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Anxiety Sensitivity and Posttraumatic Stress among Traumatic Event-Exposed Youth

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Abstract

Total and factor scores of the Childhood Anxiety Sensitivity Index (CASI) were examined in relation to posttraumatic stress symptom levels within a community-based sample of 68 (43 females) traumatic event-exposed youth between the ages of 10 and 17 years ($M_{age} = 14.74$ years). Findings were consistent with hypotheses; global AS levels, as well as disease, unsteady, and mental incapacitation concerns related positively to posttraumatic stress levels, whereas social concerns were unrelated to symptom levels. These results suggest that fears of the physical and mental consequences of anxiety are associated with relatively higher levels of posttraumatic stress subsequent to traumatic event exposure. Findings are discussed in terms of potential implications for the role of AS in developmentally-sensitive etiological models of PTSD.

Keywords

adolescence; anxiety sensitivity; trauma exposure; posttraumatic stress symptoms

Anxiety sensitivity (AS) is a cognitive vulnerability characteristic reflecting fear of anxiety and anxiety-related sensations (Reiss & McNally, 1985). Consistent with theory highlighting the role of cognitive factors in the maintenance of posttraumatic stress (Ehlers & Clark, 2000), individual differences in AS may evidence meaningful associations with posttraumatic stress symptom levels among traumatic event-exposed persons (Taylor, 2003). Specifically, AS may be relevant to posttraumatic stress in at least two ways. First, AS may amplify or enhance symptoms following traumatic event exposure (Fedoroff, Taylor, Asmundson, & Koch, 2000). For instance, compared to someone low in AS, a high AS individual may be relatively more frightened and upset by re-experiencing symptoms (e.g., flashbacks), which may exacerbate such symptoms. Second, persons high in AS may be more apt to avoid reminders of a traumatic event, thereby preventing extinction of learned trauma-related fear (Lang, Kennedy, & Stein, 2002) and/or affective processing of, and recovery from, a traumatic event (Brewin, Dalgleish, & Joseph, 1996). Indirect evidence for this perspective comes from work conducted with non-clinical samples where AS has been shown to predict avoidance of emotionally salient events (Wilson & Hayward, 2006).

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Empirical evidence supports the perspective that AS (assessed using the Anxiety Sensitivity Index [ASI; Reiss, Peterson, Gursky, & McNally, 1986]) is related to posttraumatic stress symptoms among adults. Between-groups studies indicate AS is elevated among adults with, versus without, posttraumatic stress disorder (PTSD; Asmundson & Carleton, 2005; Hinton, Pich, Safren, Pollack, & McNally, 2005). For instance, Taylor, Koch, and McNally (1992) compared ASI scores between persons with six different types of anxiety psychopathology (i.e., panic disorder, PTSD, generalized anxiety disorder, obsessive-compulsive disorder, social phobia, or simple phobia). Anxiety sensitivity was comparably elevated among persons with PTSD ($M = 31.6$; $SD = 12.8$) and those with panic disorder ($M = 36.6$; $SD = 12.3$), which is a population that generally evidences high AS. These scores were significantly higher than those observed in the comparison clinical groups, as well as norms from non-clinical samples ($M = 17.8$; $SD = 8.8$; Petersen & Reiss, 1987). Importantly, individuals in the PTSD group did not meet criteria for panic disorder, but the presence of other co-morbid anxiety disorders (e.g., OCD) was not methodologically or statistically controlled, which may have influenced the results. Independent research also has found elevated AS among persons with PTSD, even compared to traumatic event-exposed individuals without PTSD, suggesting AS is related to posttraumatic stress levels above and beyond associations with traumatic event exposure alone. Among female victims of interpersonal violence (IPV), total ASI scores were significantly higher in a PTSD positive group ($M = 30.7$; $SD = 16.5$), compared to an IPV-exposed PTSD-negative group ($M = 17$; $SD = 11.6$; Lang et al., 2002). In terms of specific facets of AS (i.e., mental incapacitation, physical, and social concerns factors on the adult ASI; Zinbarg, Brown, & Barlow, 1997), IPV-exposed adults with PTSD, as compared to IPV-exposed adults without PTSD, endorsed higher physical and mental incapacitation concerns. Research also has focused on continuous relations between AS and posttraumatic stress among traumatic event exposed adults.

