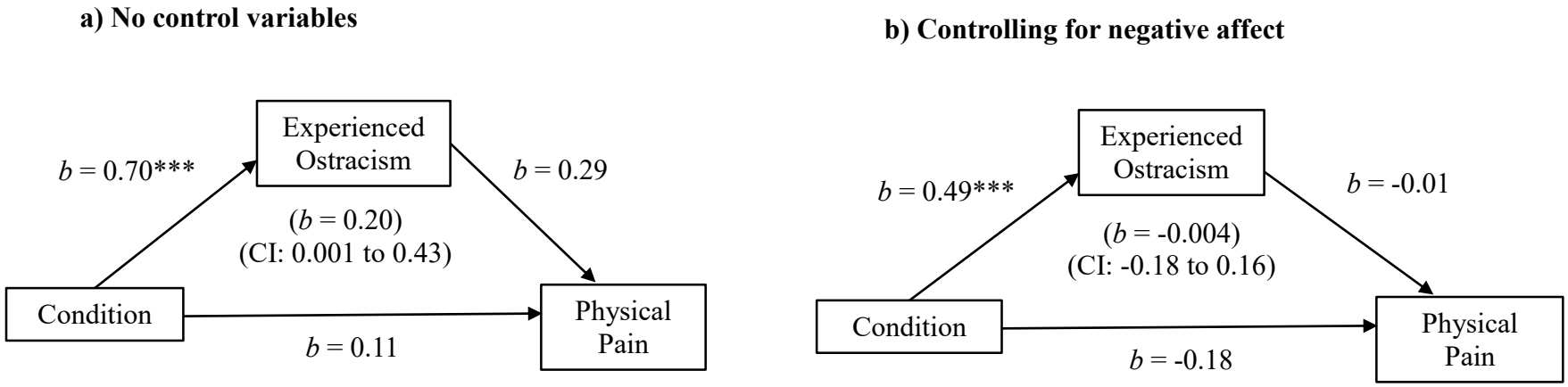
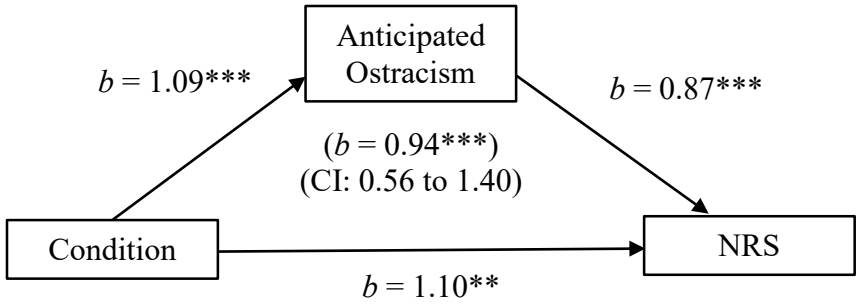
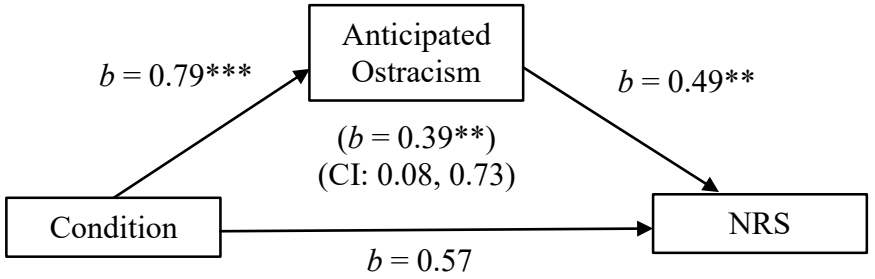


