

AN EXAMINATION OF A FRAMEWORK FOR POSTTRAUMATIC STRESS
DISORDER CORRELATES: EXPLORING THE ROLES OF NARRATIVE
CENTRALITY AND NEGATIVE AFFECTIVITY

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Recent estimates suggest that a large percentage of the population experiences some type of traumatic event over the course of the lifetime, but a relatively small proportion of individuals develop severe, long-lasting problems (e.g., posttraumatic stress disorder; PTSD). One major goal for trauma researchers is to understand what factors contribute to these differential outcomes, and much of this research has examined correlates of posttraumatic stress disorder (PTSD) symptom severity. An important next step in this line of research is the development of conceptual frameworks to foster a deeper understanding of the relationships among these diverse predictors of PTSD and their predictive power in relation to each other. A framework proposed by Rubin, Boals, and Hoyle centers on the influence of narrative centrality (construal of a traumatic experience as central to one's identity and to the life story) and negative affectivity (the tendency to experience negative emotion and to interpret situations and experiences in a negative light), suggesting many variables may correlate with PTSD symptoms via shared variance with these two factors. With a sample of 477 participants recruited from Amazon Mechanical Turk, this dissertation project extended the work of Rubin and colleagues by a) utilizing structural equation modeling techniques to simultaneously examine relationships among variables, b) investigating the utility of the model with a carefully-selected list of PTSD correlates, c) extending the model by including PTSD symptom severity, and d) exploring both direct and indirect effects to assess the roles of narrative centrality and negative affectivity as they relate to known PTSD correlates and PTSD symptom severity. PTSD correlates included social support

quality and quantity, peritraumatic dissociation, negative posttraumatic cognitions, perceived injustice, and negative religious coping. Hypotheses were partially supported, and there was some evidence that the model may be effective in distinguishing between variables more and less germane to the individual's construal of a traumatic experience.

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CHAPTER 1

INTRODUCTION

Individual Differences in Trauma Response

Recent estimates suggest that a large percentage of the population experiences some type of traumatic event over the course of the lifetime. Estimates derived from large-scale studies have varied according to measurement and sampling procedures. For example, in the National Comorbidity Study, 61% of men and 51% of women reported experiencing at least one traumatic event (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). In a similar large-scale national study in Australia, Creamer, Burgess, and McFarlane (2001) reported similar rates of 65% for men and 50% for women. Some studies have reported even higher rates of lifetime trauma exposure at 74% for men and 84% for women (Stein, Walker, Hazen, & Forde, 1997), and 90% for men and women combined (Breslau et al., 1998). More recently, Kilpatrick and colleagues examined trauma exposure rates according to event types that do or do not qualify as a traumatic event according to the recently updated fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*; American Psychiatric Association, 2013). Kilpatrick and colleagues found that 89% of people sampled reported experiencing at least one event that qualifies as a trauma according to the new diagnostic criteria for PTSD outlined in the *DSM-5* (Kilpatrick, Resnick, Milanak, Miller, Keys, & Friedman, 2013).

Despite the high rate of trauma exposure in the population, relatively few individuals who do experience a traumatic event go on to develop severe, long-lasting problems as a result of the trauma. The National Comorbidity Study Replication (NCS-R; Kessler et al., 2008) provides arguably the most accurate estimate of lifetime Posttraumatic Stress Disorder (PTSD) prevalence

rates among the U.S. population (Norris & Slone, 2013); the data for this study were derived from structured clinical interviews and were based on the PTSD diagnostic criteria in the fourth edition (text revision) of the *DSM (DSM-IV-TR*; American Psychiatric Association, 2000). The NCS-R yielded the widely-cited lifetime PTSD prevalence rate of 7%; of the large segment of the population who will experience some type of traumatic event over the course of the lifetime, only about 7% of them will go on to develop PTSD. Preliminary estimates of prevalence rates based on the updated diagnostic criteria in the *DSM-5* and data collected via self-report measures indicate that prevalence rates may increase with the diagnostic changes (Miller et al., 2012). Even with potential increases in prevalence rates, the fact remains that only a small fraction of people who experience potentially traumatic events go on to develop PTSD.

One major goal for trauma researchers is to understand what factors contribute to these differential outcomes after trauma exposure. Understanding what factors can predict poor trauma outcomes may also be helpful in shaping prevention and treatment efforts, which is the ultimate goal of many researchers. Unfortunately, trauma researchers cannot utilize the rigorous experimental research methodologies that would allow them to determine causation among factors known to be related to poor trauma outcomes; this approach is ethically (and practically) inappropriate. Thus, trauma researchers have relied on a number of other research approaches to build an understanding of what factors may contribute to the etiology of negative trauma outcomes. These approaches include: conducting prospective studies to understand how baseline levels of various risk and protective factors impact the development of trauma outcomes; conducting intervention studies to examine the impact of interventions on reducing PTSD symptoms and pinpoint mechanisms of change; and examining correlational relationships between poor trauma outcomes, such as PTSD, and other factors.

Because prospective studies are difficult to carry out methodologically, there is a small body of prospective studies that have attempted to identify and clarify PTSD risk factors by measuring them *before* the occurrence of a trauma event. The few studies that have been reported tend to focus on risk factors, such as the personality trait neuroticism (e.g., Bramsen, Dirkzwager, & van der Ploeg, 2000; Engelhard, Huijding, van den Hout, & de Jong, 2007; Parslow, Jorm, & Christensen, 2006; Frazier, et al., 2011) and poor pre-trauma functioning (e.g., Parslow et al., 2006; Lengua, Long, Smith, & Melzoff, 2005). Other prospective studies have identified protective factors associated with lower levels of PTSD symptom severity, such as pre-trauma self-esteem (Lengua et al., 2005) and optimism (Oxlad & Wade, 2008). In a more recent prospective study, Frazier et al. (2011) examined both risk and protective factors, along with potential post-trauma mediators; they found that risk factors were stronger predictors of PTSD symptom severity than were protective factors, and poor social support mediated the relationship between risk factors and PTSD symptom severity.

Another branch of trauma research has focused on the treatment of symptoms. After decades of treatment development and evaluation of those treatments, hundreds of individual studies have been conducted and a number of meta-analyses have reviewed their combined results (e.g., Watts et al., 2013; Benish, Imel, & Wampold, 2008). Effective treatments that have emerged through this process include Prolonged Exposure Therapy (Foa et al., 2005), Cognitive Processing Therapy (Resick, Nishith, Weaver, Astin, & Feuer, 2002), and Eye Movement Desensitization and Reprocessing (Rothbaum, Astin, & Marsteller, 2005; Cusack & Spates, 1999), all of which are cognitive in nature. Within the treatment efficacy literature, many studies have also investigated the mechanisms by which treatments effectively reduce PTSD symptoms (e.g., Gallagher & Resick, 2012; El-Khoury-Malhame et al., 2011; Kleim et al., 2013). For

example, Kleim et al. (2013) demonstrated that decreases in negative posttraumatic cognitions statistically and temporally predicted decreases in PTSD symptom severity. Despite the large body of research examining the efficacy of PTSD treatment approaches, no single best treatment has yet been identified.

Perhaps the largest body of literature represents the research approach of studying correlates of PTSD symptom severity. This is likely due to the relative ease of the methodological approach as compared to prospective and intervention research approaches. The focus of this project is the examination of PTSD correlates, and discussion now turns to an overview of this research.

PTSD Correlates

Decades of research have yielded a lengthy list of PTSD correlates, including demographic, individual and family history, and peri- and post-trauma variables. Brewin, Andrews, and Valentine (2000) conducted one of the first quantitative meta-analyses of PTSD risk factors, reviewing studies on 14 variables: gender, race, socioeconomic status, education, intelligence, previous psychiatric history, family psychiatric history, reported childhood abuse, reported adverse childhood events other than abuse, reported trauma exposure other than the target event, age at time of trauma exposure, trauma severity, posttrauma life stress, and posttrauma social support. Overall, the pattern of effect sizes suggested that static, demographic factors such as gender, race, and socioeconomic status, and other pre-trauma factors such as personal and family history of psychopathology, do have a small predictive relationship with PTSD severity, but that these factors are not as strongly related as others that are more proximal to the trauma experience, such as posttrauma social support. Additionally, Brewin and colleagues

cautioned against attempts to derive a template for understanding who is more likely to develop PTSD from these results because of the heterogeneity of results across study methodologies and, especially, across samples (e.g., military personnel vs. civilians).

In a subsequent meta-analysis, Ozer, Best, Lipsey, and Weiss (2003) examined additional variables not addressed in the Brewin et al. study, focusing on factors related to an individual's response to a potentially traumatic experience. Variables identified in their meta-analysis were: history of at least one previous trauma before the target traumatic event, psychological adjustment prior to trauma exposure, family history of psychopathology, perceived life threat during the traumatic event, peritraumatic dissociation, peritraumatic experience of strong negative emotion, and perceived social support after the trauma. Ozer and colleagues found that the strongest predictor of PTSD was peritraumatic dissociation and the second strongest was social support; they concluded that more temporally distal factors (e.g., demographic factors and family history of psychopathology) were weaker predictors than more proximal factors such as peritraumatic dissociation and perceived social support after the trauma. Indeed, Ozer and colleagues stated, "The strong implication is that if one could bet on only one variable, the subjective psychological response to traumatic exposure is the variable on which to place bets" (p. 69). In a more recent meta-analysis of PTSD risk factors in children and adolescents, Trickey and colleagues came to the same conclusion regarding the relatively stronger predictive power of peri- and post-trauma factors over static, pre-trauma factors (Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Very recently, Ogle, Rubin, and Siegler (2015) have underscored the importance of this focus on peri- and post-trauma perceptual factors. Thus many PTSD correlates have been identified and more recent meta-analytic reviews have begun the work of targeting the most salient variables in understanding PTSD risk and severity.

Next Steps: A Conceptual Framework for PTSD Correlates

The current state of the trauma literature is such that many correlates of PTSD symptom severity have been identified and explored in depth, including several factors relating to the perception and cognitive processing of a traumatic experience. A direction for current and future consideration in the correlational research approach is the development of conceptual frameworks to foster a deeper understanding of the relationships among these diverse predictors of PTSD and their predictive power in relation to each other. The development of such understanding has the potential to shape effective prevention and intervention efforts. One such framework has recently been proposed by Rubin, Boals, and Hoyle (2014).

Narrative Centrality and Negative Affectivity

Rubin, Boals, and Hoyle (2014) proposed a model for understanding the severity of negative trauma reactions that centers around the influence of narrative centrality and negative affectivity. Rubin and colleagues suggest that the nature of the story an individual creates about the traumatic experience and its place in the overall life story, coupled with the degree to which the person tends to experience negative affectivity, account for a great deal of the variation in individual reactions to traumatic experiences. That is, many variables may correlate with PTSD symptoms via shared variance with these two factors of narrative centrality and negative affectivity. A deeper exploration of the two central elements of Rubin and colleagues' model follows.

Narrative Centrality

Examining an individual's personal life story, or narrative identity (Singer, 2004), has long been an approach to attempting to understand various aspects of the human experience (e.g., Baumeister & Newman, 1994; Neisser & Fivush, 1994; McAdams, 1996). McAdams and McLean (2013) defined narrative identity as “a person's internalized and evolving life story, integrating the reconstructed past and imagined future to provide life with some degree of unity and purpose” (p. 234). Understanding the construction of a person's life story has been explored as an approach to studying personality (e.g., McAdams, 1996) and has formed the basis of approaches in psychotherapy, especially in terms of restructuring the narratives of stressful, painful, or otherwise difficult life experiences (Rubin et al., 2014; Bryant, 2011).