Several studies have documented positive correlations between AS and posttraumatic stress symptom levels among traumatic event exposed adults (e.g., Feldner, Zvolensky, Schmidt, & Smith, in press; Hagh-Shenas, Goodarzi, Dehbozorgi, & Farashbandi, 2005). Asmundson, Norton, Allardings, Norton, and Larsen (1998) examined AS and posttraumatic stress among 121 adults who had experienced a work-related injury. Total ASI scores were positively related to overall symptom severity as well as symptom level within each of the three posttraumatic symptom clusters (i.e., re-experiencing, avoidance, and arousal). Similarly, among 59 traumatic event-exposed adults, higher AS was associated with increased negative posttraumatic cognitions (e.g., negative cognitions about the self and world; self-blame) as well as severity of posttraumatic stress symptoms (Nixon & Bryant, 2005). Subfactor scores on the ASI also have been evaluated in relation to post-traumatic stress; Feldner, Lewis, Leen-Feldner, Schnurr, and Zvolensky (2006) observed that total ASI ($r = .28$) and physical concerns ($r = .31$) scores significantly related to posttraumatic stress level among 61 trauma-exposed rural adults.

Collectively, theory and research suggest that among trauma-exposed persons, AS is positively related to posttraumatic stress. However, to the best of our knowledge, this association has not been examined among youth. It is important to address this gap for multiple reasons. First, adolescents are at significant risk for exposure to traumatic events; recent estimates suggest as many as 68% of youth have been exposed to a traumatic event by age 16 (Copeland, Keeler, Angold, & Costello, 2007). Recognition of the considerable rates of trauma and posttraumatic stress among youth has resulted in a pressing need to articulate developmentally-sensitive etiological models in this domain (Salmon & Bryant, 2002; van der Kolk, 2005). To achieve this objective, factors thought to relate to posttraumatic stress must be empirically examined among youth, as such processes identified in adults cannot be assumed to exist or function identically at other stages of development (Cicchetti & Rogosch, 2002). Adolescence is a theoretically-relevant developmental stage in which to study anxiety, as the biopsychosocial

changes related to puberty (e.g., onset of dating and substance use, sleep deprivation, changes in the hypothalamic-pituitary-adrenal axis, increased emotional lability, and negative affectivity; Brooks-Gunn, Graber, & Paikoff, 1994; Carskadon et al., 2002; Hayward, 2003) occurring during this stage make it a “critical period” during which anxiety problems often emerge (Leen-Feldner, Reardon, Hayward, & Smith, in press). Thus, this period of enhanced vulnerability to anxiety is particularly important to study in order to advance our understanding of recovery from posttraumatic stress across the lifespan (Hayward & Sanborn, 2002). Indeed, empirical work has suggested that posttraumatic stress problems may be more likely to occur subsequent to traumatic event exposure during adolescence compared to other developmental periods (e.g., childhood; Copeland et al., 2007). For these reasons, it is important and timely to increase our understanding of the link between AS and posttraumatic stress among adolescents.

The current study sought to examine the relation between AS, its subfactors, and posttraumatic stress levels among a sample of traumatic event-exposed adolescents. To examine these processes in a developmentally-sensitive design, measures developed for, and validated among, youth were employed. In particular, the psychometrically sound Childhood Anxiety Sensitivity Index (CASI; Silverman, Fleisig, Rabian, & Peterson, 1991), adapted from the adult-focused ASI (Reiss et al., 1986) for use with youth, was employed to measure AS. A factor analysis of the CASI using several samples of American and Australian clinical and non-clinical youth suggested that the physical concerns facet identified on the ASI is comprised of two distinct factors, resulting in four factors in addition to a global factor: Disease Concerns, Unsteady Concerns, Mental Incapacitation Concerns, and Social Concerns (Silverman, Goedhart, Barrett, & Turner, 2003). Consistent with research suggesting physical and mental incapacitation concerns are most consistently linked to symptoms of PTSD among traumatized adults (e.g., Feldner et al., 2006; Lang et al., 2002), the disease, unsteady, and mental incapacitation concerns factors, along with the global index of AS, were expected to relate positively to posttraumatic stress levels in the current sample of youth. Finally, in an effort to examine the unique association between AS and trauma symptoms, the incremental predictive validity (Haynes & Lench, 2003) of AS was examined relative to several factors associated with posttraumatic stress levels among youth, including gender (Kilpatrick et al., 2003), age (Kilpatrick et al., 2003), and time since traumatic event exposure (Zatzick et al., 2006). Further, in light of empirical evidence linking negative affectivity, or the temperamentally-based proclivity for experiencing negatively valenced affective states (e.g., anger; sadness; anxiety), to trauma symptoms among youth (e.g., Weems et al., 2007), this factor also was included as a covariate. Overall, this approach allowed for evaluation of the specific association between AS and trauma symptoms after controlling for variance accounted for by these theoretically-relevant factors.

