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Understanding the role of dysfunctional post-trauma cognitions in the co-occurrence of Posttraumatic Stress Disorder and Generalized Anxiety Disorder: Two trauma samples☆

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ABSTRACT

This report focuses on the co-occurrence of PTSD-GAD and examines a factor that could operate to maintain both conditions, specifically negative post-trauma cognitions about the self, the world, and self-blame. Two separate help-seeking samples were examined: (a) a mixed gender sample of 301 individuals who had experienced a serious motor vehicle accident (MVA), a single incident, non-interpersonal trauma; and (b) a sample of 157 women who had experienced intimate partner violence (IPV), a recurrent, interpersonal trauma. When examined at the diagnostic level, posttraumatic cognitions for one diagnosis did not vary as a function of whether the other diagnosis was present. In the MVA sample, both diagnosed PTSD and GAD were associated with elevations in negative thoughts about the self. Diagnosed GAD was also significantly associated with negative thoughts about the world. In the IPV sample, diagnosed PTSD was associated with elevations in negative thoughts about the self only. When continuously measured PTSD and GAD were examined, results indicated that negative thoughts about the self showed significant simultaneous associations with PTSD and GAD in both samples. In the MVA sample, negative thoughts about the world and self-blame showed significant associations with PTSD but not with GAD. In the IPV sample, negative thoughts about the world and self-blame were not significantly associated with either PTSD or GAD. Results are discussed in light of current treatment models for these conditions, with emphasis on the potential for addressing transdiagnostic processes as a more effective approach to treating comorbid conditions following trauma.

Considerable research in the past two decades has documented that the experience of a traumatic event can lead to significant emotional problems, particularly Posttraumatic Stress Disorder (PTSD; e.g., Breslau, 2012). Recently revised, symptoms of PTSD involve hallmark symptom clusters including re-experiencing the trauma, avoidance of trauma-related stimuli, heightened physiological arousal and reactivity, and negative alterations in thoughts and mood (American Psychiatric Association [APA], 2013). Across a range of authors, there is consensus that PTSD represents a chronic disorder often accompanied by other psychiatric conditions (e.g., Ball & Stein, 2012; Kessler et al., 2005). The epidemiological literature notes that major depressive disorder (MDD), substance use disorders (SUDs), and Generalized Anxiety Disorder (GAD) are among the most common co-occurring disorders observed in patients with PTSD (Kessler et al., 2005). To date, most research on conditions that are comorbid with PTSD has focused on MDD (e.g., Breslau, Davis, Peterson, & Schultz, 2000; Franklin & Zimmerman, 2001) and SUDs (e.g., Ouimette & Brown, 2003; Stewart & Conrod, 2008), with relative neglect to GAD. The current study focuses on the co-occurrence of PTSD-GAD and examines one possible factor that could operate to maintain both conditions, specifically negative post-trauma cognitions about the self, the world, and self-blame. Two separate trauma-exposed samples were examined, permitting consideration of these associations among individuals exposed to non-interpersonal and interpersonal traumas.

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GAD is characterized by excessive, uncontrolled worry, which is accompanied by symptoms such as restlessness, fatigue, sleep and concentration difficulties (APA, 2000; APA, 2013). GAD diagnostically shares several symptoms with PTSD such as difficulty sleeping and concentrating, although a recent factor analytic study indicated a clear differentiation between the two disorders (Grant, Beck, Marques, Palyo, & Clapp, 2008). Individuals who have been diagnosed with PTSD are two to six times more likely to also be diagnosed with GAD, relative to individuals who do not carry a PTSD diagnosis (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Rates of comorbid GAD in civilian samples with diagnosed PTSD have ranged from 7.5% (Breslau, Davis, Andreski, & Peterson, 1991) to almost 76% (Shore, Vollmer, & Tatum, 1989). The obtained rates appear to depend on choice of measurement, as well as sample type (Zayfert, Becker, Unger, & Shearer, 2002). In particular, reliance on a structured diagnostic interview that minimizes clinician input may lead to inflated rates of comorbidity (Keane & Wolfe, 1990). Obtained rates of co-morbidity may also hinge on whether a community or a patient sample is examined (Zayfert et al., 2002). Moreover, as the severity of PTSD symptoms increases, so does the association with a number of co-morbid anxiety and depressive disorders (Zayfert et al., 2002).

When considering the association between GAD and PTSD, various models have evolved. One conceptual approach is to focus on shared environmental events and examine factors that may arise from these occurrences (e.g., Breslau, 2012). In the case of comorbidity between PTSD and GAD, the shared environmental feature is exposure to a traumatic event. One factor that can arise from trauma exposure is negative post-trauma cognitions about the self, the world, and self-blame. In particular, considerable research documents that cognitions about one's incompetence and inadequacy (negative thoughts about the self), the dangerousness and unpredictability of the world (negative thoughts about the world), and self-blame are common in the aftermath of a traumatic event (e.g., Beck, Jacobs-Lentz, McNiff, Olsen, & Clapp, 2014). At present, there is some support to suggest that these negative cognitions could serve as a common factor contributing to both PTSD and GAD following exposure to a trauma. If supported, this hypothesis could open up new avenues for understanding comorbidity of these two conditions. As well, this approach has notable implications for treating individuals with comorbid PTSD and GAD, specifically focusing interventions on processes that are common to both disorders.