An important aspect of the construction of a narrative about traumatic experiences is how the story of this one life event is situated in the context of the overarching life story. McAdams and McLean identified themes in the way people construct narratives about suffering, which include creating meaning from the experience (a process dubbed *meaning making* by some researchers; e.g., Park, 2010; George & Park, 2013) and determining where the stressful or negative event fits in the context of the person's entire life story. Rubin et al. (2014) address this feature of narrative construction as *narrative centrality*.

Negative Affectivity

Whereas the narrative of a unique distressing life experience is necessarily specific to that event, another approach to understanding how individuals respond to distressing events is to assess more dispositional or trait-based individual differences, which by their nature exert a broader influence on behavior, cognition, and emotion—including response to traumatic experiences (Rubin et al., 2014). One such trait is negative affectivity, the tendency to experience

negative emotion, to do so intensely, and to interpret situations and experiences in a negative light (Suls & Martin, 2005). Negative affectivity may be viewed as a broader conceptualization of the personality trait neuroticism; the broader term is in keeping with the trait dimensional diagnostic system for personality disorders in the new fifth edition of the *DSM* (*DSM-5*, American Psychiatric Association, 2013) and is the preferred term for many personality and psychopathology researchers (Suls & Martin, 2005). Negative affectivity thus incorporates the personality trait neuroticism but also includes elements of the Big Five personality traits extraversion and agreeableness (Rubin et al., 2014). In operationalizing negative affectivity, Rubin and colleagues expanded neuroticism to include measures of negative affect, affect intensity, and generalized anxiety.

Negative affectivity (in the form of neuroticism) has been shown in several prospective studies to predict exposure to traumatic events, suggesting that individuals with a high level of neuroticism have a greater likelihood of experiencing trauma—or at least reporting it (Breslau, Davis, & Andreski, 1995; Magnus, Diener, Fujita, & Pavot, 1993; Parslow et al, 2006; Specht, Egloff, & Schmukle, 2011; Vaidya, Gray, Haig, & Watson, 2002). Interestingly, there is also some evidence that experiencing a traumatic event may also lead to increases in neuroticism, at least temporarily (e.g., Boals, Southard-Dobbs, & Blumenthal, 2014; Löckenhoff, Terracciano, Patriciu, Eaton, & Costa, 2009). Thus, the relationship between neuroticism and trauma exposure is well-documented, but the causal direction of the relationship has yet to be clarified.

Neuroticism has also been shown to correlate with PTSD symptom severity. In several studies examining multiple correlates of PTSD symptom severity, neuroticism remained a strong statistical predictor, even after accounting for other correlates (e.g., Schuettler & Boals, 2011; Rubin, Berntsen and Bohni, 2008).

Rationale for Narrative Centrality and Negative Affectivity

Rubin and colleagues suggest three reasons for structuring their PTSD framework around narrative centrality and negative affectivity. First, the two constructs are fundamentally different in that narrative centrality is necessarily event-specific and negative affectivity is broad in its influence on behavior, cognition, and emotion. The two approaches to examining trauma responses are also different in that narratives are changeable and negative affectivity, a personality trait, is generally more stable over the lifetime (Costa, Herbst, McCrae, & Siegler, 2000). Second, the time course for the influence of the two constructs on trauma responses is different. The crafting of a narrative about the traumatic experience necessarily occurs after the trauma, and the centrality of that narrative develops after the trauma. Conversely, the influence of negative affectivity on a broad spectrum of behaviors is shaped over the course of the lifetime, including the period before a trauma occurred. Where narrative centrality is dynamic and malleable—with some therapeutic approaches having the goal of diminishing the centrality of the event narrative (e.g., Cognitive Processing Therapy, Resick & Schnicke, 1992; Acceptance and Commitment Therapy, Orsillo & Batten, 2005), negative affectivity is more stable over the course of the lifetime (though there is some evidence of short-term changes in negative affectivity after experiencing an adverse event [e.g., Boals, Southard-Dobbs, & Blumenthal, 2014; Löckenhoff et al., 2009]). Lastly, Rubin and colleagues pointed out that both narrative centrality and negative affectivity have not yet been addressed in meta-analytic examinations of PTSD correlates. In particular, research on narrative centrality emerged and has grown in the years since the seminal meta-analyses on PTSD correlates were conducted and published; the very first paper on the centrality construct was published in 2006 and to date over 40 published articles address the concept. There is now growing evidence that narrative centrality (Boals,

2010; Schuettler & Boals, 2011; Ogle, Rubin, & Siegler, 2015) and negative affectivity (Rubin, Berntsen, & Bohni, 2008) are very strongly related to PTSD symptom severity, even after accounting for other established PTSD predictors.

Evidence for Narrative Centrality and Negative Affectivity: Four Studies

Rubin, Boals, and Hoyle (2014) presented empirical evidence from four studies to support their framework. In all four studies, measures of narrative centrality and PTSD symptom severity were completed in reference to a specific stressful life event, whereas measures of negative affectivity were completed without reference to a specific event.

Study 1. In study 1, narrative centrality was operationalized as scores on the Centrality of Event Scale (CES; Berntsen & Rubin, 2006; 2007), a self-report measure of the degree to which the memory of a traumatic event constitutes a central feature of the person's identity, a turning point in the person's life story, and a point of reference for everyday inferences. Event centrality has evidenced strong correlations with PTSD symptom severity in diverse samples, including combat veterans (Brown, Antonius, Kramer, Root, & Hirst, 2010), community samples (Pinto-Gouveia & Matos, 2011), adult survivors of childhood sexual abuse (Robinaugh & McNally, 2011), older adults (Boals, Hayslip, Knowles, & Banks, 2011), college undergraduates (Berntsen & Rubin, 2006, 2007; Boals, 2010; Schuettler & Boals, 2011) and adults experiencing prolonged grief after the death of a loved one (Boelen, 2012). Further, event centrality has demonstrated a strong relationship with PTSD symptom severity even after controlling for other known correlates, such as peritraumatic dissociation (e.g., Schuettler & Boals, 2011; Boals, 2010).

Negative affectivity was operationalized as scores on the neuroticism (N) subscale of the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). PTSD symptom severity was operationalized as scores on the Posttraumatic Stress Disorder Checklist-Specific (PCL-S; Blanchard, Jones-Alexander, Buckley, & Foneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1994), a commonly-used self-report measure on which respondents indicate how much they have been bothered in the past month by the 17 *DSM-IV-TR* (American Psychiatric Association, 2000) symptoms of PTSD. In a sample of university students, study 1 replicated previous research in that narrative centrality and negative affectivity were both strong predictors of PTSD symptom severity, each predicted unique PTSD symptom severity variance in regression models, and there was an interaction between the two such that high scores on both factors related to greater levels of PTSD symptom severity than would be predicted by simple additive effects (Rubin et al., 2014).

Study 2. Study 2 replicated study 1 in a different sample (combat veterans) and with different measures of negative affectivity and PTSD symptom severity. In this study, participants answered measures in reference to a specific stressful combat or other military experience. Negative affectivity was operationalized as scores on the Generalized Anxiety Disorder-7 scale (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006), a self-report measure that includes items addressing the experience of negative affect (e.g., feeling nervous). PTSD symptom severity was operationalized as scores on the Impact of Events Scale-Revised (Weiss & Marmar, 1997), a commonly-used self-report measure that addresses the intrusiveness, avoidance, and hyperarousal symptoms of PTSD. The results of study 2 replicated the results of study 1 (Rubin et al., 2014).

Study 3. Study 3 replicated the statistical predictive effects of narrative centrality and negative affectivity from studies 1 and 2, but this time with three measures of each construct and with a structural equation modeling approach to verify the proposed two-factor structure. Narrative centrality was treated as a latent construct with three indicators: the longer 20-item version of the CES, the Closure Scale, and the Posttraumatic Growth Inventory. The Closure Scale (Beike & Wirth-Beaumont, 2005) measures the extent to which a past stressful life event is no longer a present concern (e.g., “The event seems like ancient history”). The Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) measures the extent to which an individual has gained positive personal growth as the result of a traumatic experience (e.g., “I have a greater appreciation for the value of my own life”). Negative affectivity was treated as a latent construct with three indicators: the neuroticism subscale of the BFI, the negative affect subscale of the Positive and Negative Affect Scale (PANAS), and the negative intensity subscale of the Affect Intensity Measure (AIM-NI). The PANAS (Watson, Clark, & Tellegen, 1988) measures the propensity to experience a list of 10 positive and 10 negative emotions. The AIM-NI (Larsen, Diener, & Emmons, 1986) measures the tendency to react to events and situations intensely and negatively (e.g., “My friends would probably say I’m a tense or ‘high-strung’ person”).

Structural equation modeling verified that a two-factor model fit best to describe the relationships among the measures, supporting the two-factor model of narrative centrality and negative affectivity. Additionally, regression analyses utilizing factor scores on the two factors supported the results of studies 1 and 2 in that higher scores on both factors resulted in higher PTSD symptom severity scores than would be predicted by simple additive effects (Rubin et al., 2014).

Study 4. Study 4 examined the two-factor model via exploratory factor analysis of several measures of PTSD correlates. Rubin and colleagues characterized these measures as a “convenience sample” of measures because they were collected for purposes related to other research questions but were present in the data set. These measures were selected on the criterion of having a correlation of at least $|.35|$ with a measure of PTSD symptom severity. Factor analysis indicated that the measures clearly loaded onto either the narrative centrality factor or the negative affectivity factor, lending support to the two-factor model (Rubin et al., 2014). The measures that aligned with the narrative centrality factor were the Centrality of Event Scale, the Closure scale, and the Posttraumatic Growth Inventory, all of which were described earlier in this paper. The measures that aligned with the negative affectivity factor included the negative affect subscale of the PANAS, which was previously described. Following is a list of additional measures that also aligned with the negative affectivity factor. Avoidance coping is a subscale of the Brief COPE (Carver, 1997), a self-report measure of coping styles. The avoidance coping subscale measures the extent to which an individual engages in an avoidant style of coping. The experiential avoidance measure from the Acceptance and Action Questionnaire II (Bond et al., 2011) also assesses avoidant coping strategies. The Insomnia Severity Index (Bastien, Vallieres, & Morin, 2001) is a self-report measure intended to assess the severity of insomnia symptoms. The Quick Inventory of Depressive Symptomatology-SR (Rush et al., 2003) is a self-report measure of depression symptoms severity over the previous 7 days. Lastly, the White Bear Suppression Inventory (Wegner & Zanakos, 1994) is a self-report measure of the tendency to suppress unwanted negative thoughts.

Model Summary

Rubin and colleagues (2014) suggested a two-factor model in which known PTSD correlates cluster under the overarching factors of narrative centrality and negative affectivity, suggesting that much of the variance in PTSD symptom severity explained by individual correlate measures may be more broadly explained by the sharing of variance with narrative centrality and negative affectivity. The researchers investigated this hypothesis with a “convenience sample” of measures present in their large-scale data collection, many of which were measures of posttrauma cognitive construals (e.g., closure) or negative trauma sequelae (e.g., insomnia). The model was supported with this convenience sample of measures, but additional research is needed to test the model with a more systematic selection of variables and measures and expand the model to include PTSD symptom severity to more fully examine the nature of the relationships among variables.