Method

Participants

Sixty-eight (43 females) traumatic event-exposed youth between the ages of 10 and 17 years ($M_{age} = 14.74$; $SD = 2.49$) were drawn from a larger, ongoing community-based study of adolescents. Ethnic and racial status reflected the make-up of the local area; approximately 6% were Hispanic/Latino, 90% Caucasian, 4.5% Asian, and 5.5% “other” or did not specify. Approximately 33% ($n = 68$) of youth who participated in the larger study reported having experienced a DSM-defined (APA, 1994) traumatic event (see below for assessment details). The trauma-exposed youth in the current study, as compared to non-exposed youth from the larger study, reported significantly higher AS total scores as well as disease, unsteady, and mental incapacitation concerns [$M = 28.20$ ($SD = 5.45$), $M = 5.56$ ($SD = 1.65$), $M = 5.26$ ($SD = 1.82$), $M = 3.71$ ($SD = 1.08$) versus $M = 25.45$ ($SD = 4.85$), $M = 5.03$ ($SD = 1.46$), $M = 4.42$

($SD = 1.49$), $M = 3.36$ ($SD = .72$), respectively; p 's $< .05$]. There were no significant differences on the social concerns facet [$M = 6.40$ ($SD = 1.49$) versus $M = 6.07$ ($SD = 1.47$), respectively]. In terms of types of traumatic events endorsed by the current sample, significant injury ($n = 19$), witnessing injury/death ($n = 29$), life-threatening accident or fire ($n = 7$), natural disaster ($n = 35$), robbed or attacked ($n = 5$), sexual abuse ($n = 9$), physical abuse ($n = 5$), and "other" ($n = 3$) event types were reported. Number of traumas reported ranged from 1 to 6 ($M = 1.47$; $SD = .90$).

Measures

Traumatic event exposure was indexed using the *Anxiety Disorders Interview Schedule-Child Version* (ADIS-C; Silverman & Albano, 1996). The ADIS-C permits the assessment of whether the reported event meets DSM criteria for a traumatic event. Specifically, participants were asked about nine specific events (e.g., "a serious natural disaster such as a tornado") as well as any other upsetting events not explicitly listed in the interview. Affirmative answers were then probed to determine whether significant threat to self or others was perceived, whether fear, helplessness, or horror (e.g., "were you very afraid?") was experienced, and time since the event. Research personnel were trained to mastery in the use of the instrument. All administrations were audiotaped and 5% of the tapes were randomly selected for a reliability check by a trained interviewer blind to participants' diagnosis; 100% diagnostic agreement was observed for these cases.

Posttraumatic stress symptom level was measured using the 17-item *Child PTSD Symptom Scale* (CPSS; Foa, Johnson, Feeny, & Treadwell, 2001). This well-established scale indexes the frequency of PTSD symptoms in relation to the most distressing event reported during the ADIS-C interview. Internal reliability for the present sample was $\alpha = .85$. The CPSS also was used to index the presence of PTSD (PTSD was defined as exposure to a DSM-defined traumatic event at least four weeks in the past, meeting symptom criteria for each of the three DSM-defined symptom clusters, and the presence of functional impairment).

The well-established 18-item *Childhood Anxiety Sensitivity Index* (CASI; Silverman et al., 1991) was used to measure AS levels. Internal reliabilities for the present sample were comparable to prior studies (e.g., Leen-Feldner, Feldner, Bernstein, McCormick, & Zvolensky, 2005; Silverman et al., 2003): total scale $\alpha = .83$; Disease Concerns (4 items) $\alpha = .58$, Unsteady Concerns (3 items) $\alpha = .72$, Mental Incapacitation Concerns (3 items) $\alpha = .54$, and Social Concerns (3 items) $\alpha = .61$.

The negative affect scale of the *Positive and Negative Affect Schedule for Children* (PANAS-C; Joiner, Catanzaro, & Laurent, 1996) was used to measure negative affectivity. The negative affect scale of the PANAS-C demonstrates good internal consistency (e.g., $\alpha = .91$ in the present sample), as well as adequate discriminant and convergent validity (Joiner et al., 1996).