There is theoretical and empirical support for the hypothesis that negative post-trauma cognitions may link comorbid PTSD and GAD. Current models of PTSD have highlighted negative, trauma-related thoughts for their role in the etiology and maintenance of the disorder. For example, Ehlers and Clark (2000) model of PTSD emphasizes the salient role of negative appraisals of the traumatic event, as well as one's reactions during the event, in creating and maintaining perceptions of threat and anxiety. Similarly, Foa and colleagues (Foa & Riggs, 1993; Foa & Rothbaum, 1998) have theorized that thoughts about the dangerousness of the world, one's own incompetence, and self-blame mediate the development of PTSD following sexual assault. Studies in this arena have involved both adult survivors of assault and motor vehicle accidents (MVAs; e.g., Ehring, Ehlers, & Glucksman, 2008), illustrating that negative post-trauma thoughts are not unique to one type of extreme event. For example, negative beliefs about the self and the world reported shortly after trauma exposure have been shown to significantly correlate with PTSD severity assessed six to twelve months later (Ehlers & Clark, 2006), even when controlling statistically for other risk factors (Dunmore, Clark, & Ehlers, 2001). Ehring et al. (2008) demonstrated that negative thoughts about the self (assessed immediately following a traumatic MVA) specifically predicted PTSD six months later, but did not predict subsequent depression or driving phobia. Overall, the literature has highlighted the prominent role that negative thoughts about one's perceived weaknesses, blame of the self, and the dangerousness of the world play in PTSD (Beck, Jacobs-Lentz, et al., 2014).

In juxtaposition to the literature on PTSD, current work on GAD has focused on the function of worry, rather than thought content per se. For example, Borkovec and colleagues have speculated that worry might function as a cognitive strategy that facilitates avoidance of more emotional topics, such as the occurrence of sexual assault or a recent death (Borkovec, Alcaine, & Behar, 2004). Although worry is associated with unpleasant feelings, these more emotional topics presumably evoke stronger levels of negative affect, relative to everyday worry. As such, worry conceivably represents a cognitive avoidance strategy, wherein the individual with GAD is focused on worry about less emotional issues (e.g., minor repairs to one's car, being late), instead of more upsetting issues. Given discussion within the literature about the nature and function of worry, it is tempting to ask whether traumatic experiences might represent a "more emotional" topic among some worriers (Borkovec et al., 2004), particularly as trauma often produces negative thoughts about one's own incompetence, the dangerousness of the world, and self-blame. Indeed, some evidence exists in samples of GAD patients to suggest that a diagnosis of GAD is associated with greater trauma exposure, relative to individuals without GAD (Borkovec et al., 2004). Earlier literature on GAD emphasized the important role of excessive perceptions of the world as a dangerous place and the self as incapable (e.g., Beck, Emery, & Greenberg, 1985; MacLeod & Rutherford, 2004). In the current study, we test the hypothesis that negative thoughts about the self and the world, as well as self-blame, represent a psychological process that is associated with the co-occurrence of GAD and PTSD in trauma survivors.

The current study examines this issue in two separate samples of trauma survivors, specifically individuals who had experienced a serious MVA, a non-interpersonal trauma, and women who had experienced intimate partner violence (IPV), a form of interpersonal trauma. MVAs are among the leading cause of PTSD in the general population (Norris, 1992). Blanchard and Hickling (2004) report that approximately 39% of help-seeking MVA samples meet diagnostic criteria for PTSD; among these patients, the rate of co-occurring GAD was at 26%. IPV also is an unfortunately common-occurring trauma, with estimates suggesting that 22%–29% of women in the United States experience IPV at some point during their lives (Tjaden & Thoennes, 2000; Zlotnik, Johnson, & Kohn, 2006). IPV involves physical, sexual, and emotional abuse that is perpetrated by a romantic partner (Tjaden & Thoennes, 2000). Exposure to IPV is associated with significant mental health problems including both PTSD and GAD (Golding, 1999). For example, Mechanic, Weaver, and Resick (2008) reported moderate (45%) to severe (31%) PTSD symptomatology among IPV survivors using cut points on a self-report questionnaire. In another study, Tolman and Rosen (2001) noted that 9.2%–13.4% of female IPV survivors were diagnosed with GAD in a sample of welfare recipients. Furthermore, 17.6%–38.4% of this sample had diagnosable PTSD, although no information about comorbidity is provided. When considering co-morbidity, one preliminary report indicates that 76.3% of female IPV survivors with a mental health diagnosis received at least one additional diagnosis (Beck, Clapp et al., 2014). As such, PTSD and GAD have been noted in the aftermath of both types of trauma.

In this paper, associations between negative post-trauma cognitions, PTSD, and GAD were examined in two separate fashions. First, in order to examine the separate and interactive effects of PTSD and GAD on these cognitions, distinct diagnostic groups (PTSD +/−, GAD+/-) were formed and compared on severity of

each type of trauma-related cognition. We hypothesized that individuals diagnosed with PTSD alone would show higher levels of negative post-trauma cognitions about the self, the world, and self-blame, relative to individuals with GAD alone and individuals with co-morbid PTSD and GAD. This hypothesis was grounded in theoretical speculations that GAD might facilitate cognitive avoidance, particularly following trauma (Borkovec et al., 2004). The three diagnosis groups (PTSD+, GAD+, and PTSD+/GAD+) were expected to report higher levels of negative cognitions, relative to the no diagnosis group (PTSD-/GAD-). Second, path analyses were conducted to explore simultaneous relationships between the three forms of negative post-trauma cognitions and continuous ratings of PTSD and GAD symptoms. These analyses allowed consideration of PTSD and GAD symptoms together and expands our understanding of how cognitive factors might impact not just disorders at a clinical level, but across the full range of symptomatology. The pattern of hypothesized results was slightly different for this set of analyses. We predicted that negative thoughts about the self would be associated with both PTSD and GAD, in light of the findings of Ehring et al. (2008). Because no previous studies have examined concurrent associations between PTSD and any other disorder with negative thoughts about the world and self-blame, hypotheses were considered exploratory owing to lack of research. However, theory would predict similar associations for negative thoughts about the world and self-blame as hypothesized for negative thoughts about the self.

