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Anxiety sensitivity moderates the painful effects of feeling burdensome to others

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Abstract

Perceived burdensomeness (PB), the perception of being a burden to others, is associated with pain and physical symptoms. Anxiety sensitivity (AS), the fear of arousal-related sensations, arising from beliefs that the sensations may have adverse personal consequences (physical, cognitive, and social), may increase risk for pain responding, particularly in anxiety-provoking (e.g. socially threatening) contexts. Accordingly, individuals high in AS may have a stronger pain response when experiencing PB than those low in AS. Undergraduate participants ($n = 262$) completed the Anxiety Sensitivity Index (ASI-3), and then were randomly assigned to re-live an experience when they were either burdensome to others (burdensome condition) or contributed equally to a group (control condition). Both social and physical self-reported pain were assessed post-manipulation. Those high in AS reported significantly higher pain ratings in the burdensome condition than the control condition; for those low in AS, pain did not change across conditions. In particular, being fearful of the physical repercussions of anxiety (AS physical concerns) while also feeling burdensome to others was associated with greater physical pain. AS may exacerbate the already painful effects of feeling burdensome to others, and may have important implications for the development of future suicide- and pain-related interventions.

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Introduction

Feeling as though one's resources or abilities fail to meet the demands of others is a difficult experience. Perceived burdensomeness (PB) is the view that one's existence burdens others (Joiner et al., 2002). Individuals high in PB often feel that they fail to contribute to the group, and that the group would be better off if they were gone (Joiner, 2005). Among those with chronic pain and terminal illness, PB has been identified as an associated factor with pain and physical symptoms (Kowal, Wilson, McWilliams, Pélouin, & Duong, 2012; McClement et al., 2007; Wilson, Curran, & McPherson, 2005). However, whether the relationship between PB and pain exists outside clinically ill populations has yet to be determined. Thus far, investigations have included measures only of physical pain. Social pain, experienced in response to a loss or potential loss of a social connection, may also be experienced because of PB.

Extant data support a relation between how social and physical pain are experienced (e.g. Chen, Williams, Fitness, & Newton, 2008; DeWall et al., 2010; Eisenberger, Lieberman, & Williams, 2003). The affective component of pain, stemming from the dorsal anterior cingulate cortex (dACC), acts as a neural "alarm system" that signals both social and physical threats. When an individual fails to meet the group's needs, this burdensome individual may be cast out from the group (Kerr & Levine, 2008; Wesselmann, Wirth, Pryor, Reeder, & Williams, 2013). Thus, perceiving oneself as burdensome poses a threat to one's social standing, and likely prompts a pain response that may be experienced as socially and/or physically painful. Individuals who are sensitive to their own anxiety may be especially attuned to socially threatening situations. Therefore, the effects of the neural "alarm system" (i.e. the pain response) may be exacerbated among those who are high in Anxiety Sensitivity (AS).

Individuals differ in their response to anxiety-provoking situations. AS reflects the extent to which individuals believe anxiety and anxiety-related sensations (e.g. racing heart) have harmful personal consequences (McNally, 2002; Reiss & McNally, 1985). The global AS construct encompasses lower order fears of physical, mental, and publicly observable (i.e. social) experiences (Zinbarg, Barlow, & Brown, 1997) and is related to an increased experience of pain; those higher in AS report elevated pain levels relative to comparison groups (Schmidt & Telch, 1997), and elevated levels of AS may potentiate pain sensations when these individuals experience anxiety induced via laboratory stressors (Schmidt & Cook, 1999). These data collectively suggest AS may reflect an individual difference dimension that increases risk for pain responding, particularly in anxiety-provoking (e.g. socially threatening) contexts (Otto et al., 2016). Accordingly, because perceiving oneself as burdensome to others is socially threatening, individuals high in AS may have a stronger pain response when experiencing PB than those low in AS (Velasco et al., 2016). That is,

being sensitive to one's own anxiety may heighten individuals' feelings of pain when they are burdensome to others.

To our knowledge, no research has directly investigated the interplay between PB and AS in relation to social or physical pain. To clarify the mixed findings in the literature regarding the relationships between PB and pain, the current study will experimentally manipulate PB. We expect participants who re-live a time when they were burdensome to others (burdensome condition) will report feeling more PB and more pain (both social and physical) than those who re-live a time when they contributed equally to a group (control condition). Lastly, we expect the association between PB and pain will depend on AS, such that those high in AS will experience more pain (both social and physical) in the burdensome condition than those in the control condition, and pain will not differ between conditions for those low in AS.