The Current Study: Model Testing

In the current study, I aimed to extend the work of Rubin and colleagues by a) utilizing structural equation modeling techniques to simultaneously examine relationships among variables, b) examining the utility of the model with a carefully-selected list of PTSD correlate variables, c) extending the model by including PTSD symptom severity, and d) examining both direct and indirect effects to assess the roles of narrative centrality and negative affectivity as they relate to known PTSD correlates and PTSD symptom severity. The new variables introduced in this examination include the two most salient risk factors identified in the prominent meta-analyses conducted on PTSD correlates (Brewin et al., 2000; Ozer et al., 2003), social support and peritraumatic dissociation, and several additional variables identified more

recently in the PTSD literature: posttrauma cognitive processing, perceived injustice, and negative religious coping.

Social Support and Peritraumatic Dissociation

Social support was the strongest PTSD correlate identified by Brewin and colleagues (2000), and peritraumatic dissociation was the strongest correlate identified by Ozer et al. (2003). These variables were selected because they represent a systematic approach to testing the Rubin et al. model; they were identified through meta-analytic techniques to be the strongest predictors of PTSD symptom severity. Whereas a systematic inclusion of all PTSD predictors identified in the meta-analyses is beyond the scope of this project, inclusion of the two strongest PTSD predictors from the meta-analyses represents a systematic approach to testing the model. Additionally, these two variables are theoretically aligned with Ozer et al.'s (2003) suggestion (which has recently been affirmed by Ogle, Rubin, & Siegler, 2015) that factors proximal to the traumatic experience and more closely related to the individual's construal of the experience are more salient to influencing the development of PTSD symptoms.

Social Support

As indicated earlier, there is a large body of research examining the relationship between social support and PTSD symptom severity (e.g., Andrews, Brewin, & Rose, 2003; Laffaye, Cavella, Drescher, & Rosen, 2008), and social support has been identified as a strong correlate of PTSD symptoms (Ozer et al., 2003). Social support has been examined from several angles (e.g., support from various categories of individuals, such as family and friends; Zimet, Dahlem, Zimet, & Farley, 1988). Additionally, social support and its relationship with PTSD risk has been

conceptualized in multiple ways—lack of social support has been correlated with increased risk of PTSD (e.g., Adams and Boscarino, 2006), and presence of social support has been correlated with reduced risk of PTSD (e.g., Ozer & Weiss, 2004). A common thread in this body of research is the characterization of social support as the generalized degree of perceived support from others, as measured by self-report instruments such as the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988).

More recently (e.g., Frazier et al, 2011; Farnsworth & Sewell, 2011), social support specifically in the wake of a traumatic experience has been conceptualized as experiencing unsupportive social interactions related to the traumatic experience (e.g., minimizing the importance of the traumatic experience). The conceptualization of support *specific to the traumatic experience* is particularly salient for work with the Rubin et al. (2014) model, especially with regard to narrative centrality. These trauma-specific unsupportive interactions have been shown to correlate with event-related distress in college student samples (Ingram, Betz, Mindes, Schmitt, & Grant Smith, 2001; Frazier et al., 2011) and in a sample of firefighters (Farnsworth & Sewell, 2011).

Examining the role of social support in shaping trauma outcomes via both the quantity (e.g., as measured by the MSPSS) and the quality of the support (i.e., unsupportive social interactions) should prove useful, in addition to observing how these two conceptualizations of social support relate to neuroticism. Previous research suggests that quantity of reported support is correlated with neuroticism (e.g., Borja, Callahan, & Rambo, 2009) and that reported unsupportive social interactions after trauma are also correlated with neuroticism (Frazier et al., 2011). Further, individuals higher in neuroticism have been shown to interpret social support as less helpful (Brackett et al., 2006); Frazier and colleagues also found in a prospective study that

pre-trauma neuroticism and negative affect predicted higher levels of reported unsupportive social interactions post-trauma.

Given this evidence, quantity of support (as measured by scores on the MSPSS) is expected to align with negative affectivity in the Rubin, Boals, and Hoyle (2014) model. The small body of research on quality of support, as measured by the Unsupportive Social Interactions Inventory (USII; Ingram et al., 2001) may suggest that unsupportive interactions could align with negative affectivity in the Rubin et al. (2014) model. However, Ingram and colleagues (2001) demonstrated that unsupportive social interactions and negative affectivity, as measured by the Positive And Negative Affect Schedule, contributed separately and uniquely to variance in post-trauma functioning in a sample of undergraduate students. To date there is no research on potential links between trauma-specific unsupportive social interactions and narrative centrality, but it stands to reason that the impact of these trauma-specific social interactions likely influences the centrality of the traumatic experience in the individual's life story, self-concept, and view of the world and others. For these reasons, quality of social support in the wake of a traumatic experience, operationalized by scores on the USII, was expected to align with narrative centrality in the model.

Peritraumatic Dissociation

Peritraumatic dissociation is generally defined as a loss of or reduction in awareness or an alteration in a person's sense of reality (e.g., altered sense of time, sense of detaching from one's self) that occurs during and/or immediately after a traumatic experience (Marshall et al., 2002). Peritraumatic dissociation has long been considered an important factor in peri- and post-trauma response, and it continues to be a variable of interest in the trauma literature. Recent research has

begun to examine what peritraumatic dissociation looks like across trauma populations (e.g., different types of events, such as death of a loved one; Boelen et al., 2012), and the latent structure of the construct (e.g., Brooks et al., 2009; Siljbrandj et al., 2012), with much of this research focused on the Peritraumatic Dissociation Experiences Questionnaire (PDEQ; Marmar et al., 1997), arguably the most widely-used measure of peritraumatic dissociation. There has also been some recent debate about the utility of examining peritraumatic dissociation as a PTSD risk factor, given the inherent difficulty of measuring the construct; reports are always retrospective and it is possible that individuals with higher PTSD symptom severity recall greater levels of peritraumatic dissociation than they actually experienced at the time (Candel & Merckelbach, 2004; van der Velden & Wittmann, 2008).

Despite disagreements in the peritraumatic dissociation literature, the construct remains a variable of interest in the trauma research field and was included in the current project. With regard to hypothesizing how peritraumatic dissociation may fit in the Rubin et al. (2014) model, there is scant literature on which to build. There is some evidence from targeted-population studies that self-reported peritraumatic dissociation and neuroticism operate independently in explaining variance in PTSD severity (e.g., in victims of motor vehicle accidents [Holeva & Tarrier, 2001]; in individuals grieving the loss of a close loved one [Boelen, Keijsers, & van den Hout, 2012]) and that neuroticism does not prospectively predict peritraumatic dissociation (in women who experienced pregnancy loss [Engelhard, van den Hout, Kindt, Arntz, & Schouten, 2003]).

To my knowledge, there currently are no studies that have investigated a potential relationship between peritraumatic dissociation and narrative centrality. However, some models of PTSD etiology (e.g., Ehlers & Clark, 2000) suggest that peritraumatic dissociation impacts the

development of PTSD through a disruption of memory formation and cohesion for the traumatic event. Though a more recent review (Bedard-Gilligan & Zoellner, 2012) has pointed out inconsistencies in the research on the connection between peritraumatic dissociation and event memory fragmentation, this literature may suggest that peritraumatic dissociation is more likely to be related to narrative centrality, which is intimately tied to the individual's autobiographical memory for the traumatic event, than to negative affectivity. Therefore, peritraumatic dissociation was expected to align with the narrative centrality factor rather than the negative affectivity factor.

Additional Variables: Peri- and Post-trauma Cognitive and Coping Factors

Research on PTSD correlates has continued to advance since the landmark meta-analyses conducted by Brewin et al. (2000) and Ozer et al. (2003). A particular focus has been variables related to the subjective trauma response, as Ozer and colleagues (2003) suggested. Factors relating to a person's cognitive appraisal of and memory for a traumatic experience and its sequelae have become an area of growing interest for trauma researchers (e.g., Janoff-Bulman, 1992; Ehlers & Clark, 2000; Brewin, 2011; Ogle, Rubin, & Siegler, 2015). Further understanding details of the cognitive and coping processes involved in perceiving and making sense of a traumatic experience may help to elucidate why only some of the many individuals who experience trauma exposure go on to develop poor outcomes, such as PTSD. Three of these cognitive and coping factors that may also help to further clarify the utility of the Rubin et al. (2014) model are discussed here: posttraumatic cognitions, perceive injustice, and negative religious coping.

Posttraumatic Cognitions

The role of an individual's cognitive processing of a traumatic experience as an influence on post-trauma functioning has recently received an increasing amount of attention in the trauma literature (e.g., Bosson, Kelley, & Jones, 2012; Cann et al., 2011; Halligan, Michael, Clark, & Ehlers, 2003). One of the most widely-used measures of posttrauma cognitive processing is the Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). The PTCI is a self-report measure encompassing three patterns of negative thoughts in the wake of a traumatic experience: negative cognitions about the self (e.g., "I am a weak person"), negative cognitions about the world (e.g., "People can't be trusted"), and self-blame (e.g., "The event happened to me because of the sort of person I am"). Both subscale and total scores have been reported in research on posttrauma cognitions (e.g., Barton, Boals, & Knowles, 2013), but more typically scores on the subscales are examined separately (e.g., Blain, Galovski, Elwood, & Meriac, 2013; Park, Mills, & Edmondson, 2012). In the current study, I examined subscale scores.

The PTCI has been shown to correlate with PTSD symptom severity in a variety of samples, including university students (Barton, Boals, & Knowles, 2013; Foa et al., 1999; Lancaster, Rodriguez, & Weston, 2011) and treatment-seeking samples (Barton et al., 2013; Foa et al., 1999). Further, the PTCI has been shown to discriminate between trauma-exposed individuals who did and did not develop PTSD symptoms (Foa et al., 1999). Recent research suggests that while negative posttraumatic cognitions, as measured by the PTCI, contribute separately to variance in PTSD symptom severity, they also interact with event centrality to explain variance in PTSD severity (Barton et al., 2013; Lancaster et al., 2011). Very recent evidence also suggests that the negative posttrauma thoughts assessed in the PTCI are correlated

with neuroticism; Christiansen and Hansen (2015) found that scores on all three subscales of the PTCI correlated significantly with neuroticism. Intuitively, it stands to reason that negative thoughts about self and the world and thoughts of self-blame would also be associated with negative affectivity. Given this pattern of evidence in the literature, posttraumatic cognitions—negative thoughts about self, negative thoughts about the world, and thoughts of self-blame—were all expected to align with both narrative centrality and with negative affectivity in the Rubin et al. (2014) model.

Perceived Injustice

Research on perceived injustice has developed very recently in the area of pain research (e.g., chronic pain, pain subsequent to injuries, etc.; Sullivan, Scott, & Trost 2012; McParland & Eccleston, 2013). The construct has been measured with the Injustice Experience Questionnaire (IEQ; Sullivan, Adams, Horan, Maher, Boland, & Gross, 2008), a self-report measure that addresses the degree to which respondents experience blame, permanence of loss, severity of loss, and sense of unfairness, all in relation to pain resulting from an injury or a chronic condition. Research has demonstrated a relationship between perceived injustice and poor outcomes related to chronic pain and injury, such as poor injury rehabilitation outcomes and poor mental health outcomes (Sullivan et al., 2012).