As noted, two separate groups of trauma survivors were examined, individuals who had experienced a traumatic MVA and women who had experienced IPV. Although some authors have postulated that survivors of interpersonal trauma are more likely to have psychological impairments, relative to survivors of single-incident, non-interpersonal trauma (e.g., Ford, 2005; Herman, 1992; van der Kolk, Roth, Percovitz, Sunday, & Spinazzola, 2005), there is little research on this issue at present. Three months following traumatic injury, Forbes et al. (2012) noted higher levels of PTSD symptoms in interpersonal trauma survivors relative to individuals who experienced non-interpersonal trauma, which decreased in magnitude by 24 months post-trauma. In contrast, Read, Griffin, Wardell, and Ouimette (2014) failed to observe a moderation effect of trauma type (interpersonal versus non-interpersonal) on the association between coping, PTSD, and alcohol use in college students. As such, analyses were conducted separately for these two patient groups, in an effort to expand available data comparing interpersonal and non-interpersonal trauma survivors.

1. Method

1.1. Participants

The two samples consisted of individuals who sought mental health assistance from two research clinics. The first sample included MVA survivors who were seen at a research clinic in the northeastern region of the United States from 2000 to 2008. The second sample included IPV survivors who were seen at a research clinic in the southern region of the United States from 2008 to 2013. Both clinics provided assessment for psychopathology following an index trauma. For both samples, exclusion criteria included the presence of psychotic symptoms, active suicidal ideation and intent, cognitive impairment as assessed by mental status testing, medical conditions that prevented clear determination of psychiatric conditions, and inconsistency in reporting. Inclusion criteria included being at least 18 years old and satisfying DSM-IV Criterion A of the diagnostic criteria for PTSD (i.e., threatened death or physical injury [A1] and feelings of intense fear, helplessness, and horror [A2]; APA, 2000).[2] Criterion A was assessed using a semi-structured interview (see below). Following assessment, individuals in both samples were offered cognitive-behavioral treatment for PTSD, if they satisfied criteria for treatment.

1.1.1. MVA sample

The study sample included 301 individuals (82 men, 219 women) who had experienced a severe MVA. Potential participants were recruited from pain clinics, physical therapists, chiropractors, and specialists in rehabilitation and internal medicine. Individuals interested in services were screened by phone by the first author. All participants in this sample had experienced a serious MVA with an average elapsed time since the accident of 2 years, 11 months (SD = 5 years 10 months). Thirty-three additional individuals were excluded from the sample due to psychotic symptoms (n = 9), suicidality (n = 1), evidence of cognitive impairment (n = 20), an advanced medical condition (n = 1), or inconsistent reporting (n = 2). Five additional individuals were excluded because they did not satisfy DSM-IV Criterion A of the diagnostic criteria for PTSD. Participants ranged in age from 18 to 79 (M = 43.54, SD = 12.41).

1.1.2. IPV sample

The study sample included 157 women who had experienced IPV. Potential participants were recruited from advocacy centers, churches, college campuses, and wellness fairs. Women interested in services were screened by phone by the first author. Thirty-five women (22.3%) were still romantically involved and/or living with their most recent abuser at the time of assessment.[3] The remaining 122 (77.7%) women had been living separately from their abusive romantic partner for an average of 3 years 10 months (SD = 7 years 2 months). Twenty-two participants were excluded from the sample due to psychotic symptoms (n = 10), evidence of cognitive impairment (n = 9), or inconsistent reporting (n = 3). An additional 20 women were excluded because they did not satisfy DSM-IV Criterion A of the diagnostic criteria for PTSD. Participants ranged in age from 18 to 75 (M = 36.81, SD = 12.34).

1.2. Measures

1.2.1. Trauma exposure

Exposure to the index trauma was assessed using the MVA interview and the Domestic Violence interview, respectively. Both of these semi-structured interviews were modeled after a similar interview developed by Blanchard and Hickling (2004). The MVA interview included questions about the specifics of each individual's accident, including when the accident occurred, what happened, and the severity of injury sustained. The Domestic Violence interview assessed exposure to physical, sexual, and emotional abuse from a romantic partner or partners, including the nature and frequency of violent and abusive acts, dates of the abusive relationship(s), and the severity of injuries sustained. Both interviews were used to determine if these life events satisfied Criterion A of the diagnostic criteria for PTSD (APA, 2000). Responses associated with feelings of fear, helplessness, and horror were assessed using a Likert scale from 0 to 100, where 0 = *not at all* and 100 = *extreme*. Similar to related studies (e.g., Beck et al., 2004), a score of 50 or higher on one of these questions was used to determine if the participant's trauma experience qualified for Criterion A.

[2] In this report, DSM-IV criteria were used to define and diagnose both PTSD and GAD, owing to the time frame when data were collected.

[3] In this situation, women were helped to formulate a safety plan if, in the interviewer's perspective, her personal safety potentially was at risk.

1.2.2. Posttraumatic Stress Disorder (PTSD)

The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1990) was used to assess PTSD symptomatology, using the DSM-IV criteria. The frequency and intensity of the 17 symptoms of PTSD were rated by a trained interviewer using a 5-point Likert scale ranging from 0 (*the symptom does not occur or does not cause distress)* to 4 (*the symptom occurs every day or causes extreme distress*). The CAPS is widely considered the gold standard for assessing PTSD and has been shown to have excellent reliability (α's ranging from .73 to .98) and validity (Weathers, Keane, & Davidson, 2001). A total CAPS score was calculated by summing the frequency and intensity ratings of each symptom of PTSD. As well, symptoms receiving a frequency rating of at least 1 and an intensity rating of 2 or higher were counted toward a diagnosis of PTSD, using DSM-IV criteria for the disorder (Blanchard et al., 1996). The CAPS was anchored to participant's MVA or IPV experiences, depending on sample membership. Participants also were asked to complete the Life Events Checklist (LEC; Gray, Litz, Hsu, & Lombardo, 2004) to screen for other potentially traumatic events. If participants endorsed other extreme events besides their index trauma, the interviewer probed for symptoms relevant to other traumas to link temporal sequencing of symptoms with specific events. Symptoms linked with other extreme events were not included in the final CAPS Total score for PTSD pertaining to the index trauma.