Procedure

All procedures related to the current study were approved by the University Institutional Review Board. Fliers were placed and information booths set up in the community to recruit participants. Written informed assent and consent (for child participation) was obtained for all participants. Thereafter, the ADIS-C was administered and participants completed a battery of questionnaires including those described in the current report. The battery was randomly ordered to control for order effects. Adolescents also participated in a series of laboratory-based activities not relevant to the current manuscript. Finally, youth were debriefed and compensated \$40.

General Analytic Approach

First, correlations were examined among the predictor and criterion variables and females and males were compared in terms of each variable using univariate analyses of variance (ANOVAs). Next, hierarchical multiple regression analyses were performed to examine the relation between AS (i.e., total and factor scores) and posttraumatic stress symptom levels. Each of the covariates (i.e., time since trauma exposure, gender, age, and negative affectivity) was entered at step 1 of the regression. Then, either the total CASI score or one of the factors was entered at step 2. Magnitude of associations was indexed using squared semi-partial correlations (sr^2). Also, youth with, versus without PTSD, were compared in terms of AS levels using univariate ANOVAs. Magnitude of group differences was indexed via eta squared (η^2).

Results

Descriptive Data and Zero-Order Correlations

See Table 1 for the means and standard deviations for, and correlations among, the criterion and predictor variables. In terms of the predictor variables, time since traumatic event exposure was not related to other predictors, and age was positively related to CASI – Social Concerns scores. Negative Affect scores on the PANAS-C were positively related to CASI total scores and all CASI subscale scores except Social Concerns. All CASI scores were significantly inter-related except the Social Concerns factor was not related to the Unsteady Concerns or Mental Incapacitation Concerns factors. Females reported significantly less time since the traumatic event compared to males [$M = 29.16$ months ($SD = 33.46$) versus $M = 50.88$ months ($SD = 44.99$), respectively; $t = 5.14$, $p < .05$] and significantly higher CASI-Unsteady Concerns [$M = 5.62$ ($SD = 1.98$) versus $M = 4.60$ ($SD = 1.32$), respectively; $t = 5.29$, $p < .05$], but did not differ in terms of other predictors. With respect to the criterion variable (i.e., CPSS scores), time since traumatic event exposure was negatively related to posttraumatic stress symptom levels. Each of the other predictors, except CASI-Social Concerns scores, was positively associated with symptom levels. There was not a gender difference in symptom levels.

Regressions Examining Associations between AS and Posttraumatic Stress Levels

See Table 2 for a synopsis of regression analyses. In the analysis that utilized CASI total scores, the predictor variables together explained 42% of the overall variance [adjusted $R^2 = .38$; $F(5, 62) = 9.28$, $p < .001$]. At step 1, time since trauma was negatively associated, and PANAS-C – Negative Affect scores and age were positively associated, with symptom levels, accounting for 5%, 5% and 6% of variance in CPSS scores, respectively. At step 2, CASI total scores related positively, accounting for an additional 22% of unique variance.

The first step of all models with CASI factor scores was comparable to that described for the regression with the CASI total score (see Table 2). The model with the Disease Concerns factor significantly accounted for 39% of overall variance in symptom levels [adjusted $R^2 = .34$; $F(5, 62) = 7.98$, $p < .001$], with the Disease Concerns factor accounting for 18% of unique variance. The model with the Unsteady Concerns factor significantly accounted for 30% of overall variance [adjusted $R^2 = .24$; $F(5, 62) = 5.30$, $p < .001$], with the Unsteady Concerns factor accounting for 9% of unique variance in symptom levels. The model with the Mental Incapacitation Concerns factor significantly accounted for 54% of overall variance in symptom levels [adjusted $R^2 = .50$; $F(5, 62) = 14.91$, $p < .001$], with the Mental Incapacitation Concerns factor accounting for 33% of unique variance. Finally, the model with the Social Concerns factor significantly accounted for 22% of variability in symptom levels [adjusted $R^2 = .15$; $F(5, 62) = 3.49$, $p < .01$]. However, as predicted, the Social Concerns factor did not account for a significant amount of unique variance.

Exploratory Analysis

Although extant research was insufficient to hypothesize differential relations between AS and posttraumatic stress levels between different age groups, we explored such relations to stimulate future tests in the area. Consistent with empirical precedent, the sample was divided into two groups (i.e., children ages 10 through 13 years and adolescents ages 14 through 17 years; Copeland et al., 2007). Regression analyses were conducted as described above for the entire sample. Among adolescents ($n = 40$), the pattern of results was comparable to that reported among the entire sample (i.e., Disease Concerns, $sr^2 = .31$; Unsteady Concerns, $sr^2 = .09$; Mental Incapacitation Concerns, $sr^2 = .34$; Total CASI, $sr^2 = .27$, all p 's $< .05$; Social Concerns, $sr^2 = .03$ [*ns*]). Among children ($n = 28$), however, only the total CASI ($sr^2 = .15$, $p < .05$) and Mental Incapacitation Concerns ($sr^2 = .33$, $p < .05$) scores related significantly to symptom levels (Disease Concerns, $sr^2 = .01$, Unsteady Concerns, $sr^2 = .05$, and Social Concerns, $sr^2 = .00$, all *ns*).