More recently, perceived injustice has been investigated in the context of trauma responses. There is growing evidence that perceived injustice is very strongly related to PTSD symptom severity in individuals experiencing whiplash injury (Sullivan, Thibault, Simmonds, Milloto, Cantin, & Velly, 2009) and in diverse medical trauma samples (Trost et al., 2015). With regard to the Rubin et al. (2014) model, perceived injustice was hypothesized to align with the

narrative centrality factor. The perception of injustice is a cognitive construal process consistent with narrative construction, and the inward focus on the severity and isolation of the experience (e.g., “Most people don’t understand how severe my situation is”) and the focus on the experience as a turning point in the life story (e.g., “My life will never be the same”) are consistent with the themes of the narrative centrality factor in the model.

Negative Religious Coping

Coping styles and processes have been a variable of interest in the trauma literature for a number of years, but attention has more recently turned to the role of religious coping in determining trauma outcomes. Negative religious coping was selected as a variable of interest in the proposed study to expand on Rubin and colleagues’ (2014) previous examination of avoidant coping, another potentially maladaptive coping style. Kenneth Pargament proposed the concept of religious coping as an individual’s “efforts to understand and deal with life stressors in ways related to the sacred” (Pargament, Feuille, & Burdzy, 2011, p. 52; Pargament & Mahoney, 2005). Religious coping is typically conceptualized as a process that can be either adaptive or maladaptive, and is measured along two dimensions with Pargament’s RCOPE and Brief RCOPE instruments (Pargament et al, 2011): positive religious coping and negative religious coping. Positive religious coping reflects an individual’s attempt to process stressful experiences through leaning on “a generally secure relationship with whatever the individual may hold sacred” (Pargament et al., 2011, p. 54). Negative religious coping, on the other hand, is generally reflective of a conflict or struggle with the individual’s conception of the sacred. Both positive and negative religious coping could be adaptive, depending on the context, but on the whole negative religious coping has been associated with both greater PTSD symptom severity

(Bradley, Schwartz, & Kaslow, 2005; Harris, Erbes, Engdahl, Olson, Winkowski, & McMahon, 2008) and with higher levels of negative affectivity (Freiheit, Sonstegard, Schmitt, & Vye, 2006; Schanowitz & Nicassio, 2006; Van Dyke, Glenwick, Cecero, & Kim, 2009). Given this pattern of evidence, negative religious coping was expected to align with negative affectivity in the model.

Summary and Restatement of Hypotheses

Over the past several decades, researchers have accumulated a wealth of knowledge about PTSD, its treatment, and related risk factors through prospective, intervention, and correlational research methods. Due to methodological constraints, a large portion of PTSD research has been (and likely will continue to be) correlational in nature. Thus, there is a need to move forward with exploration of models that may help to elucidate the nature of relationships among the diverse known PTSD correlates, with the ultimate goal of developing even more effective prevention and treatment approaches than currently exist. Rubin, Boals, and Hoyle (2014) proposed and conducted initial testing of a model that suggests many of the known PTSD correlates may fall under a two-factor model incorporating narrative centrality and negative affectivity.

In this dissertation project, I intended to extend the work of Rubin and colleagues (2014) by a) utilizing structural equation modeling techniques to simultaneously examine relationships among variables, b) testing the model's utility with a carefully-selected list of PTSD correlate variables, c) extending the model by including PTSD symptom severity, and d) examining both direct and indirect effects to assess the roles of narrative centrality and negative affectivity as they relate to known PTSD correlates and PTSD symptom severity. In the hypothesized model,

the following PTSD correlates were expected to align with the narrative centrality factor: perceived quality of social support as measured by scores on the Unsupportive Social Interactions Inventory, peritraumatic dissociation, perceived injustice, and negative posttraumatic cognitions (negative thoughts about self, negative thoughts about the world, and self-blame). The following PTSD correlates were expected to align with the negative affectivity factor: perceived quantity of social support as measured by scores on the Multidimensional Scale of Perceived Social Support, negative religious coping, and negative posttraumatic cognitions (negative thoughts about self, negative thoughts about the world, and self-blame). Note that all three types of negative posttraumatic cognitions were expected to align with both the narrative centrality and the negative affectivity factors.

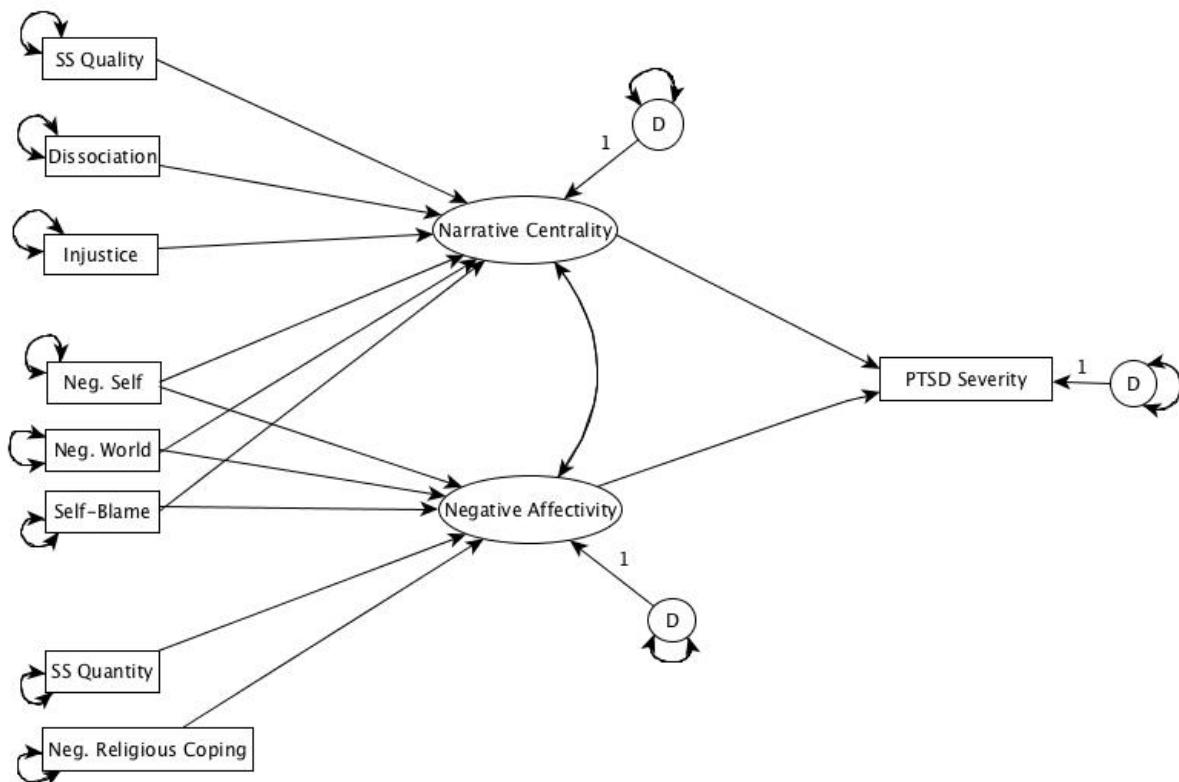


Figure 1. Hypothesized Model. For clarity, this model includes indirect paths only.

See Figure 1 for a visual representation of the proposed model. For clarity, only indirect paths are included in this figure. See Figure 4 in the Results section for the proposed full structural model, including direct paths between the PTSD correlate variables and PTSD symptom severity.

CHAPTER 2

METHOD

Participants and Procedure

Participants were recruited via Amazon Mechanical Turk (MTurk; www.mturk.com), an online workplace in which online “workers” select and complete tasks offered by “requesters.” In the MTurk framework, requesters post tasks, indicating the approximate time required and the monetary compensation offered for completing the task. In recent years, social science researchers have utilized MTurk to collect data from large and diverse samples, and the consensus appears to be that the psychometric quality (e.g., internal consistency) of data generated by MTurk participants is high and that the participant samples are typically more demographically diverse than college student samples and at least as diverse as typical internet-based samples (e.g., Behrend, Sharek, Meade, & Weibe, 2011; Burhmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010; Shapiro, Chandler, & Mueller, 2013).

In the current study, 638 individuals accessed the online survey, and a total of 541 were compensated for submitting their survey responses to MTurk. Participants ranged in age from 18 to 87 years ($M = 36.71$, $SD = 12.90$), and the median age was 33 years. See Table 1 for additional participant demographic data, including sex, ethnicity, race, and category of traumatic experience selected as currently most stressful.

In addition to using the MTurk framework to recruit and compensate participants, I utilized a web-based Mturk interface tool called TurkPrime (www.turkprime.com; Litman et al., 2015) to manage the details of the study in the MTurk framework. TurkPrime was developed as a tool to help social science researchers more easily conduct and manage studies on MTurk,

given that it can be difficult within the MTurk framework to manage the fine details of study operation, such as verifying study completion for compensation purposes and making updates to the study description (e.g., increase the payment rate, extending the estimated time to complete the study, or inviting participants to a follow-up study). TurkPrime is freely available to academic researchers.

Table 1

Demographic Information (N = 477)

Variable	<i>n</i>	%
Sex		
Female	316	66.2
Male	158	33.1
Prefer not to say	3	0.6
Ethnicity		
Hispanic or Latino	31	6.5
Not Hispanic or Latino	443	92.9
Prefer not to say	3	0.6
Race		
American Indian or Alaska Native	7	1.5
Asian	21	4.4
Black or African American	47	9.9
Native Hawaiian or Pacific Islander	1	0.2
White or Caucasian	385	80.7
Multiracial	13	2.7
Prefer not to say	3	0.6
Most Stressful Event Type		
Natural disaster	52	10.9
Fire or explosion	30	6.3
Transportation accident	65	13.6
Serious accident at home, work, or during recreational activity	17	3.6

(table continues)

Table 1 (*continues*).

Variable	<i>n</i>	%
Most Stressful Event Type		
Exposure to toxic substance	2	0.4
Physical assault	28	5.9
Assault with a weapon	14	2.9
Sexual assault	57	11.9
Other unwanted or uncomfortable sexual experience	33	6.9
Combat or exposure to a war zone (military or civilian)	4	0.8
Captivity	4	0.8
Life-threatening illness or injury	41	8.6
Severe human suffering	16	3.4
Sudden violent death	28	5.9
Sudden accidental death	42	8.8
Serious injury, harm, or death you caused to someone else	5	1
Any other very stressful event or experience	38	8
Prefer not to say	1	0.2

For the current study, all self-report measures (described below) were organized into an internet-based survey utilizing the secure online survey-building tool Qualtrics (www.Qualtrics.com). This survey was then posted as a task in MTurk. Potential participants were able to view a description of the task (questionnaires about experiencing very stressful life events and how people think about and cope with those experiences), the estimated time to complete the task (approximately 35 minutes), and the compensation awarded upon completion of the task (\$0.75). Additionally, potential participants were asked to accept the task only if they met the following inclusion criteria: at least 18 years of age, reside in the United States, and have experienced one of the 16 categories of traumatic events listed in the Life Events Checklist-5 (see Table 1 for a list of event categories) over the course of the lifetime.