1.2.3. Generalized Anxiety Disorder (GAD)

GAD was assessed using the Anxiety Disorders Interview Schedule – IV (ADIS-IV, DiNardo, Brown, & Barlow, 1994). The ADIS-IV is a semi-structured interview designed to assess anxiety, mood, somatoform, and substance use disorders and has been shown to yield valid and reliable diagnoses (Brown, DiNardo, Lehman, & Campbell, 2001). The GAD section assesses specific features of the disorder, as well as individual symptoms. GAD was only diagnosed if the content of the participant's worries did not focus on the index trauma itself. Based on this information, the interviewer rated the degree of interference and distress caused by worry and associated GAD symptoms. The overall severity of GAD was indexed by a clinical severity rating (CSR), which ranges from 0 = *none/not disabling* to 8 = *very severely disturbing/disabling*. A CSR of 4 or higher indicates that GAD symptoms met the DSM-IV diagnostic threshold for a clinical diagnosis (Brown et al., 2001).

1.2.4. Other diagnoses

Other diagnoses were assessed using the CAPS for additional index traumas (e.g., childhood sexual abuse; Blake et al., 1990) and the ADIS-IV for additional anxiety, mood, somatoform, and substance use disorders (e.g., DiNardo et al., 1994). The severity of each additional condition was indexed using a CSR, which ranged from 0 = *none/not disabling* to 8 = *very severely disturbing/disabling*. A CSR of 4 or higher indicated that symptoms met the DSM-IV threshold for a clinical diagnosis. The number of additional conditions that met diagnostic threshold were summed (total other diagnoses), which was used as a control variable in the analyses.

1.2.5. Differential diagnosis

The CAPS and ADIS-IV were administered by trained graduate and Ph.D.-level interviewers. Given symptom overlap between PTSD and GAD, considerable training was provided to interviewers concerning differential diagnosis. Consistent with general use of CAPS and ADIS-IV administration, probes were used to determine whether specific symptoms occurred in the context of a specific disorder. Symptoms were coded within a specific disorder only when they occurred during the course of that disorder. If a symptom occurred during the course of two disorders, symptom severity was split between the two disorders. As well, all interviews were recorded. A sample of 97 MVA (32%) and 50 IPV (32%) interviews were selected at random and reviewed by an independent clinician for inter-diagnostician agreement, computed using intraclass correlation coefficients (ICC). ICC for the CAPS Total score was .99 for the MVA sample and .95 for the IPV sample. The ICC for the GAD clinical severity rating was .97 for the MVA sample and .92 for the IPV sample.

1.2.6. Negative trauma-related cognitions

Negative trauma-related cognitions were measured using the Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). This 36-item self-report measure contains three sub-scales: negative thoughts about the self (e.g., "I am a weak person", "If I think about the trauma, I will not be able to handle it"), negative thoughts about the world (e.g., "People cannot be trusted", "The world is a dangerous place"), and self-blame (e.g., "The event happened because of the way I acted", "There is something about me that made the event happen"). The PTCI uses a response scale that ranges from *totally disagree* (1) to *totally agree* (7). Responses were anchored to participant's MVA or IPV experiences, depending on index trauma. High convergent validity with other scales that measure trauma-related cognitions has been noted (e.g., Foa et al., 1999; van Emmerik, Schoorl, Emmelkamp, & Kamphuis, 2006). In previous work, internal consistency was excellent for each subscale with alphas ranging from .86 to .97 (Foa et al., 1999). Analysis with the current sample indicated good inter-item reliability for both MVA and IPV samples for all three subscales: negative thoughts about the self (MVA: $\alpha = .95$; IPV: $\alpha = .93$), negative thoughts about the world (MVA: $\alpha = .85$; IPV: $\alpha = .87$), and self-blame (MVA: $\alpha = .77$; IPV: $\alpha = .80$).

1.3. Procedure

Procedures were approved by the Institutional Review Boards at the two separate institutions where data were collected. Following provision of informed consent, each participant was interviewed, first with the MVA or Domestic Violence interview to assess trauma characteristics, followed by the CAPS for the index trauma and the ADIS-IV for the assessment of GAD and other anxiety, mood, and somatoform disorders. The participant then completed a battery of measures which included the PTCI. Following the assessment, participants were given feedback concerning the results of the diagnostic interviews, debriefed, and provided with referrals for additional services when appropriate.

1.4. Data analytic approach

1.4.1. Data screening and preparation

Prior to analysis, recommendations of Tabachnick and Fidell (2007) were used to determine if assumptions were met for univariate and multivariate analyses. All variables were screened by inspecting the range (minimum and maximum values), means, standard deviations, skewness, and kurtosis. With the exception of the self-blame subscale of the PTCI in the MVA sample, all variables were within normal limits (see Table 2). The self-blame scale in the MVA sample was transformed to meet normality assumptions for the first set of analyses. For the second set of analyses, the moderate skew of the self-blame subscale (MVA sample only) was accounted for via reliance on nonparametric bootstrapping. In the MVA sample there were six univariate outliers (Z-score > 3.29) for the PTCI self-blame subscale and one multivariate outlier (Mahalanobis distance $p < .001$; Tabachnick & Fidell, 2007); these data were deleted. No univariate or multivariate outliers were noted for the IPV sample. Examination of correlations among variables did not reveal any correlations greater than .90, a Durbin Watson greater

Table 1
Description of the two samples.