Method

Participants and design

An a priori power analysis indicated a minimum of 139 participants for each condition (278 total participants) were required to have 80% power for detecting a small-sized effect when employing the traditional .05 criterion of statistical significance. Therefore, 319 undergraduate participants were recruited from a large, ethnically diverse university in the Southwestern United States. Using a simple two-group between-participants design, participants were randomly assigned to one of the two conditions: burdensome or control (i.e. Equal contribution). This study was reviewed and approved by the university's Institutional Review Board. Participants were required to be at least 18 years or older and provide their informed consent to participate. Human subject data were kept confidential using a participant number coding system.

We removed 20 repeat participants who took the survey twice; for repeat participants, we used only their first responses for data analysis. In addition, we removed 40 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. To reduce the potential of bias within our experimental groups, we employed stratified randomization based on gender and ethnicity. 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 are presented in this paper, with the exception of basic demographics, which were assessed at the end of the baseline measures but before the manipulation to facilitate stratified randomization based on gender and ethnicity. Items within each scale were randomized.

Demographics and pain prevalence

Participants answered questions about basic demographics such as age, gender, and race/ethnicity. Participants listed any specific medical illnesses they had including problems with

chronic pain. Participants answered either “yes” or “no” to the question, “Do you suffer from pain on a regular basis?” If the participant selected yes, they were asked to “choose the time period that best describes how long you’ve experienced this pain,” with answer choices of “less than 1 month,” “1 month,” “3 months,” “6 months,” or “more than 6 months.”

Anxiety sensitivity

The Anxiety Sensitivity Inventory-Third Edition (ASI-3; Taylor et al., 2007) assesses concern associated with possible negative consequences of anxiety-related symptoms. Participants responded to 18 items on a 0 (*very little*) to 4 (*very much*) scale. The ASI-3 was derived, in part, from the original ASI (Reiss, Peterson, Gursky, & McNally, 1986), but this version has improved psychometric properties relative to the early versions, and has since been validated in non-clinical samples (Osman et al., 2010). The sum of all responses yields an ASI Global score ranging from 0 to 72. The ASI-3 is composed of one higher order factor (ASI Global/total score) and three lower order factors: physical (e.g. “It scares me when my heart beats rapidly”), cognitive (e.g. “When my thoughts seem to speed up, I worry that I might be going crazy”), and social concerns (e.g. “I worry that other people will notice my anxiety”) (Taylor et al., 2007). In the current sample, the ASI-3 demonstrated high levels of internal consistency in terms of the Global score used in the present study ($\alpha = .92$).

PB manipulation

To manipulate PB, we created a re-living paradigm structured similarly to those used in past research involving the re-experience of social and physical pain (Bernstein, Sacco, Brown, Young, & Claypool, 2010; Chen et al., 2008; Riva, Wirth, & Williams, 2011). Participants were randomly assigned to one of the two conditions: burdensome or control. 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 needed to completely describe their experience.

Manipulation check

Participants also completed a modified version of the Interpersonal Needs Questionnaire (INQ; Van Orden, Cukrowicz, Witte, & Joiner, 2012), 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 PB (14 items) measured using a 1 (*Not at all true for me*) to 7 (*Very true for me*) scale. We used the 14 items measuring PB as the manipulation check. These items were re-framed 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 PB. The PB items of the INQ demonstrated exceptional reliability in the current sample ($\alpha = .96$).

Pain measures

Participants completed an adapted version of the Numerical Rating Scale-11 (NRS-11; Hartrick, Kovan, & Shapiro, 2003), with the only adaptation being that they were asked to report how much pain they experienced during the time they just recalled (instead of on a daily basis, or “right now” as is often the case in clinical practice). The only modification was a change in wording to be context-specific to the re-living task. The NRS-11 is one of the most commonly used measures of physical pain (Miró, Castarlenas, & Huguet, 2009), and demonstrates reliability and validity (Bijur, Latimer, & Gallagher, 2003; Hollen et al., 2005; Williamson & Hoggart, 2005). This measure has also been used by researchers to measure social pain (Riva et al., 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.

Using a 0 (*No pain at all*) to 10 (*Worst pain imaginable*) scale, we created two additional items to differentiate feelings of social pain from physical pain. Specifically, we asked participants to report how much physical pain and social pain they experienced during the time they just recalled using two separate questions (e.g. “how much *physical* pain did you experience?” and “how much *social* pain did you experience?”).