Participants were able to voluntarily choose to accept the task or not. Once they entered the online survey, an informed consent notice explained the nature of the study and participants were free to exit the study at any time. Compensation was awarded in MTurk (via the TurkPrime researcher interface) after survey completion was verified in Qualtrics. To verify completion, a random code was generated in Qualtrics at the end of the survey and participants were instructed to enter this code in MTurk. The TurkPrime researcher interface automatically matched participant-entered codes with Qualtrics-generated codes to verify completion and award compensation in MTurk. Participant names and identifying information were not collected in the survey and MTurk worker identification numbers were anonymized by TurkPrime, ensuring participant privacy.

To support participant safety in potential cases of distress during the study, a link to resources was included on each survey page with the language, “If you feel you need assistance, please contact any of the following.” The phone number for the Suicide Prevention Lifeline (1-800-273-8255) and a link to the National Center for PTSD’s “Where to get help for PTSD” resources webpage (<http://www.ptsd.va.gov/public/where-to-get-help.asp>) was displayed.

Measures

Trauma History and PTSD Symptom Severity

Life Events Checklist-5

The Life Events Checklist-5 (LEC-5; Weathers et al., 2013) is a self-report measure of trauma exposure. Seventeen LEC-5 items present 16 categories of potentially traumatic

experiences (e.g., forced sexual contact, violent crime). The additional item allows participants to report “any other very stressful event or experience” which was not recorded on the previous items. For each event category, respondents indicate how they experienced it (if at all) by endorsing one or more of the following responses: happened to me, witnessed it, learned about it, part of my job, not sure, and doesn’t apply. Importantly, the LEC-5 also includes items to facilitate identifying the *most* distressing event if more than one event type was endorsed. The instructions clarify for the respondent that “for the purposes of this questionnaire, [this] means the event that currently bothers you the most.” This item structure facilitates identifying the index most stressful event that is the focus of several of the measures assessing responses to that event. Though the LEC-5 presents a few follow-up questions for the identified most distressing event (e.g., “Was someone seriously injured or killed?”), only the question assessing time elapsed since the event was included to avoid unnecessary disclosure of additional details related to the stressful experience. As presented, the LEC-5 items allowed for demographic analysis of event type, how the event was experienced (e.g., “happened to me”), and time since the event.

At the time of this dissertation’s submission, the website for the National Center for PTSD, which houses a repository of trauma exposure and PTSD severity measures, stated, “Psychometrics are not currently available for the LEC-5. Given the minimal revisions from the original version of the LEC, few psychometric differences are expected” (National Center for PTSD^a, n.d.). The LEC was developed in conjunction with the Clinician Administered PTSD Scale (CAPS), which is widely considered the gold standard for PTSD assessment (Gray, Litz, Hsu, & Lombardo, 2004). Gray and colleagues reported in a university student sample strong test-retest reliability and convergent validity as evidenced by alignment with the Traumatic Life Events Questionnaire (TLEQ) and a similar pattern of correlations with variables known to

correlate with the TLEQ. Gray and colleagues also reported in a combat veteran clinical sample correlations in expected directions with PTSD symptom severity and other measures of psychological distress (Gray et al, 2004).

PTSD Checklist 5

The PTSD Checklist 5 (PCL-5; Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013) is a 20-item self-report measure that mirrors the PTSD symptoms outlined in the 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013). Participants rate the degree to which they have been bothered by each symptom during the past month on a scale ranging from 0 (*not at all*) to 4 (*extremely*). The PCL-5 can be scored in different ways according to its intended use (National Center for PTSD^b, n.d.). In the proposed study, scores for all items were totaled for a sum score ranging from 0 to 80. The measure has been in limited use as researchers transition from the *DSM-IV* model of PTSD symptoms to the *DSM-5* model, but Blevins, Weathers, Davis, Witte, and Domino (2015) reported evidence of internal consistency (Cronbach's alpha = .94) and both convergent and discriminant validity across two samples of trauma-exposed university students. Wortmann and colleagues (2016) also reported high internal consistency reliability and correlations of expected direction and magnitude with criterion measures including depression, anxiety, and insomnia in a treatment-seeking military sample. Internal consistency reliability estimates for the PCL-5 and all other continuous variable measures are reported in Table 2 (Chapter 3, Results), alongside descriptive and univariate normality statistics.

Narrative Centrality Indicators

Centrality of Event Scale

The Centrality of Event Scale (CES; Berntsen & Rubin, 2006) is a 7-item scale designed to measure the extent to which a personal life event is construed as being central to the respondent's identity, life story, and understanding of the world. Participants indicate on a 5-point scale ranging from 1 (*totally disagree*) to 5 (*totally agree*) how much they agree with each statement. Example items include "I feel that this event has become part of my identity" and "This event has become a reference point for the way I understand myself and the world." Item scores are summed for a CES total score ranging from 7 to 35. High internal consistency reliability for the CES has been reported by Berntsen and Rubin (2006), Cronbach's α ranging from .88 to .92 in a college student sample. Berntsen and Rubin also reported that individuals with high scores on a measure of PTSD symptom severity consistent with PTSD diagnosis had markedly higher scores on the CES; thus, the CES exhibits criterion validity in distinguishing those with high levels of PTSD symptom severity.

Closure Scale

The Closure Scale (Beike & Wirth-Beaumont, 2005) is a five-item self-report measure designed to assess the degree to which a memory for an experience is closed, meaning that the individual feels the event is behind him or her (Beike & Wirth-Beaumont, 2005). Items include "the event is a closed book to me" and "the event is 'unfinished business' for me" (reverse scored). Though the Closure Scale items are sometimes rated on a 7-point scale (1 = *not at all*, 7 = *very much*; Beike & Wirth-Beaumont, 2005; Beike, Markman, & Karadogan, 2009), in this study the items were rated on a 10-point scale (1 = *not at all*, 10 = *very much*) to maintain consistency with implementation of this measure in the studies by Rubin, Boals, and Hoyle

(2014). Similarly, the measure is sometimes scored by calculating the mean score across all items (Beike et al., 2009), but in this study item scores were summed for a total closure score ranging from 10 to 50 to maintain consistency with implementation of this measure in the studies by Rubin and colleagues (2014). Beike & Wirth-Beaumont (2005) reported internal consistency reliability estimates ranging from .80 to .90 in a series of three studies; in a later study of regret over lost opportunities, Beike and colleagues (2009) reported moderate negative correlations between closure scores and both regret intensity and disappointment, providing evidence of validity for the closure measure.

Posttraumatic Growth Inventory

The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a 21-item self-report measure on which respondents indicate to what degree they have experienced several positive changes following a very stressful life event (e.g., “I changed my priorities about what is important in life”; “I know that I can better handle difficulties”). The Likert-type rating scale ranges from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change to a very great degree as a result of my crisis*). A total scale score is calculated by summing all item scores; total scores may range from 0 to 105. Participants were instructed to answer the PTGI items in reference to their chosen most stressful event. Reliability for the PTGI has been reported at .97 in a recent study utilizing the measure in a context similar to the current study (Rubin, Boals, & Hoyle, 2014). Tedeschi and Calhoun (1996) reported that the PTGI did not correlate with social desirability (providing evidence of discriminant validity) and did have moderate positive correlations with the personality traits optimism and openness to experience (evidence of concurrent validity). Importantly, scores on the PTGI also distinguished between

individuals who had and had not experienced a severe trauma (providing evidence of construct validity).

Negative Affectivity Indicators

Big Five Inventory-Neuroticism

The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008) is a 44-item self-report measure of the “big five” dimensions of personality: neuroticism, extroversion, openness, conscientiousness, and agreeableness. Respondents indicate on a five-point rating scale (1 = *disagree strongly*, 5 = *agree strongly*) how much they agree that each statement applies to them. The neuroticism subscale consists of eight items (e.g., I am someone who...can be tense; ...gets nervous easily); the item numbers from the full BFI scale are 4, 9 (reverse-scored), 14, 19, 24 (reverse-scored), 29, 34 (reverse-scored), and 39. A total subscale score is obtained by calculating the mean score for the subscale items, and subscale total scores may range from 1 to 5. Recent studies utilizing this measure in contexts similar to the current study have reported internal consistency reliability estimates of .82 to .84 (Boals, Southard-Dobbs, & Blumenthal, 2015; Rubin, Boals, & Hoyle, 2014). John and colleagues (2008) reported that the BFI correlates substantially with other big-five personality measures and with peer ratings of the personality traits, providing evidence of convergent and construct validity for the instrument.

Positive and Negative Affect Schedule - Negative

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item self-report measure consisting of a 10-item positive subscale and a 10-item negative subscale. Each item presents a single emotion (e.g., distressed, scared), and the respondent indicates on a 5-point scale (1 = *very slightly or not at all*, 5 = *extremely*) the degree to which he or she has experienced the emotion over a specified period of time (e.g., the past week, past year, in general). In the current study, participants were instructed to indicate to what extent “you generally feel this way, that is, how you feel on the average” (Watson et al., 1988) because negative affect is assessed here from a trait perspective. To reduce participant burden, only the negative subscale was included. The subscale is scored by summing responses on the 10 negative subscale items; total scores may range from 10 to 50. Recent studies utilizing this measure in contexts similar to the current study have reported internal consistency reliability estimates of .83 to .88 (Boals, Southard-Dobbs, & Blumenthal, 2014; Rubin, Boals, & Hoyle, 2014). Watson and colleagues reported a coefficient alpha of .87 for the “in general” version of the PANAS-Negative subscale, and strong evidence of convergent and divergent validity (Watson et al., 1988).

Affect Intensity Measure - Negative Intensity

The Affect Intensity Measure (AIM; Larsen, Diener, & Emmons, 1986) is a 40-item self-report measure designed to assess the intensity with which respondents tend to react to life events. Respondents are prompted to indicate to what degree they tend to experience each item (e.g., “My emotions tend to be more intense than those of most people”) on a Likert-type scale ranging from 1 (*never*) to 6 (*always*). Recent psychometric work on the AIM suggests that items 6, 15, 19*, 26*, 28*, 30, 31*, 34, and 39 (reverse-scored items indicated with an asterisk) of the

AIM comprise a negative intensity subscale (Rubin, Hoyle, & Leary, 2013) that correlates in expected directions with measures of negative affect and neuroticism, providing evidence of validity for the subscale. Recent studies have also provided strong evidence of reliability of the negative intensity subscale, indicated by Cronbach's α values ranging from .80 to .81 (Boals, Southard-Dobbs, & Blumenthal, 2014, Rubin, Boals, & Hoyle, 2014; Rubin, Hoyle, & Leary, 2013). The negative intensity subscale score is determined by calculating the mean of scores on the subscale items; subscale total scores may range from 1 to 6.

PTSD Correlates

Unsupportive Social Interactions Inventory

The Unsupportive Social Interactions Inventory (USII; Ingram, Betz, Mindes, Schmitt, & Grant Smith, 2001) is a 24-item self-report measure that assesses the degree to which a respondent has experienced four categories of unsupportive, unhelpful, or upsetting social interactions relating to a particular stressful experience. In this study, the index event was the participant's identified most stressful experience. The four categories of interactions form four subscales, each with six items: 1) distancing, characterized by "behavioral or emotional disengagement"; 2) bumbling, characterized by "behaviors that are awkward, uncomfortable, intrusive, or inappropriately focused on 'fixing' the person"; 3) minimizing, characterized by "attempts to force optimism or to downplay the importance of the person's concerns"; and 4) blaming, characterized by "criticism and finding fault." Example items include: "did not seem to want to hear about it" (distancing); "did not seem to know what to say, or seemed afraid of saying or doing the 'wrong' thing" (bumbling); "told me to be strong, to keep my chin up, or that

I should not let it bother me” (minimizing); and “told me I had gotten myself into the situation in the first place, and now must deal with the consequences” (blaming).