	Sample 1: MVA $n = 301$		Sample 2: IPV $n = 157$	
Age (in years; mean, SD)	43.54	(12.41)	36.81	(12.34)
	n	%	*n*	%
Race				
Caucasian	242	80.3	86	54.8
African American	44	14.6	53	33.8
Hispanic	7	2.3	3	1.9
Asian	2	.7	3	1.9
Other or no answer	6	2.0	12	7.6
Educational background				
Elementary school	1	.3	3	1.9
High school	52	17.3	16	10.2
Attended or completed college	202	67.1	102	65.0
Attended or completed graduate training	46	15.3	36	22.9
Reported annual household income				
Below $10,000	38	12.6	33	21.0
$10,000 to $20,000	49	16.3	38	24.2
$20,000 to $30,000	47	15.6	19	12.1
$30,000 to $50,000	74	24.6	25	15.9
Over $50,000	74	24.6	30	19.1
Declined to respond	19	6.3	12	7.6
Employment Status				
Full-Time	89	29.6	46	29.3
Part-Time	58	19.3	50	31.8
Unemployed	62	20.6	39	24.8
Disabled	68	22.6	12	7.6
Homemaker	20	6.6	6	3.8
Retired	1	.3	3	1.9
Declined to Respond	3	1.0	1	.6

Note: MVA = Motor Vehicle Accident; IPV = Intimate Partner Violence.

than 4, or other problems associated with multicollinearity and/or homoscedasticity.

1.4.2. Analytic strategy

In order to examine the separate and interactive effects of PTSD and GAD on the three forms of dysfunctional cognitions, distinct groups were formed based on diagnostic status (PTSD +/−, GAD+/-) and compared for severity on each type of trauma-related cognition, using a 2 x 2 MANCOVA conducted using GLM. In these analyses, the number of additional diagnosable disorders noted on the CAPS and ADIS-IV was controlled, to assure that the obtained results did not reflect additional comorbidity. In the event of a significant overall model, parameter estimates were computed for each dependent variable. Effect sizes (partial eta squared) were computed and interpreted using Kirk's (1996) metric wherein an effect of .01 is considered small, .06 is considered medium, and .14 is considered large. The first MANCOVA examined the separate and interactive effects of PTSD and GAD diagnoses in the MVA survivors. This analysis was then repeated with the IPV sample.

In order to explore simultaneous relationships between the three forms of negative post-trauma cognitions and continuous ratings of PTSD and GAD symptoms, path analyses using structural equation modeling (SEM) were conducted using Muthén and Muthén (2012) MPlus software. Continuous ratings of PTSD (CAPS-Total score) and GAD (CSR) were used in these analyses; the path models were just-identified and perfectly reproduced the observed covariance matrix (Kline, 2011). Nonparametric bootstrapping was used to generate 2000 samples, via resampling. Pathways were examined using path coefficients, with individual paths reflected by the standardized coefficient. Coefficients within the ranges of .10, .30, and .50 are consistent with small, medium, and large effect sizes respectively (Kline, 2011). The first path model examined the association between negative cognitions about the self, world and self-blame on PTSD and GAD in MVA survivors. The second path model examined the association between negative cognitions about the self, world, and self-blame on PTSD and GAD in IPV survivors. In both models, the number of additional clinical disorders was controlled.

2. Results

2.1. Description of the samples

As noted in Table 1, the MVA sample was significantly older [$t(456) = 6.61$, $p < .001$], had a larger percentage of Caucasian participants [computed as Caucasian v. other races, χ^2 (1, $N = 457$) = 32.39, $p < .001$], had a significantly higher income [computed as > $30,000 v. under $30,000, χ^2 (1, $N = 428$) = 7.55, $p = .01$], and was more likely to be on disability than unemployed [computed as employed v. unemployed v disability, χ^2 (2, $N = 454$) = 17.11, $p < .001$] relative to the IPV sample. The samples did not differ on education level.

2.1.1. Comparison of the MVA and IPV samples on study variables

Intercorrelation of study variables are shown in Table 2, separated by sample. A similar pattern of correlations was noted in the two samples, with the exception of the association between CAPS Total and PTCI Self Blame, where a significant association was noted in the IPV sample but not in the MVA sample.

Comparison of the two samples on study variables indicated a number of significant differences. IPV survivors reported significantly higher scores on the PTCI subscales reflecting negative

Table 2
Zero order correlations, means and standard deviations of all variables for both samples.

	1.	2.	3.	4.	Mean	SD
Sample 1: MVA Sample ($n = 301$)						
1. PTCI Negative Thoughts of Self	–				2.97	1.33
2. PTCI Negative Thoughts of World	.58***	–			4.33	1.36
3. PTCI Self-blame	.37***	.25***	–		1.85	1.08
4. CAPS- Total	.43***	.35***	.03	–	46.21	23.13
5. GAD- ADIS-IV	.37***	.23***	.05	.21***	2.69	2.09
Sample 2: IPV Sample ($n = 157$)						
1. PTCI Negative Thoughts of Self	–				3.22	1.27
2. PTCI Negative Thoughts of World	.61***	–			4.78	1.39
3. PTCI Self-blame	.60***	.45***	–		3.70	1.59
4. CAPS- Total	.41***	.31***	.25**	–	29.90	21.83
5. GAD- ADIS-IV	.32***	.16*	.14	.16*	3.27	2.29

Notes. IPV = Intimate Partner Violence, MVA = motor vehicle accident, PTCI = Posttraumatic Cognitions Inventory, CAPS-Total = Clinician Administered PTSD Scale – Total score, GAD- ADIS-IV = Generalized Anxiety Disorder – Anxiety Disorders Interview Schedule for DSM-IV. **$p < .05$, **$p < .01$, ***$p < .001$.

Table 3
Univariate parameters (F, significance, and effect size) predicting dysfunctional trauma-related cognitions (Posttraumatic Cognitions Inventory) from PTSD and GAD.