Time since the event

To explore whether participants varied in how much time had passed since the recalled event occurred, participants answered one open response question at the end of the study, “How much time has passed since the event you wrote about occurred?” Participants were asked to answer using months as the metric of time.

Results

Zero-order correlations assessed relationships between the variables of interest (Table 1). Because the two NRS items were highly correlated and use the same metric, we collapsed the two items into one mean score, which was used as the NRS variable in the subsequent analyses. Using general linear modeling, we conducted a one-way between-subjects ANOVA to test the effectiveness of the reliving manipulation on the outcomes of interest. To test our moderation hypotheses, we used the approach recommended by Aiken, West, and Reno (1991). Condition and AS Global (grand mean centered) were entered as predictors. Condition was entered into the model as a dummy coded variable, and is consistently coded (0 = Control condition, 1 = Burdensome condition) throughout the analyses. A product term was entered into a multiple regression model to test the interaction hypotheses. For significant interactions, we ran simple slopes analyses to examine conditional effects. We defined “high” and “low” levels of AS in simple slopes analyses as one standard deviation

above and below mean levels. We examined residuals to confirm they were distributed normally. We 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 $\chi^2(1) = .497, p = .481$.

Verifying that the manipulation functioned as intended, participants who relived an experience in which they were burdensome to others reported more PB than participants in the control condition (see Table 2 for Regression Results). Participants, on average, recalled an event that occurred about 15 months ago ($M = 15.17, SD = 25.43$). However, the effect of the manipulation held regardless of the time since the recalled event had occurred $t(1,250) = 10.87, p < .001$.¹

In support of our hypothesis, PB was positively related to participant’s scores on the Numerical Rating Scale (NRS), a standardized pain measure, such that those in the burdensome condition reported experiencing significantly more pain than those in the control condition. PB was also positively associated with social pain, such that participants in the burdensome condition experienced more social pain than those in the control condition.² In contrast to our hypotheses, PB was not associated with physical pain.³ In an exploratory analysis, we found no significant relationship between PB and AS (see Table 2).

For the moderation hypothesis, we ran separate analyses on each of the three pain measures (see Table 3 for interaction results). In support of our hypothesis, we found a significant Condition by AS (Global Score) interaction for the NRS, a standardized measure of pain. Those high in AS reported significantly higher NRS pain ratings in the burdensome condition than the control condition; for those low in AS, reported pain did not change across conditions (see Figure 1(a)). When participants reported based on their social pain, we found a similar interaction pattern to that found for the NRS (See Figure 2(a)). Lastly, in contrast to our hypotheses, the Condition by AS (Global score) interaction was not significant for physical pain (see Table 3). Interestingly, however, when we entered a Condition by physical concerns interaction (an AS lower order factor) into the model *post hoc*, the interaction term was significant. Those high in AS physical concerns reported experiencing significantly more physical pain in the burdensome condition compared to the control condition; those low in physical concerns did not differ in their physical pain rating across conditions (See Figure 3(a)).

Because the main interaction hypothesis of the current paper revolves around the burdensome condition, we reversed the pairwise comparison displayed in Figures 1(a)–3(a) to examine each condition across AS increases and decreases. For the NRS, the burdensome condition strengthened the relationship between AS and pain, with individuals high in AS reporting more pain on the NRS than those with low AS; the control condition, however, did not change the relationship between AS and pain (see Figure 1(b)). The relationship between

¹There was a marginally significant difference between conditions in how much time had passed since the event occurred, $t(1,250) = -2.01, p = .05$. To ensure this did not influence our results, we also ran each of our models including this time variable as a covariate and found the same pattern of results, including the same significant interactions as those reported in this article.

²This effect persisted even when controlling for physical pain $F(2, 259) = 24.29, p < .001$.

³When we added social pain to the model, although the overall model was significant $F(2, 259) = 16.51, p < .001$, Condition still was not a significant predictor ($b = -.22, p = .394$).

AS and social pain was strengthened for those in the burdensome condition, such that those high in AS reported significantly more social pain in the burdensome condition than those with low AS; the control condition did not change the relationship between AS and social pain (see Figure 2(b)). Although both conditions strengthened the relationship between AS physical concerns and physical pain for those with high and low levels of AS physical concerns, the burdensome condition increased the relationship the most (see Figure 3(b)).