Items address unsupportive behaviors across various social others and are not specific to a particular social relationship. Respondents indicate how much of each type of interaction they have experienced with regard to the specific stressful event, rating each item on a scale of 0 (*none*) to 4 (*a lot*). The USII is scored by calculating the mean rating across all 24 items. Both the scale total score and subscale scores have been utilized in previous research and are recommended for use by the instrument’s authors (Ingram et al., 2001). In this study, the total USII score was used to represent perceived quality of social support. Cronbach’s α for the total scale was .86 and .90 in the measure development studies (Ingram et al., 2001). Ingram and colleagues also reported evidence of incremental and construct validity for the USII via its unique contribution to variance accounted for in depression, distress, and physical symptoms after a stressful life event, after controlling for negative affect, generalized social support, and generalized negative social interactions.

Multidimensional Scale of Perceived Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item self-report measure that assesses the perceived sufficiency of social support from three different groups or types of individuals: family, friends, and significant others. Example items include: “my family really tries to help me”, “I can talk about my problems with my friends”, and “I have a special person who is a real source of comfort to me.” Respondents indicate how much they agree with each statement, rating each item on a Likert-

type scale of 1 (*very strongly disagree*) to 7 (*very strongly agree*). The MSPSS is scored by calculating the mean score across items.

Both the scale total score and subscale scores have been examined in previous research, and both the total scale and the subscales have demonstrated strong evidence of reliability across various populations and strong estimates of internal consistency (Osman, Lamis, Freedenthal, Gutierrez, & McNaughton-Cassill, 2014; Zimet et al., 1988; Zimet, Powell, Farley, Werkman, & Berkoff, 1990). Zimet and colleagues (1988) pointed to negative correlations with reported depression and anxiety symptoms as evidence of construct validity for the MPSS. In a later study, Zimet and colleagues (1990) further reported that only scores on the significant other support subscale were related to marital status, and only scores on the family support subscale were related to frequency of sharing experiences with one's mother (in an adolescent sample), further providing discriminant validity for the measure's subscales. However, after examining measurement invariance across gender groups and finding strong evidence of a general factor on all 12 MSPSS items, Osman and colleagues (2014) strongly recommended use of the total scale score. In this study, the total MSPSS score was used to represent general quantity of social support.

Posttraumatic Dissociative Experiences Questionnaire

The Posttraumatic Dissociation Experiences Questionnaire Self-Report Version (PDEQ; Marmar, Weiss, & Metzler, 1997) is a 10-item self-report measure intended to assess the extent to which an individual experienced dissociation symptoms during or immediately after a specific stressful or potentially traumatic event. In this study, the index event was the participant's identified most stressful experience. Respondents rate items on the PDEQ to indicate the degree

to which they experienced each reaction during or immediately after the index stressful event, using a rating scale ranging from 1 (*not true at all*) to 5 (*extremely true*), and a mean score across the 10 items serves as a total scale score. Example items include “I had moments of losing track of what was going on – I ‘blanked out’ or ‘spaced out’ or in some way felt that I was not part of what was going on” and “What was happening seemed unreal to me, like I was in a dream or watching a movie or play.” Several studies have reported strong evidence of internal consistency reliability for the PDEQ, with Cronbach’s α ranging from .73 to .89 across various trauma-exposed samples (Marshall, Orlando, Jaycox, Foy, & Belzberg, 2002; Sijbrandij et al., 2012). Several studies have reported evidence of construct and criterion validity for the PDEQ (Marshall et al., 2002). For example, Shalev, Peri, Canetti, and Schreiber (1996) found in a prospective study that PDEQ scores obtained within one week of physical trauma requiring hospitalization predicted PTSD symptom severity six months later.

Posttraumatic Cognitions Inventory

The Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) is a 33-item self-report measure designed to assess three distinct patterns of negative thoughts and beliefs that may follow a traumatic experience. The three subscales include: 1) negative thoughts about self (e.g., “I am a weak person”); 2) negative thoughts about the world (e.g., “People can’t be trusted”); and 3) thoughts of self-blame (e.g., “The event happened to me because of the sort of person I am”). Respondents rate agreement with each statement on a scale ranging from 1 (*totally disagree*) to 7 (*totally agree*). The Negative Cognitions About Self subscale comprises 21 items (numbers 2, 3, 4, 5, 6, 9, 12, 14, 16, 17, 20, 21, 24, 25, 26, 28, 29, 30, 33, 35, and 36), the Negative Cognitions About the World subscale has 7 items (numbers 7,

8, 10, 11, 18, 23, and 27), and the Self-Blame subscale has 5 items (numbers 1, 15, 19, 22, and 31). Because the subscales have unequal numbers of items, subscale scores are determined by calculating the mean score on items for the respective subscale. A total scale score may also be calculated by summing all item scores. In the current study, the subscale scores were used to represent negative posttraumatic cognitions across the three categories.

Foa and colleagues (1999) reported strong evidence of internal consistency reliability for the three subscales and the total score: negative thoughts about self, Cronbach's $\alpha = .97$; negative thoughts about the world, Cronbach's $\alpha = .88$; self-blame, Cronbach's $\alpha = .86$; and total score Cronbach's $\alpha = .97$. Test-retest reliability for all subscales was also strong; Spearman's ρ values ranged from .75 to .89 for 1-week retest and from .80 to .86 for 3-week retest. Foa and colleagues (1999) also reported strong evidence for the PTCI's construct validity in moderate to strong positive correlations with similar subscales on the Personal Beliefs and Reactions Scale (Resick, Schnicke, & Markway, 1991; Mechanic & Resick, 1993) and positive beta weights for all subscales in regression analyses predicting PTSD, depression, and general anxiety symptom severity. Additionally, the PTCI discriminated between individuals with high and low levels of reported PTSD symptom severity, providing further support of discriminant validity (Foa et al., 1999).

Injustice Experience Questionnaire

The Injustice Experience Questionnaire (IEQ; Sullivan, Adams, Horan, Maher, Boland, & Gross, 2008) is a 12-item self-report measure developed initially to assess perceived injustice (i.e., feelings and thoughts of blame and unfairness) in individuals experiencing pain related to an injury (e.g., a work-related injury). Respondents indicate on a five-point rating scale (0 =

never, 4 = *all the time*) how often they experience different thoughts with regard to their injury. Item scores are summed for a total score ranging from 0 to 48. The IEQ has been shown to be a reliable measure, with Cronbach's α equal to .92 in a sample of whiplash injury victims (Sullivan et al., 2008). The IEQ has also been shown to predict PTSD symptom severity in individuals who had experienced traumatic whiplash injuries, providing evidence of criterion validity (Sullivan et al., 2009).

More recently, the IEQ has been slightly adapted to apply more broadly to stressful life events beyond those resulting in physical injury alone. This adapted version of the IEQ was used in the current study. Language in the measure's instructions and items that refer to "injury" was replaced with "stressful event" in the following manner, with new language indicated in brackets:

When injuries [stressful events] happen, they can have profound effects on our lives. This scale was designed to assess how your injury [the distressing event] has affected your life. Listed below are twelve statements describing different thoughts and feelings that you may experience when you think about your injury [the distressing event]. Using the following scale, please indicate how frequently you experience these thoughts and feelings when you think about your injury [the distressing event].

Two of the IEQ items (1 and 8) refer to "my injury." These items were adapted to refer to "my situation." Otherwise, the items remained unaltered.

Brief R-COPE - Negative

The Brief R-COPE (Pargament, Smith, Koenig, & Perez, 1998; Pargament, Feuille, & Burdzy, 2011) is a 14-item self-report measure designed to assess a respondent's engagement in religious coping, defined as "efforts to understand and deal with life stressors in ways related to the sacred" (Pargament et al., 2011, p. 52). The Brief R-COPE includes two subscales, positive

and negative religious coping (NRC), each of which consists of seven items. Example items in the NRC subscale include “felt punished by God for my lack of devotion” and “questioned God’s love for me.” Respondents rate each item on a scale ranging from 1 (*not at all*) to 4 (*a great deal*). Subscale item scores are summed for a subscale total score ranging from 7 to 28. In a relatively recent systematic review of literature on the Brief R-COPE, Pargament and colleagues (2011) reported that internal consistency for the NRC subscale has ranged from .60 in a sample of Pakistani university students to .90 in a sample of cancer patients. In the same review paper, Pargament and colleagues presented an overview of strong evidence for the concurrent, predictive, and incremental validity of the R-COPE. To reduce participant burden, only the NRC subscale items were included in the proposed study.

Other Items

Demographic variables

Participants were asked to identify their sex, ethnicity (Hispanic or Latino, or not Hispanic or Latino), race, and age. On each item, participants were able to select “Prefer not to say.”

Careless Responding Indicators

Following the recommendations of Meade and Craig (2012), I included three questions to detect patterns of careless responding in the survey. Two directed-response questions were included (the first appearing after roughly 1/3 of the survey questions, and the second after roughly 2/3 of the survey questions). These questions directed participants to select a particular

response (e.g. select “strongly agree” for this question), which was then coded as correct or incorrect. Incorrect responses to these items indicated potential careless responding.

Additionally, a question at the end of the survey asked participants to self-evaluate and report the quality of their responses and whether they should be included in the study’s analyses.

CHAPTER 3

RESULTS

Data Cleaning

The initial dataset contained 638 cases, including those who did not complete the survey. I removed two cases because they did not give consent to participate in the study and exited the survey; I removed 86 additional cases because they began but did not complete the survey. Next, I examined responses on the three careless responding indicator items. I retained only cases that passed all three careless responding checks, removing 69 cases from the dataset for suspected careless responding. After these deletions for noncompletion and suspected careless responding, the dataset contained 481 cases. Next, I created a new variable in the dataset consisting of the calculated completion time in minutes (the difference between start time and end time). I removed all cases with a completion time under five minutes, resulting in three deletions. After this deletion, the dataset contained 478 cases.

Lastly, I examined all cases to ensure that a single most stressful event had been nominated in the Life Events Checklist. This step was important because other measures related to the individual's perception and cognitive processing of the stressful event (e.g., Centrality of Event Scale, Posttraumatic Cognitions Inventory) assume reference to a single stressful event. I removed one case because the individual clearly indicated in an open-response description of the stressful event that they were not responding with regard to a single stressful event ("I was just thinking in general..."). At the completion of these screening procedures, the dataset contained 477 cases.

I conducted the previously described data cleaning steps with the raw data file in Microsoft Excel. Next, I imported the data file to IBM SPSS Statistics versions 19 and 22; different versions were the product of working on different computers across multiple work sessions. Measure items requiring reverse-scoring were recoded into new variables.

Data Screening

Data screening was conducted in IBM SPSS versions 19 and 22. Missing values analysis indicated that there was well under 5% missing data in the dataset. Examination by variable/item indicated that the highest rate of missingness for any single variable was 1.3% (Posttraumatic Growth Inventory item #18 and Injustice Experience Questionnaire item #7). All other variables had well below 1% missing data. To detect patterns of missingness, including missing completely at random (MCAR), I conducted Little's MCAR test (1988). The test indicated that the data were MCAR, $\chi^2(20,658) = 20,625.89, p = .562$. Note that a χ^2 value that is not statistically significant suggests an MCAR pattern among missing data.