	PTSD			GAD		
	F	*p*	Partial eta^2	F	*p*	Partial eta^2
Sample 1: MVA sample (*n* = 301)						
Negative thoughts about the self	11.67	.002	.04	22.81	.0001	.07
Negative thoughts about the world		n.s.		7.35	.007	.03
Self-blame		n.s.			n.s.	
Sample 2: IPV sample (*n* = 157)						
Negative thoughts about the self	7.64	.006	.05		n.s.	
Negative thoughts about the world		n.s.			n.s.	
Self-blame		n.s.			n.s.	

Notes: IPV = Intimate Partner Violence, MVA = motor vehicle accident.

thoughts about the self [$t(455) = -2.00$, $p = .05$], world [$t(456) = -3.44$, $p = .001$], and self-blame [$t(450) = -1.84$, $p < .001$], relative to the MVA sample. As well, the IPV sample had higher GAD ADIS-IV severity scores, [$t(456) = -2.82$, $p = .01$], relative to the MVA sample. MVA survivors reported significantly higher CAPS Total scores, [$t(455) = 7.40$, $p < .001$], relative to the IPV sample (see Table 2).

2.1.2. Occurrence of PTSD and GAD in the samples

In the MVA sample, 166 (55.1%) participants met criteria for MVA-related PTSD on the CAPS. One-hundred thirteen (37.5%) of the participants met criteria for GAD on the ADIS-IV. Seventy-six (25.2%) met full criteria for both PTSD and GAD. The average severity level of PTSD symptoms in this sample was $M = 46.21$ ($SD = 23.13$) which could be considered moderate. The average severity level of GAD symptoms in this sample was $M = 2.69$ ($SD = 2.09$), which also could be considered moderate. The correlation between the CAPS Total score and the CSR for GAD was $r = .21$, $p < .001$. The MVA sample had a mean of 1.65 additional diagnoses ($SD = 1.37$).

In the IPV sample, 42 (26.8%) participants met criteria for current IPV-related PTSD on the CAPS. Eighty-eight (56.1%) of the participants met criteria for GAD on the ADIS-IV. Twenty-nine (18.5%) met full criteria for both PTSD and GAD. The average severity level of PTSD symptoms in this sample was $M = 29.90$ ($SD = 21.83$), which could be considered mild and the average severity level of GAD symptoms was $M = 3.27$ ($SD = 2.29$), which could be considered moderate. The correlation between the CAPS Total score and the CSR for GAD was $r = .16$, $p = .05$. The IPV sample had a mean of 1.62 additional diagnoses ($SD = 1.57$).

2.2. Examining the separate and interactive effects of PTSD and GAD on negative thoughts about the self, the world, and self-blame.

In the MVA sample, the PTSD × GAD interaction was non-significant, although both the PTSD main effect (Wilks' lambda = .93, F(df 3, 288) = 7.43, $p < .001$) and GAD main effect (Wilks' lambda = .92, F(df 3288) = 8.59, $p < .0001$) were significant. As noted in Table 3, the PTSD main effect indicated that negative thoughts about the self was significant in this sample, with a small effect size. The PTSD + group reported higher levels of negative thoughts about the self ($M = 3.41$, $SE = .09$) relative to the PTSD- group ($M = 2.66$, $SE = .11$). The GAD main effect indicated significant differences between the GAD+ and GAD-groups for both negative thoughts about the self and negative thoughts about the world, with a medium effect noted for negative thoughts about the self and a small effect noted for negative thoughts about the world. The GAD + group reported higher levels of negative thoughts about the self ($M = 3.48$, $SE = .12$) and negative thoughts about the world ($M = 4.72$, $SE = .13$) relative to the GAD-group (negative thoughts about the self: $M = 2.58$, $SE = .08$, negative thoughts about the world: $M = 4.07$, $SE = .10$).[4]

In the IPV sample, the PTSD main effect was significant (Wilks' lambda = .95, F(df 3149) = 2.85, $p < .05$) but the PTSD × GAD interaction and the GAD main effect were not significant. As seen in Table 3, only negative thoughts about the self showed a significant association with PTSD, with a medium effect size. The PTSD + group reported higher levels of negative thoughts about the self ($M = 4.04$, $SE = .20$) relative to the PTSD-group ($M = 2.93$, $SE = .11$).

2.3. Examining the simultaneous associations of negative thoughts about the self, the world, and self-blame with PTSD and GAD

In the MVA sample, a significant direct association of negative thoughts about the self was noted for both PTSD ($B = 5.75$; $\beta = .33$; $p < .001$) and GAD ($B = .46$; $\beta = .29$; $p < .001$; see Fig. 1, Model A). As noted, all associations were positive, indicating that higher levels of negative cognitions about the self were associated with higher levels of PTSD and GAD. The association between the negative thoughts about the self subscale and PTSD was of moderate size, while the association between this subscale and GAD was small in magnitude. Negative thoughts about the world revealed a significant direct association with PTSD ($B = 2.29$, $\beta = .14$; $p = .03$; see Fig. 1, Model A) but not for GAD ($p = .9$), with higher levels of negative cognitions about the world associated with higher levels of PTSD. This effect was small in magnitude. A negative association was noted between self-blame and PTSD ($B = -3.00$, $\beta = -.15$; $p < .001$; see Fig. 1, Model A), indicating that higher levels of self-blame were associated with significantly lower levels of PTSD. This effect was small in magnitude. No association was noted between self-blame and GAD ($p = .4$).[4]

In the IPV sample, a significant direct association of negative thoughts about the self was noted for both PTSD ($B = 3.50$; $\beta = .20$; $p = .03$) and GAD ($B = .55$; $\beta = .31$; $p = .01$; see Fig. 1, Model B). These associations were positive, indicating that higher levels of negative cognitions about the self were associated with higher levels of PTSD and GAD. The association between the self subscale and PTSD was small in magnitude, while the association between the self subscale and GAD was large in magnitude. No significant pathways were noted between negative thoughts about the world or self-blame with either PTSD or GAD.

[4] Because the MVA sample included both male and female participants, these analyses were repeated, controlling for gender. The pattern of results was identical.