Discussion

Individuals who experience PB often feel they fail to contribute to the needs of others, and that their presence causes distress (Joiner, 2005). This study was the first to experimentally manipulate PB; participants who re-lived a time when they were burdensome to others reported greater PB than those who re-lived a time when they contributed equally to a group. In addition, participants felt more pain after re-living a time when they were burdensome compared to those who re-lived an experience in which they contributed equally to a group task. Importantly, feeling burdensome to others *and* being high in AS played out as a problematic combination in the current data; those high in AS felt even *more* pain as indicated by the NRS and social pain measure compared to those low in AS. When participants explicitly reported their physical pain, those high in AS physical concerns, a component of AS, reported more physical pain in the burdensome condition than those with low AS physical concerns.

The present findings replicate previous work that found that individuals who perceived themselves as burdensome to others also experience greater pain (Kowal et al., 2012). However, in regard to physical pain, our data also partially support the previous research that found no relationship between PB and pain severity (Kanzler, Bryan, McGeary, & Morrow, 2012). In the current study, PB was not associated with physical pain unless an individual was high in AS physical concerns. However, because of the *post hoc* nature of our investigation of AS physical concerns and physical pain, these results should be considered preliminary and need further replication. The extent to which PB is associated with pain may depend on (1) whether an individual is sensitive to their own anxiety, and (2) whether social or physical pain is measured. Social pain may be more strongly linked to AS and PB compared to physical pain; this is in line with the idea that social pain may be characterized as an anxiety-related reaction, and both PB and AS would be expected to produce greater anxiety in a threatening or stressful situation. Lastly, the extent to which the social and physical pain experiences overlap in the context of PB needs further investigation.

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, theater), (3) a group task or common goal in the workplace or military, (4) a social event, and (5) personal injury or illness. It appears PB 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 PB.

Exploring factors that modify the pain experience is needed in models of the relationship between PB and pain. These data have direct implications for physical and social pain management as well as other pain-related sequelae such as suicide (Fishbain, 1996). Specifically, interventions aimed at correcting dysfunctional cognitions related to AS and PB may be useful for ameliorating both social and physical pain experiences. The fact that social pain was a key outcome in our findings suggests that researchers and practitioners should pay more attention to social pain as part of the pain experience. Social pain is an emotional reaction to the loss, or potential loss, of a social connection (MacDonald & Leary, 2005). Developing PB involves assessing one's social standing, such as whether one contributes to and is valued by others in their group. Thus, it is imperative that researchers include measures of social pain in addition to physical pain in future investigations of PB. Doing so will allow for a more comprehensive understanding of individuals' pain experiences.

The current study includes limitations that can be addressed in future research. Although individuals can accurately recall both physically and socially painful experiences (Erskine, Morley, & Pearce, 1990; Morley, 1993), their re-experience may not be the same as the original event. In particular, 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 et al., 2008). Accordingly, our lack of consistent findings for physical pain may have been due to the re-living manipulation, and may not be reflective of the extent to which PB influences physical pain. In the current study, we also tested whether the time since the event occurred may have impacted the results of the manipulation. Based on our findings, it does not appear that the time since the event exerted a powerful influence over the results. Further, the recall of the painful experience may also be linked to individual levels of AS and not solely the painful experience; for example, participants' recollection may have been amplified by AS. Some research suggests a cognitive bias for physical threat among persons with high AS (e.g. Keogh & Cochrane, 2002). Future research may therefore benefit by exploring whether persons high in AS demonstrate a bias to recall more pain rather than less. Future research should consider other experimental paradigms that may help investigators refine their understanding of these concepts. For example, the use of experimental pain paradigms such as the cold pressor task are not limited by potential recall effects and could be a more direct way to examine some of these relationships in future studies.

In addition, these data were collected from a non-clinical sample. Individuals who experience chronic pain may be affected by PB differently than individuals who do not experience pain on a regular basis. The sample was also predominantly female. Thompson, Keogh, French, and Davis (2008) found that the relationship between AS and subjective pain existed primarily for females. It may be that the results reported in this paper do not necessarily extend to males in the same way. Thus, these gender differences should continue to be examined in future research. Lastly, self-report can only begin to help us understand these relationships—especially in terms of physical pain. Future studies should consider including physiological measures of pain in addition to self-report.