Discussion

The current study is the first to examine AS factors in relation to posttraumatic stress among youth. As predicted, total CASI scores as well as the mental incapacitation, disease, and unsteady concerns facets were positively correlated with posttraumatic stress symptom levels. Indeed, these facets accounted for considerable variance in symptom levels (9 – 37%) even after accounting for variance associated with several empirically and theoretically relevant covariates. This pattern suggests that, relative to their low AS counterparts, traumatic event-exposed youth who fear the physical and mental consequences of anxiety may be at risk for more severe posttraumatic stress symptoms. Interestingly, findings from the current study extend a growing body of work suggesting AS may be a broad-based cognitive vulnerability for anxiety and related problems. For instance, AS evidences associations with an array of clinical problems among youth, including panic (Hayward, Killen, Kraemer, & Taylor, 2000), depression (Weems, Hammond-Laurence, Silverman, & Ferguson, 1997), substance use (Leen-Feldner et al., 2007), and sleep problems (Gregory & Eley, 2005). These outcomes also co-vary with traumatic event exposure (Pine & Cohen, 2002), highlighting the potentially important role of AS in traumatic event exposure - clinical symptom associations.

As predicted, the social concerns facet was unrelated to posttraumatic stress levels. However, this pattern of findings will require independent replication before firm conclusions can be drawn, as extant evidence is mixed on this issue. For instance, the social concerns facet has been linked to general anxiety symptoms among youth (e.g., Gregory & Eley, 2005), although the anxiety index in these studies did not include symptoms of posttraumatic stress and participants were not evaluated for traumatic event exposure. Therefore, it may be that social concerns are relevant to certain types of anxiety symptoms (e.g., school phobia), but not posttraumatic stress. A next step in this line of inquiry may be to test whether the association between social concerns and posttraumatic stress levels vary between samples of youth with socially-relevant and non socially-relevant traumatic experiences (e.g., sexual abuse perpetrated by a key socializing agent versus natural disaster).

Collectively, the significant links between AS and posttraumatic stress levels observed in the current study are consistent with the suggestion that adolescence is a particularly relevant stage in which to study the effects of traumatic event exposure. Given concurrent and prospective evidence for direct effects of gonadal and adrenal hormones on anxiety symptoms among adolescents (Susman, Dorn, & Chrousos, 1991), the hormonally-driven biological changes of puberty may enhance anxiety-relevant vulnerability during adolescence, putting trauma-exposed youth at risk for a variety of internalizing-type problems. Anxiety sensitivity may play a key role in this process. Indeed, exploratory analyses suggested that AS disease and unsteady concerns were related to posttraumatic stress levels among relatively older youth (ages 14

through 17), but not among younger youth (i.e., ages 10 through 13 years), suggesting future research is needed to better understand how AS relates to posttraumatic stress across the course of adolescence. However, the current age-related findings should be interpreted with caution due to the relatively small number of youth between ages 10 and 13 ($n = 28$). Future prospective work in this domain could usefully test a possible moderating role of AS in terms of the trauma exposure – symptom development relation among youth in different age groups to advance our understanding of the interplay among these factors across development.

Several limitations to this study warrant consideration. First, while the current cross-sectional design provides an important “snapshot” of relations between AS and posttraumatic stress among youth, it is limited in the sense that directionality of associations cannot be inferred. Therefore, it is unclear whether AS maintains posttraumatic stress, posttraumatic stress increases AS, or the two variables exhibit bi-directional associations. Prospective work that examines youth before and after traumatic event exposure would contribute to our understanding of the temporal relations among the examined variables. Second, the current sample consisted primarily of Caucasian youth who voluntarily participated in a laboratory-based study for compensation. Thus, selection biases may be at play; future research would benefit from employing techniques that limit self-selection and increase generalizability (e.g., random sampling). Third, the current study relied exclusively on self-report to measure AS and posttraumatic stress, leaving open the possibility that shared method variance, recall biases, and memory distortions influenced the results. The use of laboratory-based strategies designed to elicit traumatic event-relevant reactivity (e.g., script-driven imagery procedures; Orr, Metzger, Miller, & Kaloupek, 2004) would allow for multi-modal evaluation (e.g., psychophysiologic reactivity) as well as “real-time” self-report of posttraumatic stress-relevant responses to traumatic event cues. Similarly, the internal consistencies of the CASI subscales were moderate, which may also have contributed to measurement error in terms of AS and its association with trauma symptoms. Replication of the current findings and continued refinement of measuring AS among youth would strengthen confidence in the current findings.