Figure 4 (a-b). Experienced ostracism mediates the effect of condition on physical pain (Model 4). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

a) No control variables



b) Controlling for negative affect



c) Controlling for negative affect & experienced ostracism

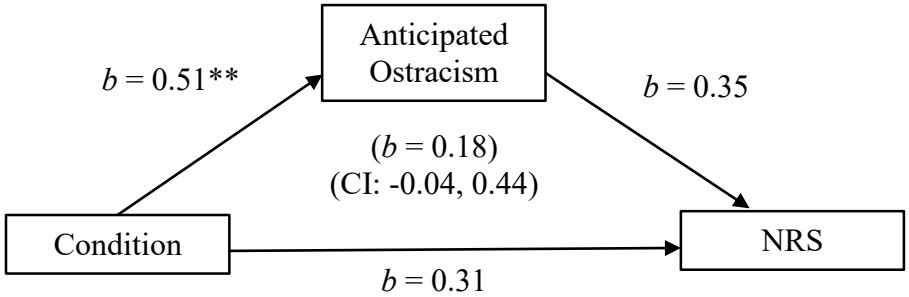


Figure 5 (a-c). Anticipated ostracism mediates the effect of condition on participant's scores on the Numerical Rating Scale (NRS; Model 5). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

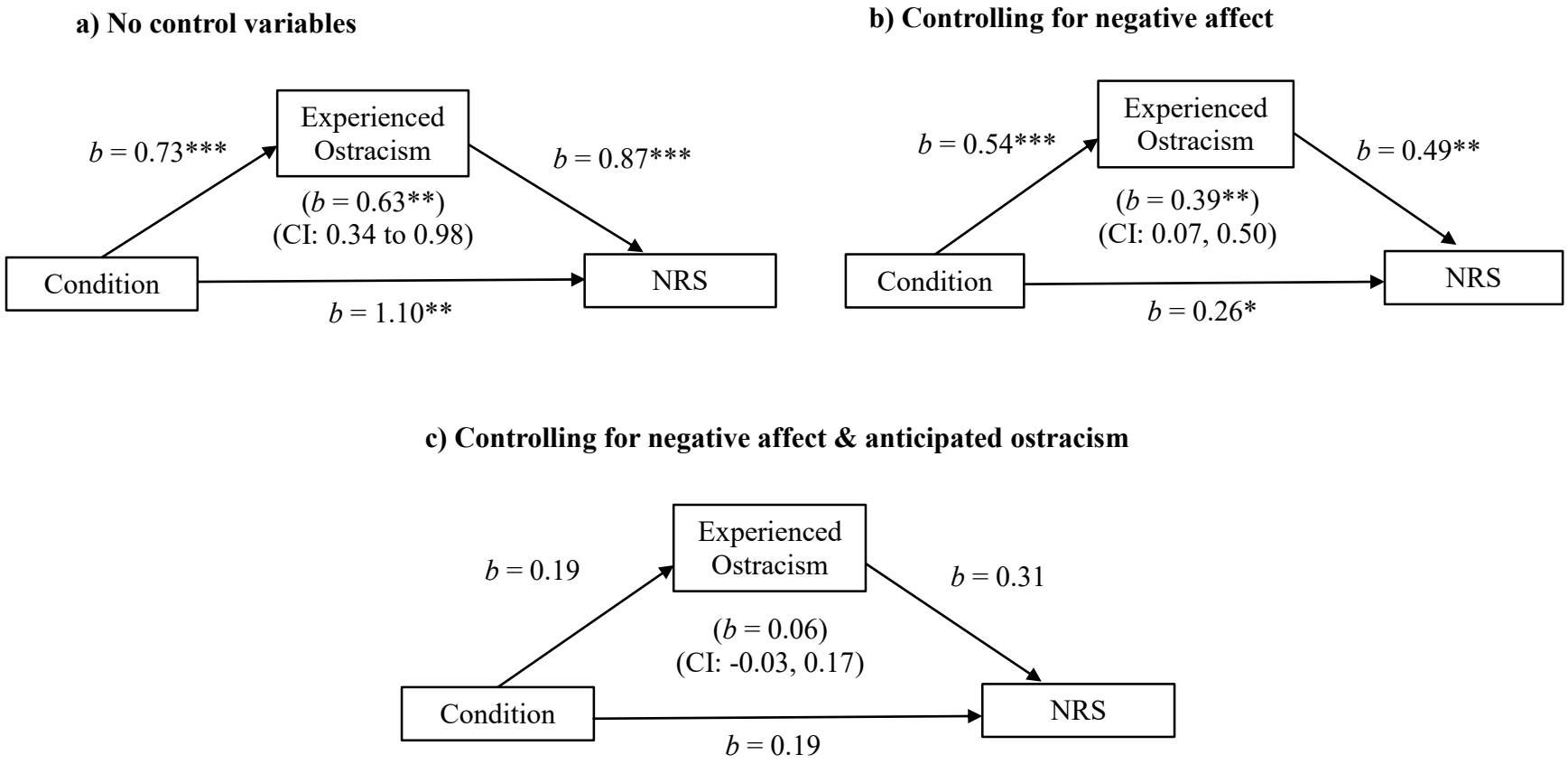
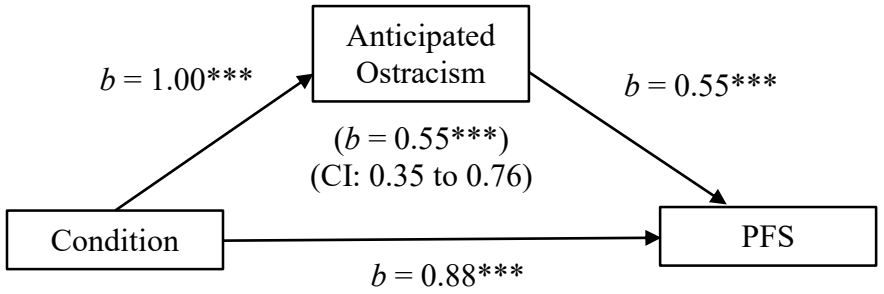
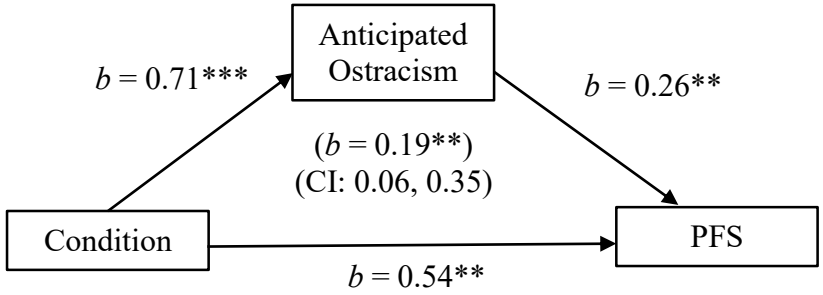