Although the experimental paradigm we employed presents limitations, it uniquely contributes to previous research in that it is the first experimental manipulation of PB, an important facet of understanding the PB–pain link. There was evidence to suggest that being sensitive to one’s own anxiety may exacerbate the already painful effects of perceiving oneself as burdensome to others. In terms of physical pain, being sensitive to one’s physical anxiety-related responses heightened the pain experience. These data have direct implications for physical and social pain management as well as other pain-related and PB-related sequelae such as suicide (Fishbain, 1996; Joiner, 2005).

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Figure 1.

AS strengthens the effect of the burdensome condition on participants' scores on the NRS.

Notes: Simple slopes depicting the two-way Condition $\times$ AS interaction predicting pain reported using the NRS. Higher scores reflect more pain, and asterisks indicate significant differences ($***p < .001$). Panel A: depicts the interaction for participants reporting high and low AS across conditions (Conditions coded as 0 = Control, 1 = Burdensome). Panel B: depicts the reverse comparison for participants' condition across levels of AS.

Figure 2.

AS strengthens the effect of the burdensome condition on participants' social pain.

Notes: Simple slopes depicting the two-way Condition $\times$ AS interaction predicting pain reported using the NRS. Higher scores reflect more pain, and asterisks indicate significant differences ($***p < .001$). Panel A: depicts the interaction for participants reporting high and low AS across conditions (Conditions coded as 0 = Control, 1 = Burdensome). Panel B: depicts the reverse comparison for participants' condition across levels of AS.

Figure 3.

AS physical concerns strengthen the effect of the burdensome condition on participants' physical pain.

Notes: Simple slopes depicting the two-way Condition $\times$ AS interaction predicting pain reported using the NRS. Higher scores reflect more pain, and asterisks indicate significant differences ($*p < .05$, $**p < .01$). Panel A: depicts the interaction for participants reporting high and low AS across conditions (Conditions coded as 0 = Control, 1 = Burdensome). Panel B: depicts the reverse comparison for participants' condition across levels of AS.

Table 1

Bivariate correlations between variables of interest.

	1	2	3	4	5	6
1. Condition	–					
2. Perceived burdensomeness	.56**	–				
3. Numerical rating scale (pain)	.22*	.42**	–			
4. Physical pain	.03	.16**	.53**	–		
5. Social pain	.23**	.50**	.67**	.33**	–	
6. Anxiety sensitivity	–.08	.18**	.26**	.23**	.35**	–

* $p < .05$;

** $p < .01$.

Table 2

Regression results for the relationship between PB and outcomes of interest.

Outcome	<i>M (SD)</i>				<i>t</i>	Sig
	Control	Burdensome	<i>b</i>	SE		
Manipulation check (PB)	2.06 (.95)	3.80 (1.58)	1.74	.16	19.26	<.001***
NRS pain	1.94 (2.19)	3.04 (2.67)	1.10	.34	3.20	.002**
Social pain	2.01 (2.30)	3.19 (2.81)	1.19	.32	3.75	<.001***
Physical pain	.93 (1.93)	1.04 (2.29)	.11	.26	.43	.67
Anxiety sensitivity	1.07 (.78)	.95 (.82)	-.12	.10	-1.23	.22

Note: Condition dummy coded as 0 = Control condition, 1 = Burdensome condition.

**
 $p < .01$;

 $p < .001$.

Table 3

Regression results for testing the interaction between condition and measures of pain.

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>Sig</i>
<i>NRS pain</i>				
Constant	2.54	.16	15.59	<.001 ***
Condition	1.24	.33	3.81	.002 **
Anxiety sensitivity (AS)	.84	.19	4.34	<.001 ***
Condition × AS global score	1.01	.39	2.60	.010 *
<i>Social pain</i>				
Constant	2.57	.14	17.64	<.001 ***
Condition	1.34	.29	4.57	<.001 ***
Anxiety sensitivity (AS)	1.19	.18	6.48	<.001 ***
Condition × AS global score	.70	.37	1.92	.056 ^t
<i>Physical pain</i>				
Constant	.99	.13	7.83	<.001 ***
Condition	.19	.25	.74	.46
Anxiety sensitivity (AS)	.61	.16	3.80	.002 **
Condition × AS global score	.39	.32	1.22	.224

Note: Condition dummy coded as 0 = Control condition, 1 = Burdensome condition.

^t
 $p < .10$.*
 $p < .05$;**
 $p < .01$;***
 $p < .001$.