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References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington, DC: Author; 1994.
- Asmundson GJG, Carleton R. Fear of pain is elevated in adults with co-occurring trauma-related stress and social anxiety symptoms. *Cognitive Behaviour Therapy* 2005;34:248–255. [PubMed: 16319036]
- Asmundson G, Norton G, Allderdings M, Norton P, Larsen D. Posttraumatic stress disorder and work-related injury. *Journal of Anxiety Disorders* 1998;12:57–69. [PubMed: 9549609]
- Brewin C, Dalgleish T, Joseph S. A dual representation theory of posttraumatic stress disorder. *Psychological Review* 1996;103:670–686. [PubMed: 8888651]
- Brooks-Gunn J, Graber J, Paikoff R. Studying links between hormones and negative affect: Models and measures. *Journal of Research on Adolescence* 1994;4:469–486.
- Carskadon M, Harvey K, Duke P, Anders T, Litt I, Dement W. Pubertal changes in daytime sleepiness. *Sleep: Journal of Sleep and Sleep Disorders Research* 2002;25:525–605.
- Cicchetti D, Rogosch F. A developmental psychopathology perspective on adolescence. *Journal of Consulting and Clinical Psychology* 2002;70:6–20. [PubMed: 11860057]

- Copeland W, Keeler G, Angold A, Costello E. Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry* 2007;64:577–584. [PubMed: 17485609]
- Ehlers A, Clark D. A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy* 2000;38:319–345. [PubMed: 10761279]
- Fedoroff I, Taylor S, Asmundson G, Koch W. Cognitive factors in traumatic stress reactions: Predicting PTSD symptoms from anxiety sensitivity and beliefs about harmful events. *Behavioural and Cognitive Psychotherapy* 2000;28:5–15.
- Feldner M, Lewis S, Leen-Feldner E, Schnurr P, Zvolensky M. Anxiety sensitivity as a moderator of the relation between trauma exposure frequency and posttraumatic stress symptomatology. *Journal of Cognitive Psychotherapy: An International Quarterly* 2006;20:201–213.
- Feldner M, Zvolensky M, Schmidt N, Smith R. A prospective test of anxiety sensitivity as a moderator of the relation between gender and posttraumatic symptom maintenance among high anxiety sensitive young adults. *Depression and Anxiety*. in press
- Foa E, Johnson K, Feeny N, Treadwell K. The Child PTSD Symptom Scale: A preliminary examination of its psychometric properties. *Journal of Clinical Child Psychology* 2001;30:376–384. [PubMed: 11501254]
- Gregory A, Eley T. Sleep problems, anxiety and cognitive style in school-aged children. *Infant and Child Development* 2005;14:435–444.
- Hagh-Shenas H, Goodarzi M, Dehbozorgi G, Farashbandi H. Psychological consequences of the bam earthquake on professional and nonprofessional helpers. *Journal of Traumatic Stress* 2005;18:477–483. [PubMed: 16281245]
- Haynes S, Lench H. Incremental validity of new assessment measures. *Psychological Assessment* 2003;15:456–466. [PubMed: 14692842]
- Hayward, C. Gender differences at puberty. New York: Cambridge University Press; 2003.
- Hayward C, Sanborn K. Puberty and the emergence of gender differences in psychopathology. *Journal of Adolescent Health* 2002;30S:49–58. [PubMed: 11943575]
- Hayward C, Killen J, Kraemer H, Taylor C. Predictors of panic attacks in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 2000;39:207–214. [PubMed: 10673832]
- Hinton D, Pich V, Safren S, Pollack M, McNally R. Anxiety sensitivity in traumatized Cambodian refugees: A discriminant function and factor analytic investigation. *Behaviour Research and Therapy* 2005;43:1631–1643. [PubMed: 16239155]
- Joiner T, Catanzaro S, Laurent J. Tripartite structure of positive and negative affect, depression, and anxiety in child and adolescent psychiatric inpatients. *Journal of Abnormal Psychology* 1996;105:401–409. [PubMed: 8772010]
- Kilpatrick D, Ruggiero K, Acierno R, Saunders B, Resnick H, Best C. Violence and risk of PTSD, major depression, substance abuse/dependence, and comorbidity: Results from the National Survey of Adolescents. *Journal of Consulting and Clinical Psychology* 2003;71:692–700. [PubMed: 12924674]
- Lang A, Kennedy C, Stein M. Anxiety sensitivity and PTSD among female victims of intimate partner violence. *Depression and Anxiety* 2002;16:77–83. [PubMed: 12219339]
- Leen-Feldner E, Feldner M, Bernstein A, McCormick J, Zvolensky M. Anxiety sensitivity and anxious responding to bodily sensations: A test among adolescents using a voluntary hyperventilation challenge. *Cognitive Therapy and Research* 2005;29:593–609.
- Leen-Feldner, E.; Reardon, L.; Hayward, C.; Smith, R. The relation between puberty and adolescent anxiety: Theory and evidence. In: Zvolensky, M.; Smits, J., editors. *Health Behaviors and Physical Illness in Anxiety and its Disorders: Contemporary Theory and Research*. Springer Publishing; in press
- Leen-Feldner E, Zvolensky M, van Lent J, Vujanovic A, Bleau T, Bernstein A, Bielawski-Branch A, Feldner M. Anxiety sensitivity moderates tobacco smoking in regard to panic attack symptoms and bodily complaints: A concurrent test among adolescents. *Journal of Psychopathology and Behavioral Assessment* 2007;29:69–79.
- Nixon R, Bryant R. Are negative cognitions associated with severe acute trauma responses? *Behaviour Change* 2005;22:22–28.