Figure 6 (a-c). Experienced ostracism mediates the effect of condition on participant's scores on the Numerical Rating Scale (NRS; Model 6). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

a) No control variables



b) Controlling for negative affect



c) Controlling for negative affect & experienced ostracism

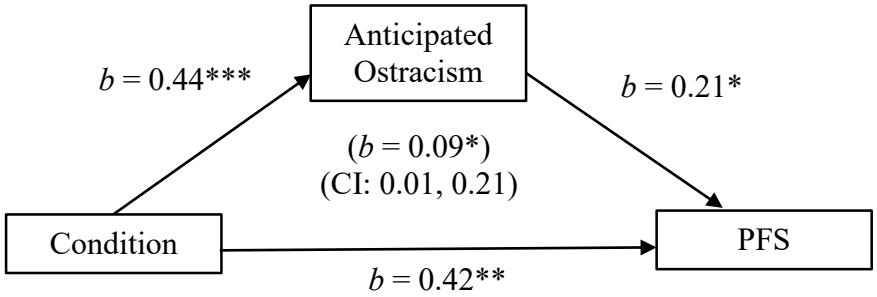


Figure 7(a-c). Anticipated ostracism mediates the effect of condition on participant's scores on the Pain Faces Scale (PFS; Model 7). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

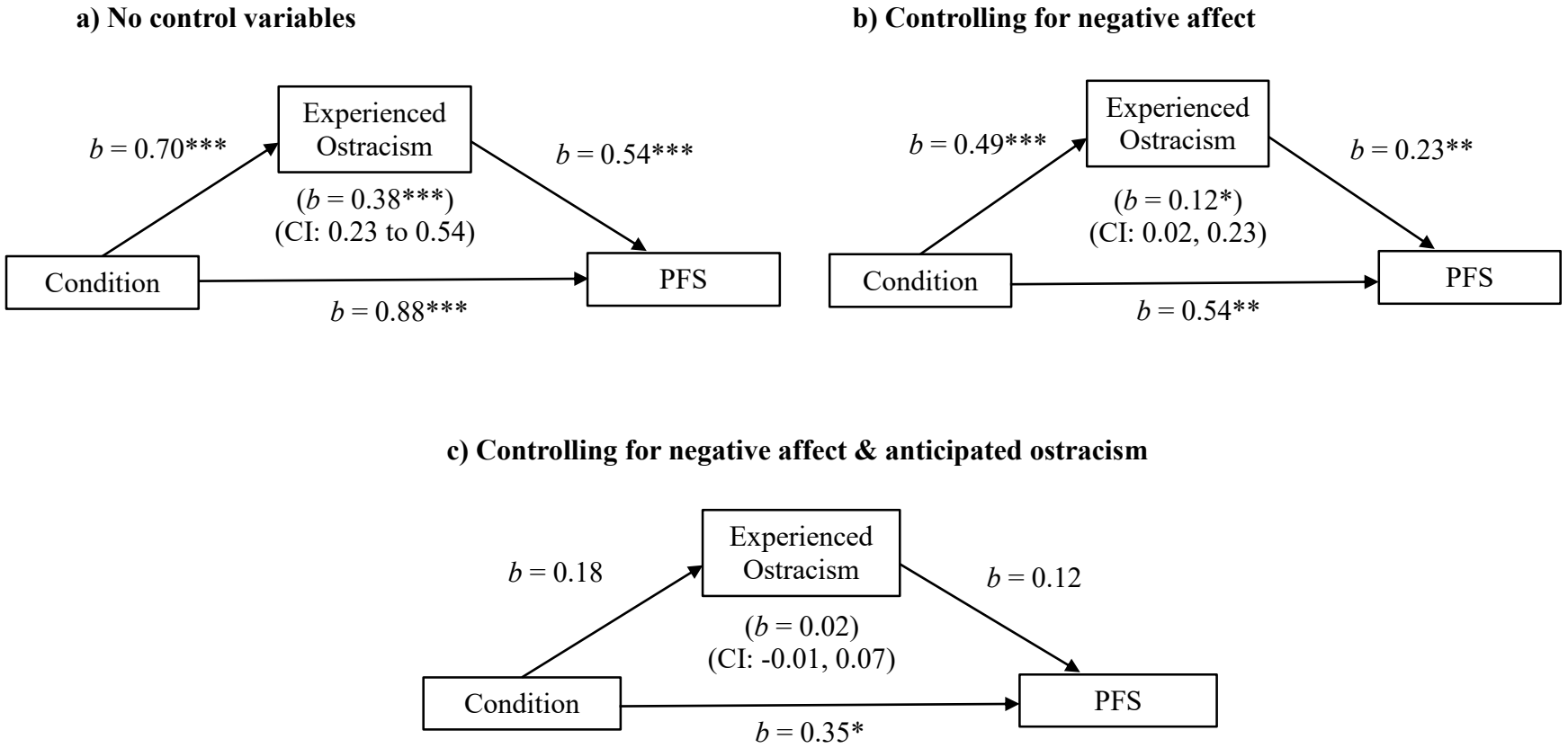


Figure 8 (a-c). Experienced ostracism mediates the effect of condition on participant's scores on the Pain Faces Scale (PFS; Model 8). The Normal theory test for the indirect effect of the mediator, magnitude of the indirect effect, as well as its associated confidence interval is listed below the mediator. Note: *** $p < .001$. ** $p < .01$ * $p < .05$.

APPENDICES

[BASELINE MEASURES]

Appendix A: Positive and negative affect schedule (PANAS)

Directions: This scale consists of a number of words that describe different feelings and emotions. Read each item and then select the appropriate answer next to that word. Indicate to what extent you feel this way *right now*.