Following the recommendation of Schlomer, Bauman, and Card (2010), I selected multiple imputation as the method for addressing missing data. Multiple imputation is generally considered a best practice in handling missing data because parameter estimates are less biased and more precise in comparison to other imputation or deletion methods, and standard errors are more accurate (Schlomer et al., 2010). This is true in part because imputations are conducted in multiple datasets over which parameter estimates are averaged or pooled. Five imputed datasets were created in the multiple imputation process, and all analyses from this point forward were conducted on the multiply imputed dataset.

I examined univariate descriptive statistics for the key study variables to ensure all values were within acceptable range. See Table 2 for descriptive statistics, including internal consistency estimates (Cronbach's alpha) for each of the key study variables. According to conventions generally observed in structural equation modeling research, skewness index values $> |3.0|$ and kurtosis index values $> |20.0|$ indicate problematic univariate non-normality (Kline, 2011). All skew and kurtosis values were well under these thresholds.

Table 2

Descriptive Statistics for Continuous Variables (N = 472)

Variable	M	SD	α	Skew	Kurtosis
PCL-5	25.92	18.69	.951	.500 – .516	-.635 – -.630
PANAS	18.99	8.34	.932	.881 – .884	-.129 – -.120
-Negative					
BFI-Neuroticism	2.93	.91	.876	-.142 – -.139	-.335 – -.332
Affect Intensity	3.23	.93	.859	.149 – .154	.089 – .102
-Neg.					
CES	23.72	7.24	.914	-.495 – -.489	-.311 – -.306
PTGI	47.31	25.10	.946	-.101 – -.100	-.925 – -.918
Closure	25.63	12.50	.874	.130 – .133	-.880 – -.876
USII	1.32	.93	.950	.352 – .357	-.822 – -.817
MSPSS	5.14	1.37	.942	-.827 – -.823	.388 – .399
PDEQ	2.55	.96	.889	.148 – .150	-.763 – -.757
Neg. Cognitions	2.55	1.41	.965	.799 – .806	-.174 – -.160
-Self					
Neg. Cognitions	3.92	1.64	.913	-.056 – -.050	-.864 – -.860
-World					
Self-Blame	2.39	1.50	.874	.908 – .911	-.195 – -.184
IEQ	17.09	10.69	.932	.206 – .211	-.842 – -.832
Neg. Religious	10.91	5.01	.904	1.206 – 1.210	.570 – .584
Coping					

Note. Means are pooled across the five imputed datasets. Standard deviation, Cronbach's alpha, skew index, and kurtosis index values are reported as a range across the five imputed datasets. Where single values are reported in these columns, the same value was calculated in all five imputed datasets. PCL-5 = PTSD Checklist 5. PANAS-Negative = Negative subscale of the Positive and Negative Affect Schedule. BFI-Neuroticism = Neuroticism subscale of the Big Five Inventory. Affect Intensity-Neg. = Negative Intensity subscale of the Affect Intensity Measure. CES = Centrality of Event Scale. PTGI = Posttraumatic Growth Inventory. USII = Unsupportive Social Interactions Inventory. MSPSS = Multidimensional Scale of Perceived Social Support. PDEQ = Posttraumatic Dissociation Questionnaire. IEQ = Injustice Experience Questionnaire.

In addition to examining univariate features of the data, I also took steps to identify multivariate outliers. One method for doing so is to calculate Mahalanobis distance values for each case; this value identifies cases that are outliers on the combination of the multiple variables of interest by reflecting the case's distance from the centroid, or the point in multivariate space that represents the intersection of the means of all of the variables (Tabachnick & Fidell, 2001). The Mahalanobis distance statistic follows a chi-square distribution. According to Tabachnick and Fidell, a conservative threshold for identifying multivariate outliers is to identify cases with a Mahalanobis distance value greater than that consistent with a p value of .001 and degrees of freedom (df) equal to the number of variables included when calculating the Mahalanobis distance value. In this case, $df = 15$, and the corresponding chi-square/Mahalanobis distance cutoff value was 37.697. Five cases were identified as multivariate outliers through this procedure. Because deletion of these cases was not a significant loss of data and removing them could improve accuracy of parameter estimates in further analyses, I removed the five multivariate outlier cases from the dataset. For this final dataset, on which all subsequent analyses were conducted, $N = 472$.

Preliminary Analyses

I examined bivariate correlations among the key study variables before proceeding with planned SEM analyses. See Table 3 for bivariate correlations among the key study variables. A few patterns emerged among the correlations. First, in this study scores on the Posttraumatic Growth Inventory (PTGI) seemed to have an attenuated relationship with scores on other key variables: PTSD Checklist-5 (PCL-5), Centrality of Event Scale (CES), and Closure.

Table 3

Bivariate Correlations for Key Study Variables (N = 472)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. PCL-5	—														
2. PANAS-Negative	.58	—													
3. BFI-Neuroticism	.51	.57	—												
4. Affect Intensity-Negative	.51	.57	.82	—											
5. CES	.53	.25	.35	.26	—										
6. PTGI	.22	.02	-.10	-.05	.26	—									
7. Closure	-.42	-.21	-.34	-.28	-.51	-.02	—								
8. USII	.59	.40	.31	.30	.38	.25	-.23	—							
9. MSPSS	-.23	-.26	-.24	-.16	-.08	.21	.16	-.22	—						
10. PDEQ	.54	.32	.31	.32	.42	.25	-.18	.42	-.10	—					
11. Neg. Cognitions-Self	.68	.62	.52	.49	.38	-.02	-.36	.62	-.35	.38	—				
12. Neg. Cognitions-World	.55	.36	.46	.38	.43	.07	-.32	.47	-.27	.32	.59	—			
13. Self-Blame	.48	.40	.27	.26	.20	.03	-.12	.50	-.19	.25	.71	.39	—		
14. IEQ	.64	.40	.41	.38	.66	.21	-.53	.54	-.21	.40	.61	.58	.32	—	
15. Neg. Religious Coping	.49	.30	.24	.22	.27	.21	-.14	.43	-.17	.30	.48	.38	.33	.45	—

Note. Correlations are pooled across the five multiply imputed datasets. PCL-5 = PTSD Checklist 5. PANAS-Negative = Negative subscale of the Positive and Negative Affect Schedule. BFI-Neuroticism = Neuroticism subscale of the Big Five Inventory. Affect Intensity-Negative = Negative Intensity subscale of the Affect Intensity Measure. CES = Centrality of Event Scale. PTGI = Posttraumatic Growth Inventory. USII = Unsupportive Social Interactions Inventory. MSPSS = Multidimensional Scale of Perceived Social Support. PDEQ = Posttraumatic Dissociation Questionnaire. IEQ = Injustice Experience Questionnaire. Correlations greater than $\pm .10$ are statistically significant at $p < .05$ and correlations greater than $\pm .14$ are statistically significant at $p < .01$.

The correlation between PTGI scores and PCL-5 scores was roughly half that reported by Rubin, Boals, and Hoyle (2014) in both Study 3 ($r = .38$) and Study 4 ($r = .41$). The same was true for the correlation between scores on the PTGI and the CES: Rubin and colleagues reported correlations of .59 and .60 in Study 3 and Study 4, respectively. Lastly, a similar pattern was also evident in the correlation between scores on the PTGI and on Closure. Whereas Rubin and colleagues reported $r = -.22$, the correlation between PTGI and closure was near-zero in the current study. This pattern signaled a potential problem with the measurement model for the latent construct narrative centrality in the primary analyses.

Other observations among the bivariate correlations include the low magnitude of the correlation between the two measures of social support (quality, USII, and quantity, MSPSS): $r = -.22$. The negative direction of the correlation is not surprising, given that the measure of social support quality focuses on *unsupportive* social interactions specific to the traumatic experience, but given that the (assumed) underlying broad construct for both measures is social support, the correlation between the two measures was low in magnitude.

Lastly, the correlation between scores on social support quantity (MSPSS) and PCL-5 was surprisingly low in magnitude ($r = -.23$), given the wealth of evidence pointing to social support as a strong and consistent correlate of PTSD symptom severity, including multiple meta-analyses (Brewin et al., 2000; Ozer et al., 2003). As a point of reference, a criterion for inclusion in Rubin, Boals, and Hoyle's (2014) Study 4—in which they conducted an exploratory factor analysis with total scale scores on a “convenience sample of measures” was that the measure correlate $r \geq |.35|$ with PTSD symptom severity. The MSPSS scores in this study did not meet that criterion. However, I did include MSPSS scores in the primary SEM analyses because this iterative analysis approach allows for model respecification where indicated. I checked data for

the MSPSS again to ensure there were no errors in data handling or scoring, and all values were within expected range.

Primary Analyses

I utilized structural equation modeling (SEM) techniques to assess the fit of the hypothesized models. I conducted all SEM analyses in Mplus version 7 (Muthén & Muthén, 1998-2015), using raw multiply imputed data files and Maximum Likelihood estimation (Kline, 2011). I followed the two-step approach as described by Kline (2011), in which I first examined the measurement model for the two latent variables, followed by the full hypothesized structural regression (SR) model. See Figure 2, which depicts the initial proposed measurement model for the two latent factors, narrative centrality and negative affectivity.

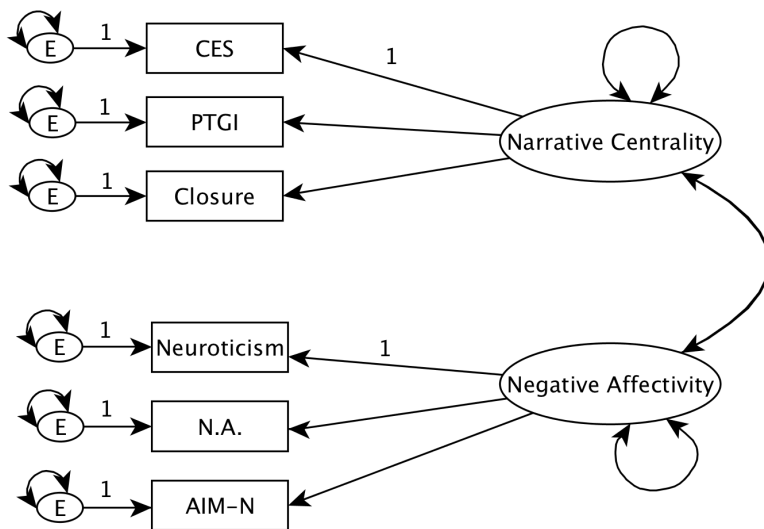


Figure 2. Initial proposed measurement model for latent factors narrative centrality and negative affectivity. CES = Centrality of Event Scale. PTGI = Posttraumatic Growth Inventory. N.A. = Negative Affect. AIM-N = Affect Intensity Measure – Negative.

Note that in this measurement model, narrative centrality is anchored to the indicator event centrality (CES), and negative affectivity is anchored to neuroticism. These ostensibly are the

core variables/indicators for each latent variable, and so the path coefficients are set to 1. This measurement model is a direct replication of the model reported by Rubin, Boals, and Hoyle (2014).

Fit for the initial measurement model was poor, which was unsurprising given the previously described pattern of correlations with the PTGI measure. PTGI was removed from the model, which greatly improved the model fit. See Figure 3 for the modified measurement model with standardized path coefficients and Table 4 for model fit statistics for the measurement model with and without the PTGI. Subsequent analyses excluded PTGI as an indicator of the latent variable narrative centrality.