- Orr, S.; Metzger, L.; Miller, M.; Kaloupek, D. Psychophysiological Assessment of PTSD. In: Wilson, J.; Keane, T., editors. *Assessing psychological trauma and PTSD*. 2. New York: Guilford; 2004. p. 289-343.
- Petersen, RA.; Reiss, S. *Anxiety Sensitivity Index Manual*. Palos Heights, IL: International Diagnostics Systems, Inc; 1987.
- Pine D, Cohen J. Trauma in children and adolescents: Risk and treatment of psychiatric sequelae. *Biological Psychiatry* 2002;51:519–531. [PubMed: 11950454]
- Reiss, S.; McNally, R. Expectancy model of fear. In: Reiss, S.; Bootzin, R., editors. *Theoretical issues in behavior therapy*. San Diego, CA: Academic Press; 1985. p. 107-121.
- Reiss S, Peterson R, Gursky M, McNally R. Anxiety, sensitivity, anxiety frequency, and the prediction of fearfulness. *Behaviour Research and Therapy* 1986;24:1–8. [PubMed: 3947307]
- Salmon K, Bryant R. Posttraumatic stress disorder in children: The influence of developmental factors. *Clinical Psychology Review* 2002;22:163–188. [PubMed: 11806018]
- Silverman, W.; Albano, A. *The Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions*. San Antonio, TX: Psychological Corporation; 1996.
- Silverman W, Fleisig W, Rabian B, Peterson R. Child Anxiety Sensitivity Index. *Journal of Clinical Child Psychology* 1991;20:162–168.
- Silverman W, Goedhart A, Barrett P, Turner C. The facets of anxiety sensitivity represented in the Childhood Anxiety Sensitivity Index: Confirmatory analyses of factor models from past studies. *Journal of Abnormal Psychology* 2003;112:364–374. [PubMed: 12943015]
- Susman E, Dorn L, Chrousos G. Negative affect and hormone levels in young adolescents: Concurrent and predictive perspectives. *Journal of Youth and Adolescence* 1991;20:167–190.
- Taylor S. Anxiety sensitivity and its implications for understanding and treating PTSD. *Journal of Cognitive Psychotherapy: An International Quarterly* 2003;17:179–186.
- Taylor S, Koch W, McNally R. How does anxiety sensitivity vary across the anxiety disorders? *Journal of Anxiety Disorders* 1992;6:249–259.
- van der Kolk B. Developmental Trauma Disorder: Toward a rational diagnosis for children with complex trauma histories. *Psychiatric Annals* 2005;35:401–408.
- Weems C, Hammond-Laurence K, Silverman W, Ferguson C. The relation between anxiety sensitivity and depression in children and adolescents referred for anxiety. *Behavior Research and Therapy* 1997;35:961–966.
- Weems C, Pina A, Costa N, Watts S, Taylor L, Cannon M. Predisaster trait anxiety and negative affect predict posttraumatic stress in youths after hurricane Katrina. *Journal of Consulting and Clinical Psychology* 2007;75:154–159. [PubMed: 17295574]
- Wilson K, Hayward C. Unique contributions of anxiety sensitivity to avoidance: A prospective study in adolescents. *Behaviour Research and Therapy* 2006;44:601–609. [PubMed: 16023074]
- Zatzick D, Grossman D, Russo J, Pynoos R, Berliner L, Jurkovich G, Sabin J, Katon W, Ghesquiere A, McCauley E, Rivara F. Predicting posttraumatic stress symptoms longitudinally in a representative sample of hospitalized injured adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 2006;45:1188–1195. [PubMed: 17003664]
- Zinbarg R, Barlow D, Brown T. Hierarchical structure and general factor saturation of the Anxiety Sensitivity Index: Evidence and implications. *Psychological Assessment* 1997;9:277–284.