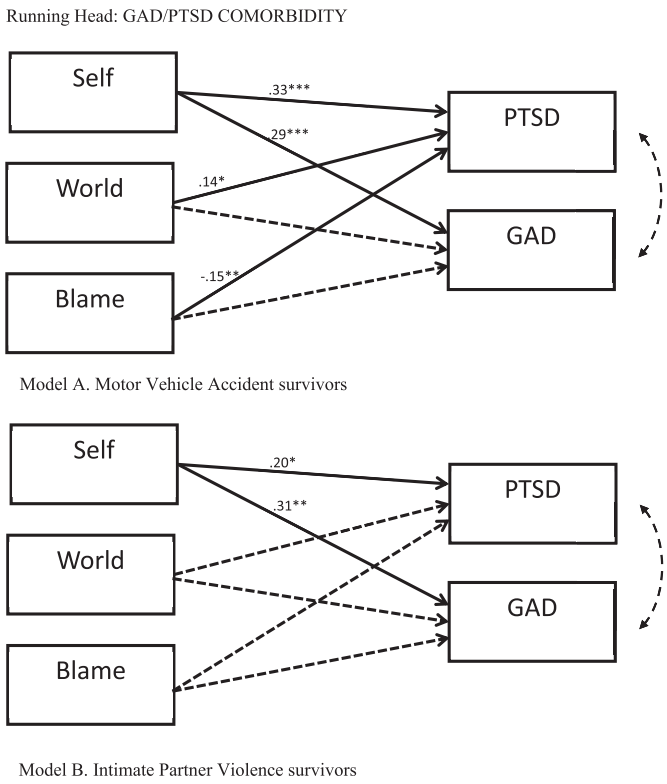

Fig. 1. Path models illustrating associations between negative posttraumatic cognitions on PTSD and GAD for Motor Vehicle Accident survivors (Model A) and Intimate Partner Violence survivors (Model B). Both models controlled for number of additional clinical diagnoses. Notes: Self = The Posttraumatic Cognitions Inventory subscale assessing negative thoughts about self; World = The Posttraumatic Cognitions Inventory subscale assessing negative thoughts about the world; Blame = The Posttraumatic Cognitions Inventory subscale assessing negative thoughts of self-blame; PTSD = Clinician Administered PTSD Scale, Total Score; GAD = Generalized Anxiety Disorder, Clinical Severity Rating. Paths noted with a broken line reflect a nonsignificant association ($p > .05$); paths noted with a solid line reflect a significant association * $p < .05$, ** $p < .01$, *** $p < .001$. Standardized path coefficients are presented.

3. Discussion

The current study examined associations between negative thoughts about the self, the world, and self-blame with PTSD and GAD in two trauma samples, individuals who had experienced a serious MVA and women who had experienced IPV. When considering PTSD and GAD as diagnostic entities, results indicated that negative thoughts about the self were associated with higher levels of PTSD in both the MVA and IPV samples and with higher levels of GAD in the MVA sample. Negative thoughts about the world were only associated with higher levels of GAD in the MVA sample. No interaction effects were noted between PTSD and GAD diagnoses in these analyses, contrary to hypotheses. When PTSD and GAD symptoms were examined continuously, results indicated that negative thoughts about the self showed significant associations with both PTSD and GAD in both samples, as hypothesized. Negative thoughts about the world and self-blame showed significant associations with PTSD but not with GAD in the MVA sample. In the IPV sample, negative thoughts about the world and self-blame were not significantly associated with either PTSD or GAD.

Across both types of analysis, these results suggest that negative thoughts about the self may represent a factor that operates to maintain both PTSD and GAD, although differences emerged depending on how PTSD and GAD were operationalized. Categorical consideration of the role of negative thoughts about the self with PTSD and GAD revealed significant associations only in the MVA sample, while continuous consideration of PTSD and GAD suggested the association of both conditions with negative thoughts about the self in both trauma samples. The latter analyses may better map onto clinical presentation of patients with either PTSD or GAD (or both conditions), as a larger range of symptoms was represented in these analyses. Alternatively, it is possible that negative post-trauma cognitions are not notably associated with a diagnosis of GAD following interpersonal trauma. Importantly, no interaction effects were noted when examining patients with co-morbid conditions versus individuals with only one (or no) disorder. The lack of a significant interaction between PTSD and GAD implies that the hypothesized role of worry as cognitive avoidance may not be applicable when considering negative post-trauma cognitions in trauma survivors. It is possible that negative post-trauma cognitions do not capture the nature of worry as cognitive avoidance, however. To explore this hypothesis more completely, alternative paradigms are necessary. Future studies would be helpful in exploring processes such as deliberate thought suppression in patients with co-morbid PTSD and GAD, as an alternative approach to addressing this hypothesis.

Negative thoughts about the world and self-blame did not show significant simultaneous associations with PTSD and GAD in either sample. Although this component of the tested models was exploratory, the lack of significant findings suggests that additional examination of dysfunctional cognitions in these domains may not be fruitful. Furthermore, early discussion in the GAD literature that focused on exaggerated perceptions that the world is dangerous (e.g., Beck et al., 1985; MacLeod & Rutherford, 2004) was not supported by these findings. As noted in Fig. 1, negative thoughts about the world and self-blame both showed significant associations with PTSD in the model involving the MVA sample, but not in the IPV model. Although a number of explanations for this pattern of findings are possible, the contrast between the MVA and IPV models in this regard could suggest that when examined in concert with GAD symptoms, PTSD symptoms are more clearly associated with all three forms of dysfunctional trauma cognitions following single incident, non-interpersonal trauma, but not following repeated, interpersonal traumatic events. These findings can be interpreted a variety of ways. For example, it is possible that repeated interpersonal trauma results in more complex psychological processes, relative to single-event traumas (e.g., van der Kolk et al., 2005). Potentially, this additional complexity may reduce the saliency of dysfunctional trauma cognitions. Alternatively, methodological issues such as the recruitment processes used for each sample could be at play in accounting for these unexpected findings. Additional research is needed examining how the nature of a traumatic experience impacts cognitive and emotional processes in survivors. Notably, a negative coefficient was obtained between self-blame and PTSD in the MVA model; this result likely reflects a suppression effect, particularly given the nonsignificant positive bivariate correlation obtained between these two variables (see Table 1; Paulhus, Robins, Trzesniewski, & Tracy, 2004).