	1 Very slightly or not at all	**2 A little**	**3 Moderately**	**4 Quite a bit**	**5 Extremely**
1. Interested	1	2	3	4	5
2. Distressed	1	2	3	4	5
3. Excited	1	2	3	4	5
4. Upset	1	2	3	4	5
5. Strong	1	2	3	4	5
6. Guilty	1	2	3	4	5
7. Scared	1	2	3	4	5
8. Hostile	1	2	3	4	5
9. Enthusiastic	1	2	3	4	5
10. Proud	1	2	3	4	5
11. Irritable	1	2	3	4	5
12. Alert	1	2	3	4	5
13. Ashamed	1	2	3	4	5
14. Inspired	1	2	3	4	5
15. Nervous	1	2	3	4	5
16. Determined	1	2	3	4	5
17. Attentive	1	2	3	4	5
18. Jittery	1	2	3	4	5
19. Active	1	2	3	4	5
20. Afraid	1	2	3	4	5

Appendix B: Fear of Social & Physical Threat Scale

Instructions: You will be shown a series of items which describe a variety of PAINFUL EXPERIENCES. Please read each item and think about how FEARFUL you are of experiencing the PAIN associated with each item. If you have never experienced the PAIN of a particular item, please answer on the basis of how FEARFUL you expect you would be if you had such an experience. Click on one rating per item to rate your FEAR OF PAIN in relation to each event.

Please note that some questions may ask you to think about "someone who is important to you." Please think about the same person when answering these kind of questions.

1 (Not at all) – 7 (Extremely)

How FEARFUL you are of experiencing the pain of…

1	being left out of a group.
2	being ignored during a party.
3	being ignored during a conversation.
4	being excluded from a conversation.
5	being betrayed by someone who is important to you.
6	feeling ignored by someone who is important to you.
7	someone who is important to you stops talking to you.
8	not being invited to a party organized by your friends.
9	being verbally abused by a family member.
10	your partner forgetting your birthday.
11	your spouse/partner forgetting your anniversary.
12	being betrayed by your partner.
13	being embarrassed in front of your classmates by your professor.
14	your professor yelling at you that you are an incompetent student.
15	being verbally abused by your boss.
16	breaking your arm.
17	breaking your leg.
18	breaking your neck.
19	hitting a sensitive bone in your elbow - your "funny bone".
20	getting a paper-cut on your finger.
21	getting strong soap in both eyes while bathing or showering.
22	having a blood sample drawn with a hypodermic needle.
23	receiving an injection in your arm.
24	receiving an injection in your hip/buttocks.

Appendix C: Self-Construal Scale

Instructions: Please indicate the degree to which you agree with the following statements: (1=strongly disagree, 7=strongly agree)

Interdependent Items

1. I have respect for the authority figures with whom I interact
2. It is important for me to maintain harmony within my group
3. My happiness depends on the happiness of those around me
4. I would offer my seat in a bus to my professor
5. I respect people who are modest about themselves
6. I will sacrifice my self-interest for the benefit of the group I am in
7. I often have the feeling that my relationships with others are more important than my own accomplishments
8. I should take into consideration my parents' advice when making education/career plans
9. It is important to me to respect decisions made by the group
10. I will stay in the group if they need me, even when I'm not happy with the group
11. If my brother or sister fails, I feel responsible
12. Even when I strongly disagree with group members, I avoid an argument

Appendix D: Physical Symptoms Checklist (PSC)

Think back over the past 7 days. On how many of these days have you experienced each of the physical symptoms below? For example, if you have had a headache on 3 out of the last 7 days, put a 3 in the space beside that item. If you are not sure about the number of days you have experienced each symptom, please give your best estimate. Do not count any symptoms (e.g., sore muscles) that you experienced as a result of intentional physical exercise.

_____1. headache
_____2. chest pain
_____3. coughing
_____4. shortness of breath
_____5. stiff/sore muscles
_____6. stomach ache/pain/upset
_____7. runny/congested nose
_____8. faintness/dizziness
_____9. racing/pounding heart
_____10. sore throat

Medical Diagnoses

1. Do you suffer from pain on a regular basis? Yes / No

[If Yes, answer 1a & 2a]

1 a) Please choose the time period that best describes how long you've experienced this pain?

