

Anxiety sensitivity and trauma exposure alter pain perception: Evidence of hypoalgesia in women

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Introduction

- ◆ Anxiety sensitivity (AS) is the fear of anxiety-related sensations (e.g., heart rate, blushing, racing thoughts) based on the belief that they have may have negative consequences (Reiss & McNally, 1985).
- ◆ AS has been associated with increased experiences of pain (hyperalgesia) in a number of samples and most notably in women (e.g., Thompson et al., 2008).
- ◆ Trauma exposure, a necessary pre-condition for the development of post-traumatic stress disorder (PTSD), has been associated with increased (hyperalgesia; e.g., Scarinci et al., 1994), decreased (hypoalgesia; e.g., Kraus et al., 2009), and normal experiences of pain (e.g., Schmahl et al., 2010).
- ◆ Each of AS, trauma exposure, and altered pain perception are believed to be vulnerability and maintenance factors in co-occurring chronic pain and PTSD (Asmundson & Katz, 2008).
- ◆ Despite the theoretical and empirical associations between AS, PTSD, and chronic pain, no study has yet explored trauma exposure and AS for interactions relating to pain perception.
- ◆ The present investigation examined the relationships between trauma exposure, sex, and AS in pain perception in a student and community sample.

Methods

- ◆ A total of 95 student and community members (55% women) participated in the investigation and completed an online version of the Traumatic Life Events Questionnaire. Participants meeting DSM-IV-TR PTSD Criteria A1 and A2 were classified as trauma exposed.
- ◆ Participants completed the *Anxiety Sensitivity Index-3* (ASI-3; Taylor et al., 2007) and measures associated with pain perception (e.g., fear of pain, pain anxiety).
- ◆ Quantitative sensory testing was conducted using a 3cm² contact thermode controlled by a PATHWAY Pain and Sensory Evaluation System – (Medoc Advanced Medical Systems, Ramat Yishay, Israel). Administered stimuli ranged from 0° C to 50° C.
- ◆ Sensory testing involved heat and cold threshold testing (i.e., heat pain threshold, cold pain threshold, heat tolerance, cold tolerance) and self-reports of pain intensity and unpleasantness (i.e., heat and cold pain magnitude estimates).
- ◆ Analysis of Covariance (ANCOVA) was used to test main effects for sex, trauma exposure, and total ASI-3 scores on pain perception, as well as for ASI-3*Sex*Trauma interactions. Covariates included: Fear of pain, pain anxiety, trait anxiety, current pain, and depression scores.

Results

- ◆ Women exhibited increased pain sensitivity relative to men on heat pain threshold ($p < .01$, $\eta_p^2 = .09$) and tolerance ($p < .001$, $\eta_p^2 = .19$) and cold pain threshold ($p < .05$, $\eta_p^2 = .05$) and tolerance ($p < .01$, $\eta_p^2 = .10$).
- ◆ Trauma exposure had no significant main effects on heat or cold pain perception with the aforementioned inclusion of covariates in the ANCOVAs.
- ◆ ASI-3 scores were associated with greater heat ($p < .01$, $r = .27$) and cold pain tolerance ($p < .05$, $r = .21$) across the sample (i.e., hypoalgesia); however, this effect was strongest in women ($p = .05$, $r = .27$; $p = .01$, $r = .34$).
- ◆ ANCOVAs identified significant three-way ASI-3*Sex*Trauma interactions for cold pain threshold ($F[3, 287] = 3.29$, $p < .05$, $\eta_p^2 = .11$) and tolerance ($F[3, 287] = 3.09$, $p < .05$, $\eta_p^2 = .11$) but not for heat pain (Table 1).
- ◆ Similar interactions were identified for the sum of all heat and cold pain intensity ($F[3, 287] = 2.97$, $p < .05$, $\eta_p^2 = .10$) ratings and unpleasantness scores ($F[3, 287] = 2.61$, $p < .05$, $\eta_p^2 = .09$).
- ◆ The interactions indicated that women who reported trauma exposure exhibited hypoalgesia only when also having high levels of AS (Figures 1 & 2). Indeed, these women reported cold pain threshold and tolerance levels comparable to those of men.

Discussion

- ◆ The current investigation sought to examine the relationships between sex, trauma, and AS in altered pain perception
- ◆ In the present sample women generally demonstrated greater pain sensitivity (i.e., hyperalgesia) than men, while trauma had no independent effect. AS was associated with hypoalgesia, contrasting with previous findings (e.g., Thompson, 2008).
- ◆ Women who had experienced a trauma and also had high AS exhibited pain tolerances equal to those of men and significantly greater hypoalgesia than other women. No such interactions were found for men.
- ◆ Trauma and AS may alter pain perception differently between sexes, which may have implications for the etiology and maintenance of PTSD and chronic pain. The findings may contribute to growing literature examining other disorders (e.g., borderline personality disorder; Schmahl et al., 2010) and pain perception.
- ◆ The exploratory nature of the current investigation limited the size of the sample due to the complexity of the reported interactions (e.g., relatively few men or women would have had high levels of AS and experienced a trauma). Future investigations should confirm these findings using stringent statistical procedures and larger samples.

Table 1. ANCOVA results demonstrating main effects and interactions on pain perception – Includes pain related covariates

	AS			Sex			Trauma			AS*Sex*Trauma		
	F	p	η_p^2	F	p	η_p^2	F	p	η_p^2	F	p	η_p^2
Sum pain intensity for all stimuli	<1	>.10	<.01	3.16	0.08	0.04	<1	>.10	<.01	2.97	0.04	0.10
Sum pain unpleasantness for all stimuli	<1	>.10	<.01	2.95	0.09	0.04	<1	>.10	<.01	2.61	0.06	0.09
Heat pain threshold	<1	>.10	<.01	3.69	>.10	0.04	1.25	>.10	<.01	1.10	>.10	0.04
Cold pain threshold	1.90	>.10	0.02	3.60	>.10	0.04	1.23	>.10	0.02	3.29	0.02	0.11
Heat pain tolerance	9.46	<.001	0.10	8.30	<.001	0.09	<1	>.10	<.01	<1	>.10	<.01
Cold pain tolerance	13.34	<.001	0.14	10.90	<.001	0.12	<1	>.10	<.01	3.01	0.03	0.10