In considering negative thoughts about the self as a factor that may operate to maintain both PTSD and GAD, one might speculate how these thoughts relate to both forms of psychopathology. Negative post-trauma cognitions reflect cognitive overgeneralization (Moore & Zoellner, 2007), a concept that refers to global beliefs that are extreme and applied indiscriminately. Overgeneralization has been targeted as a key element underlying PTSD, with emphasis given to behavioral components of overgeneralized fear learning (e.g., Foa, Huppert, & Cahill, 2006). Cognitive overgeneralization of negative features of one's self, as the current results suggest, could be an equally important process in understanding maintaining factors for GAD and possibly other

disorders. As noted by Jayawickreme, Yasinski, Williams, and Foa (2012), negative thoughts about the self also show a significant association with alcohol craving severity, in a treatment-seeking sample with comorbid PTSD and Alcohol Dependence. It is possible that high levels of overgeneralized negative thoughts about the self underlie multiple forms of problematic coping following stress. Such problematic coping might include situational avoidance, rumination, experiential avoidance, excess alcohol use, and other processes that are believed to be fundamental, transdiagnostic components of emotional disorders (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014). An understanding of the role these transdiagnostic processes play in emotional disorders could transform the way symptom co-occurrence is conceptualized and treated.

The current findings have interesting implications with respect to treatment of patients with comorbid PTSD and GAD. In particular, it is possible that targeting negative thoughts about the self could be an effective approach to address a common process that maintains both disorders following trauma exposure. As an exemplar, Cognitive Processing Therapy (CPT; Resick & Schnicke, 1993) utilizes cognitive therapy techniques modeled after cognitive approaches to treat depression (e.g., Beck, Rush, Shaw, & Emery, 1979), along with written trauma exposure, to address PTSD. This treatment has been shown to effectively reduce both PTSD and comorbid depression (e.g. Monson et al., 2006; Resick, Nishith, Weaver, Astin, & Feuer, 2002). It is possible that CPT could also reduce symptoms of GAD based on the results of the current report, although this issue has not as yet been explored in treatment outcome research on CPT. Additional research examining the function served by negative post-trauma thoughts about the self may facilitate adaptation of cognitive therapy protocols such as CPT in ways that address additional transdiagnostic processes that are functionally related to negative thoughts about the self.

Like all empirical reports, the current investigation has a number of limitations. First, the data used in this report were cross-sectional and, thus, cannot determine causality. It will be important for future studies to examine change over time in factors associated with comorbidity between PTSD and GAD, particularly focusing on the role of cognitive processes that may link these two conditions. Second, the two samples used in this report were both help-seeking, similar to typical clinical practice; findings should be generalized with caution to samples of community trauma survivors. Additionally, DSM-IV criteria were utilized in this report, owing to the time interval when data were collected. It will be important to examine this question, using the DSM-5 criteria for PTSD, particularly given the addition of a new symptom cluster addressing negative alterations in cognition and mood (APA, 2013). Fourth, data were not consistently available with respect to the onset of GAD relative to trauma exposure. It would seem important to consider whether the excessive worry that is a cardinal aspect of GAD might represent a "vulnerability" factor that increases the likelihood of developing symptoms of PTSD after a trauma (e.g., Barlow, et al., 2014). Lastly, the IPV sample contained 35 women who were still romantically involved with their perpetrator. This type of participant is not typically included in research on PTSD, as there is no assurance that their trauma exposure has concluded. Additional research comparing women who are at-risk for on-going IPV with women who have left abusive romantic relationships could be very useful for delineating potential differences in cognitive processes.

To further our understanding of cognitive factors that underlie comorbidity, it may be important to also utilize non-self report measures that assess cognitive processes such as attentional bias, memory, and rumination (e.g., Ehlers, Ehring, & Kleim, 2012). These additional methodologies can expand our understanding of how cognitive processes function. The current report is distinguished by its reliance on interviewer-based measures of psychopathology, a feature that represents an advance in this literature. Continued examination of rates of comorbidity should rely on interviewer measures, as method variance has contributed to discrepancies across studies (Zayfert et al., 2002).

In sum, the current report examined dysfunctional trauma-related thoughts as possible factors that could maintain the co-occurrence of PTSD and GAD in two help-seeking trauma samples, one characterized by exposure to a single event, non-interpersonal trauma and the other characterized by recurrent interpersonal trauma that is private and associated with stigma and shame. Negative thoughts about the self emerged as a salient factor in both conditions, although differences were noted depending on how PTSD and GAD were operationalized. Because PTSD is so frequently comorbid with other conditions, continued efforts are needed to understand those processes that increase risk for multiple disorders. Empirical identification of factors underlying co-morbidity may improve treatment outcomes for trauma survivors, particularly if treatments can be developed that address functional linkages between conditions and address core transdiagnostic processes (e.g., Barlow et al., 2014). Although the field has made enormous progress in developing efficacious treatments for PTSD (e.g., Foa, Keane, Friedman, & Cohen, 2009), much remains to be learned about how and why these treatments influence associated psychiatric conditions (e.g., Hamblen, Barnett, Hermann, & Schnurr, 2012). As such, greater knowledge of processes that contribute to comorbidity may pave the way for development of a second generation of treatments for PTSD, specifically treatments that address transdiagnostic factors that impact comorbidity following trauma.

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