- Less than 1 month
- 1 month
- 3 months
- 6 months
- More than 6 months

1 b) What do you think causes you pain? (If you have been diagnosed with chronic pain or any sickness that causes chronic pain please type what you are diagnosed with).

_____

2. Please list any medical or psychological conditions you currently suffer from:

_____

Appendix E: Basic Demographic Questionnaire

Instructions: Lastly, we would like to ask you some questions about yourself. Please choose or enter the most accurate answer.

1. Age ___

2. Gender
   - Male
   - Female
   - Other: _____

3. Class level
   - College- Freshman
   - College- Sophomore
   - College- Junior
   - College- Senior
   - Graduate Student
   - Other (Specify in next question)

4. If class level "Other" please specify
_____

5. Race/Ethnicity
   - White or Caucasian
   - American Indian or Alaska Native
   - Black or African American
   - Chinese
   - Japanese
   - Korean
   - Vietnamese
   - Indian
   - European American
   - Latino
   - Native Hawaiian or other Pacific Islanders
   - More than One Race [(optional) specify: ___]
   - Other or Unknown (specify in next question)

6. If Race/Ethnicity "Other," please specify
_____

7. Where were the following people born? (If outside of the U.S., please specify)
   - You
   - Your mother
   - Your father

- Grandmother on Mother's side (your mother's mother)
- Grandfather on Mother's side (your mother's father)
- Grandmother on Father's side (your father's mother)
- Grandfather on Father's side (your father's father)

8. Did you immigrate to the US? Yes/No
   If Yes: How many years have you been in the US? ___

9. What is your sexual orientation?
   - Heterosexual
   - Homosexual
   - Bisexual
   - Other: _____

10. What is your major?
_____

11. What language do you mostly speak?
   - English
   - Spanish
   - Chinese (Mandarin)
   - Cantonese
   - French
   - Japanese
   - German
   - Other

12. If language "Other," please specify
_____

13. What is your height? ___ft. ____in.

14. What is your weight in pounds? ____lbs.

15. Religious Affiliation?
   __ Christian
   __ Jewish
   __ Hindu
   __ Buddhist
   __ Muslim/Islam
   __ Agnostic
   __ Atheist
   __ Non-religious/secular
   __ Other (specify)_____

MANIPULATION

Appendix F: Perceived Burdensomeness Manipulation

Reliving Burden Paradigm- Burden Condition

Recall a time when you worked in a group to complete a task and ***you were burdensome to the group***. This could have been a time you were part of a group that contained only you and one other partner, or you and multiple other group members.

Type what happened and describe the group interaction you just thought of (step-by step, in order as it happened). Take as much time as you need when explaining what happened.

Reliving Equal Contribution Paradigm- Control Condition

Recall a time when you worked in a group to complete a task and ***you contributed equally to the group***. This could have been a time you were part of a group that contained only you and one other partner, or you and multiple other group members.

Type what happened and describe the group interaction you just thought of (step-by step, in order as it happened). Take as much time as you need when explaining what happened.

[POST-MANIPULATION MEASURES]

Appendix G: Manipulation Check Items

Interpersonal Needs Questionnaire (INQ)

Using the scale below, please indicate the extent to which each item was true for you.

1	2	3	4	5	6	7
Not at all true for me			Somewhat true for me			Very True for me

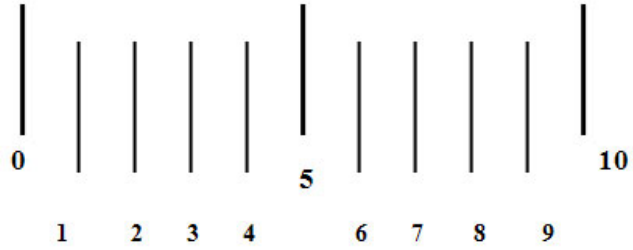
(Burdensomeness items)