Table 1
Descriptive Data and Zero-Order Relations between Predictor and Criterion Variables

	mean (SD)	1	2	3	4	5	6	7	8	9
1. Time since Trauma (months)	37.15 (39.22)	-	-.04	-.01	-.13	-.09	-.02	-.22	.03	-.27*
2. Negative Affectivity (PANAS-C)	28.47 (11.50)		-	-.03	.52**	.46**	.32**	.32**	.13	.25*
3. Age (years)	14.74 (2.49)			-	.05	-.01	.00	.00	.24*	.25*
4. CASI- Total Score	28.20 (5.88)				-	.84**	.80**	.63**	.46**	.58**
5. AS – DC	5.55 (1.66)					-	.65**	.58**	.28*	.52**
6. AS – UC	5.25 (1.83)						-	.36**	.13	.38**
7. AS – MI	3.72 (1.09)							-	.15	.68**
8. AS – SC	6.41 (1.53)								-	.19
9. Posttraumatic Stress Symptoms	4.10 (6.48)									-

Note. $n = 68$;

* $p < .05$.

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$p < .01$; Time since trauma reported during ADIS-C; PANAS-C: Positive and Negative Affect Scale (Joiner et al., 1996); CASI = Childhood Anxiety Sensitivity Index (Silverman et al., 1991); AS-DC = Anxiety Sensitivity – Disease Concerns; AS-UC = Anxiety Sensitivity – Unsteady Concerns; AS-MI = Anxiety Sensitivity – Mental Incapacitation Concerns; AS-SC = Anxiety Sensitivity – Social Concerns; Posttraumatic Stress Symptoms were indexed using the CPSS (Foa et al., 2001).

Table 2
Individual Variable Contributions Predicting Posttraumatic Stress Symptom Level

	ΔR^2	CASI Total Score β	sr^2	ΔR^2	Disease Concerns β	sr^2	ΔR^2	Unsteady Concerns β	sr^2
Step 1	.20**			.20**			.20**		
Time since Trauma		-.25*	.05		-.25*	.05		-.25	.05
Negative Affect		.25*	.05		.25*	.05		.25*	.05
Gender		.03	.00		.03	.00		.03	.01
Age		.26*	.06		.26*	.06		.26*	.06
Step 2	.22**			.18**			.09**		
Time since Trauma		-.20*	.03		-.22*	.04		-.27*	.06
Negative Affect		-.03	.00		.02	.00		.15	.01
Gender		-.00	.00		.02	.00		-.04	.00
Age		.21*	.04		.26**	.06		.24*	.05
AS		.56**	.22		.49**	.18		.33*	.09
					Social Concerns β	sr^2			
Step 1	ΔR^2 .20**		sr^2	ΔR^2 .20*					
Time since Trauma		-.25*	.05		-.25	.05			
Negative Affect		.25*	.05		.25*	.05			
Gender		.03	.00		.03	.00			
Age		.26*	.06		.26*	.06			
Step 2	.34**			.01					
Time since Trauma		-.14	.00		-.25*	.06			
Negative Affect		.06	.00		.22	.04			
Gender		-.04	.00		.06	.00			
Age		.24**	.05		.23*	.04			
AS		.63**	.33		.12	.01			

Note. $n = 68$; β = standardized beta weight; AS = anxiety sensitivity; Time since trauma reported during ADIS-C; Posttraumatic Stress Symptoms were indexed using the CPSS (Foa et al., 2001).