1. During the experience I just recalled, the group would have been better off if I were gone.
2. During the experience I just recalled, I gave back to the group.
3. During the experience I just recalled, the group would have been happier without me.
4. During the experience I just recalled, I failed the group.
5. During the experience I just recalled, the group would have missed me if I went away.
6. During the experience I just recalled, I was a burden to the group.
7. During the experience I just recalled, I was an asset to the group.
8. During the experience I just recalled, I thought my ideas, skills, or energy made a difference.
9. During the experience I just recalled, I think I contributed to the well-being of the group.
10. During the experience I just recalled, I felt like a burden to the group.
11. During the experience I just recalled, I thought the group wished they could be rid of me.
12. During the experience I just recalled, I contributed to the group.
13. During the experience I just recalled, I made things worse for the group.
14. During the experience I just recalled, I mattered to the group.

Appendix H: Pain (Post-Manipulation)

Numerical Rating Scale

During the time you just recalled, how much pain did you experience?
Use the scale below to rate your pain (0 means 'no pain' and 10 'worst pain imaginable').



How unpleasant was the pain you experienced during the time you just recalled?
Use the scale below to rate your pain (0 means 'neutral' and 10 'extremely unpleasant').

Pain Faces Scale

Using the scale below, please indicate which face best represents the pain you experienced during the experience you just recalled.

Additional Pain Items

Scale: 0 (No pain at all) – 10 (Worst pain imaginable)

1. How much *physical pain* did you experience?
2. How much *social pain* did you experience?

Appendix I: Ostracism Measures

Anticipated Ostracism
Using the following scale, please rate the degree to which you agree with the following statements.

1	2	3	4	5
Not at all				Very much so

1. During the time I just recalled, I was worried that the group was going to exclude me.
2. During the time I just recalled, I was worried that the group was going to ignore me.
3. During the time I just recalled, I was concerned that the group would shut me out of group activities.
4. During the time I just recalled, I felt like my group members wanted me to leave the group.
5. During the time I just recalled, I was concerned that I was going to get kicked out of the group.

Experienced Ostracism items
1. During the time I just recalled, I was excluded.
2. During the time I just recalled, I was ignored.

Appendix J: Depressive Symptoms

CES-D Scale

Below is a list of some ways you may have felt or behaved. Please indicate how often you have felt this way during the experience you just recalled. Please only provide one answer to each question.

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

Appendix K: Positive and negative affect schedule (PANAS)

Directions: This scale consists of a number of words that describe different feelings and emotions. Read each item and then select the appropriate answer next to that word. Indicate to what extent you felt this way *during the experience you just recalled*.

	1 Very slightly or not at all	**2 A little**	**3 Moderately**	**4 Quite a bit**	**5 Extremely**
1. Interested	1	2	3	4	5
2. Distressed	1	2	3	4	5
3. Excited	1	2	3	4	5
4. Upset	1	2	3	4	5
5. Strong	1	2	3	4	5
6. Guilty	1	2	3	4	5
7. Scared	1	2	3	4	5
8. Hostile	1	2	3	4	5
9. Enthusiastic	1	2	3	4	5
10. Proud	1	2	3	4	5
11. Irritable	1	2	3	4	5
12. Alert	1	2	3	4	5
13. Ashamed	1	2	3	4	5
14. Inspired	1	2	3	4	5
15. Nervous	1	2	3	4	5
16. Determined	1	2	3	4	5
17. Attentive	1	2	3	4	5
18. Jittery	1	2	3	4	5
19. Active	1	2	3	4	5
20. Afraid	1	2	3	4	5

Appendix L: Additional Re-living Task-related Questions

Please think back to the time we asked you to recall earlier in the study.

1. How difficult was it for you to think of a past social situation that fit the description of the experience we asked you to recall?

1	2	3	4	5
Slightly or Not at all	A little	Moderately	Quite a bit	Extremely

2. How much time has passed since the event you wrote about occurred? (Please answer in months) _____

3. On a relationship level, how close were you with the other group members?

1	2	3	4	5
Not close at all	A little	Moderately	Quite a bit	Extremely close

4. How many people were in your group (including yourself)? ____