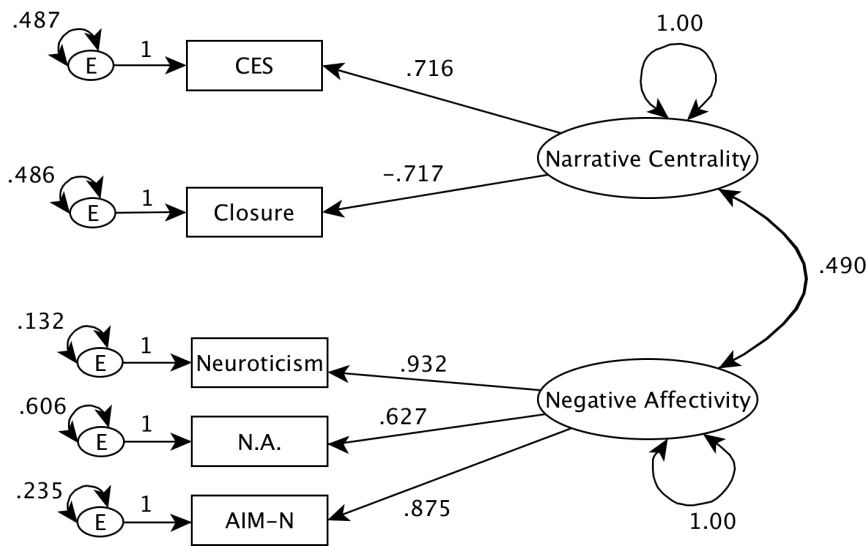


Figure 3. Modified measurement model for latent factors narrative centrality and negative affectivity. CES = Centrality of Event Scale. N.A. = Negative Affect. AIM-N = Affect Intensity Measure – Negative.

Note that for the standardized solution, path coefficients represent the correlation between observed indicator variables and their respective latent factors, and the square of the standardized path coefficient represents the proportion of variance in the indicator explained by

the latent factor (Kline, 2011). Note also that the standardized parameter estimate for the unanalyzed association between the two latent factors narrative centrality and negative affectivity represents the correlation between the two latent factors. At .49, this is roughly twice the magnitude of the correlation reported by Rubin, Boals, and Hoyle (2014) in Study 4.

Table 4

Model Fit Indices for Measurement Model

Model	χ^2 Model Fit		RMSEA			CFI	SRMR
	Value	df	Estimate	CI LL	CI UL		
1. Initial measurement model	61.415**	8	0.119**	0.092	0.148	0.947	0.065
2. Measurement model without PTGI	10.872*	4	0.06	0.018	0.105	0.993	0.016

Note. RMSEA = root mean square error of approximation. CI = confidence interval. LL = lower limit. UL = upper limit. CFI = comparative fit index. SRMR = standardized root mean square residual. PTGI = Posttraumatic Growth Inventory.

^aThe statistical significance test for the RMSEA estimate is referred to as the “close fit test”; $p < .05$ reflects rejection of the close fit hypothesis and is considered evidence not in favor of the model’s fit (Kline 2011).

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

After confirming adequate model fit for the measurement model, I proceeded with analysis of the proposed structural regression (SR) model. See Figure 4 for the full proposed model, including all direct and indirect paths between the PTSD correlate variables and PTSD symptom severity. Fit for the initial model was adequate but not ideal, so I carefully examined path coefficients and identified a theory-consistent step-by-step plan for model respecification. A warning message indicated that in its current version, Mplus is unable to generate modification indices with multiply imputed data, which served to underscore the reliance on theory-consistent decision-making in model respecification.

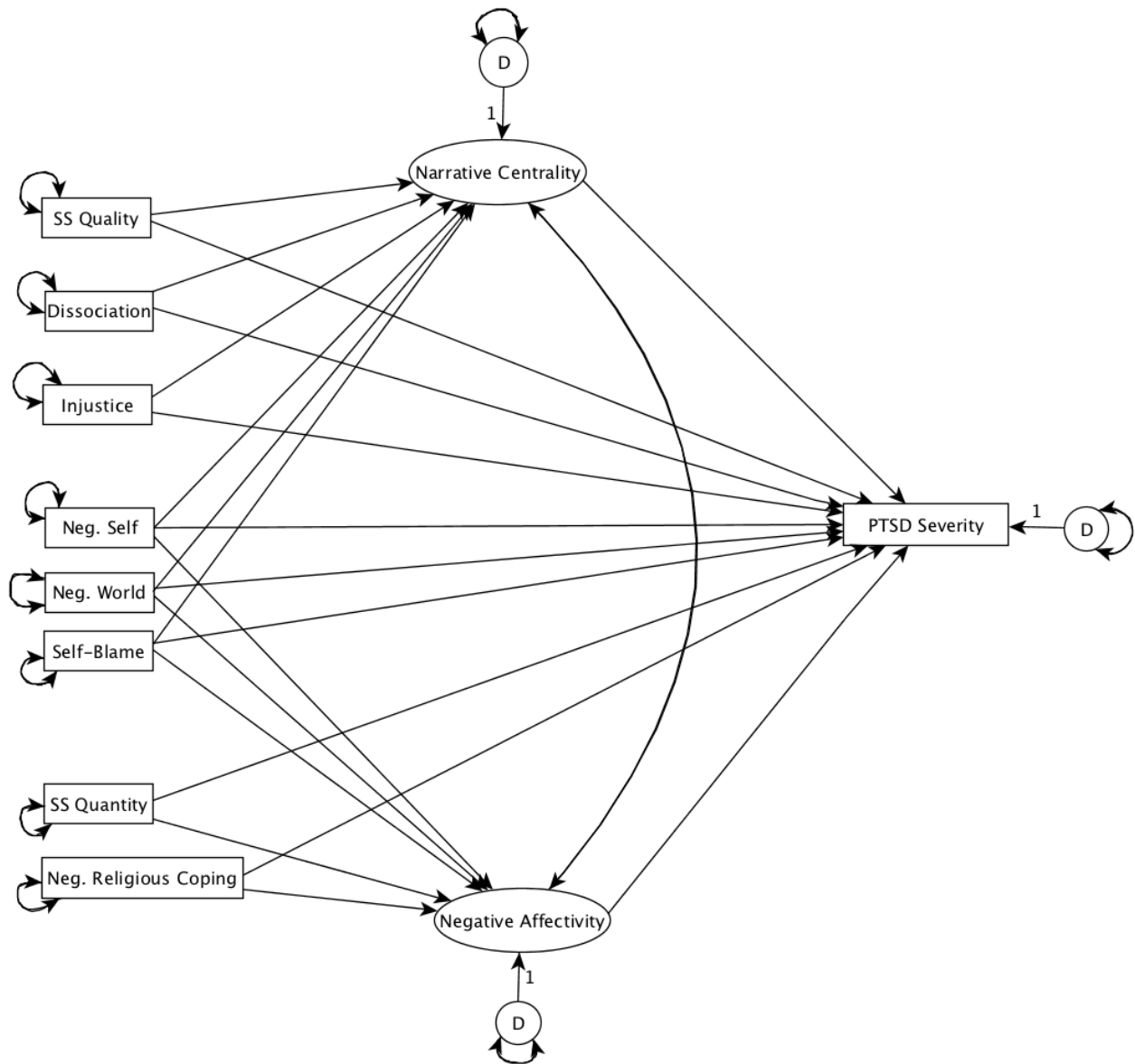


Figure 4. Structural regression model depicting proposed relationships among PTSD correlate variables, narrative centrality, negative affectivity, and PTSD symptom severity.

The model respecification plan included the following steps: 1) trim multiple non-statistically significant direct paths from PTSD correlate variables (negative cognitions about the world, injustice, and social support quantity) to PTSD symptom severity, as these suggested possible theory-consistent full mediation; 2) trim non- statistically significant paths from the

three posttraumatic cognitions categories to narrative centrality, as they were hypothesized to load on both narrative centrality and negative affectivity, or either factor; 3) trim the non-statistically significant path from negative religious coping to negative affectivity, which suggests non-mediation of the relationship with PTSD symptom severity; 4) deleting the non-statistically significant indirect path for social support quality (USII) and social support quantity (MSPSS), suggesting non-mediation of the relationship with PTSD symptom severity.

Note that this last respecification removed social support quantity from the model entirely. After each model respecification, I reviewed model fit indices and compared parameter estimates to the previous model. There were no appreciable changes in model fit, parameter estimates for path coefficients or variances, or in R^2 (proportion of variance explained) for the endogenous variables. See Table 5 for model fit indices for the original SR model and for each successive (nested) respecified model. Because the model fit changed very little after respecification, standardized parameter estimates for the original full SR model are depicted in Figure 5 and are discussed next.

All variables in the model collectively accounted for almost 70% of the variance in PTSD severity, $R^2 = .687$. Consistent with my hypotheses, peritraumatic dissociation and perceived injustice had statistically significant path coefficients to the latent factor narrative centrality. Further, the direct path from perceived injustice to PTSD severity was near zero, suggesting that the relationship between perceived injustice and PTSD severity may be fully mediated by narrative centrality. Whereas the three types of negative posttraumatic cognitions (negative cognitions about self, the world, and self-blame) were hypothesized to align with both narrative centrality and negative affectivity, only the paths to negative affectivity were statistically significant.

Table 5

Model Fit Indices for All Nested Structural Regression Models

Model	χ^2 Model Fit		RMSEA			CFI	SRMR
	Value	df	Estimate ^a	CI LL	CI UL		
1. Initial SR model	219.239**	36	0.104**	0.091	0.117	0.912	0.052
2. Trimmed direct path from neg. world to PTSD severity	219.843**	37	0.102**	0.089	0.116	0.912	0.052
3. Trimmed direct path from injustice to PTSD severity	220.105**	38	0.101**	0.088	0.114	0.913	0.052
4. Trimmed direct path from SS quantity to PTSD severity	220.116**	39	0.099**	0.087	0.112	0.913	0.052
5. Trimmed paths from all 3 negative cognition types to narrative centrality	225.327**	42	0.096**	0.084	0.109	0.912	0.053
6. Trimmed path from neg. religious coping to negative affectivity	226.189**	43	0.095**	0.083	0.107	0.912	0.052
7. Trimmed path from SS quality to narrative centrality and added path to negative affectivity	226.989**	43	0.095**	0.083	0.108	0.912	0.053
8. Trimmed path from SS quality to negative affectivity (only direct path from SS quality to PTSD severity remaining)	227.188**	44	0.094**	0.082	0.106	0.912	0.052
9. Trimmed path from SS quantity to negative affectivity and added path to narrative centrality	226.290**	44	0.094**	0.082	0.106	0.913	0.052
10. Trimmed path from SS quantity to narrative centrality (SS quantity removed from model)	214.932**	39	0.098**	0.085	0.111	0.915	0.054

Note. RMSEA = root mean square error of approximation. CI = confidence interval. LL = lower limit. UL = upper limit. CFI = comparative fit index. SRMR = standardized root mean square residual. Neg. world = negative thoughts about the world. SS = social support.

^aThe statistical significance test for the RMSEA estimate is referred to as the “close fit test”; $p < .05$ reflects rejection of the close fit hypothesis and is considered evidence not in favor of the model’s fit (Kline 2011).

** $p < .001$

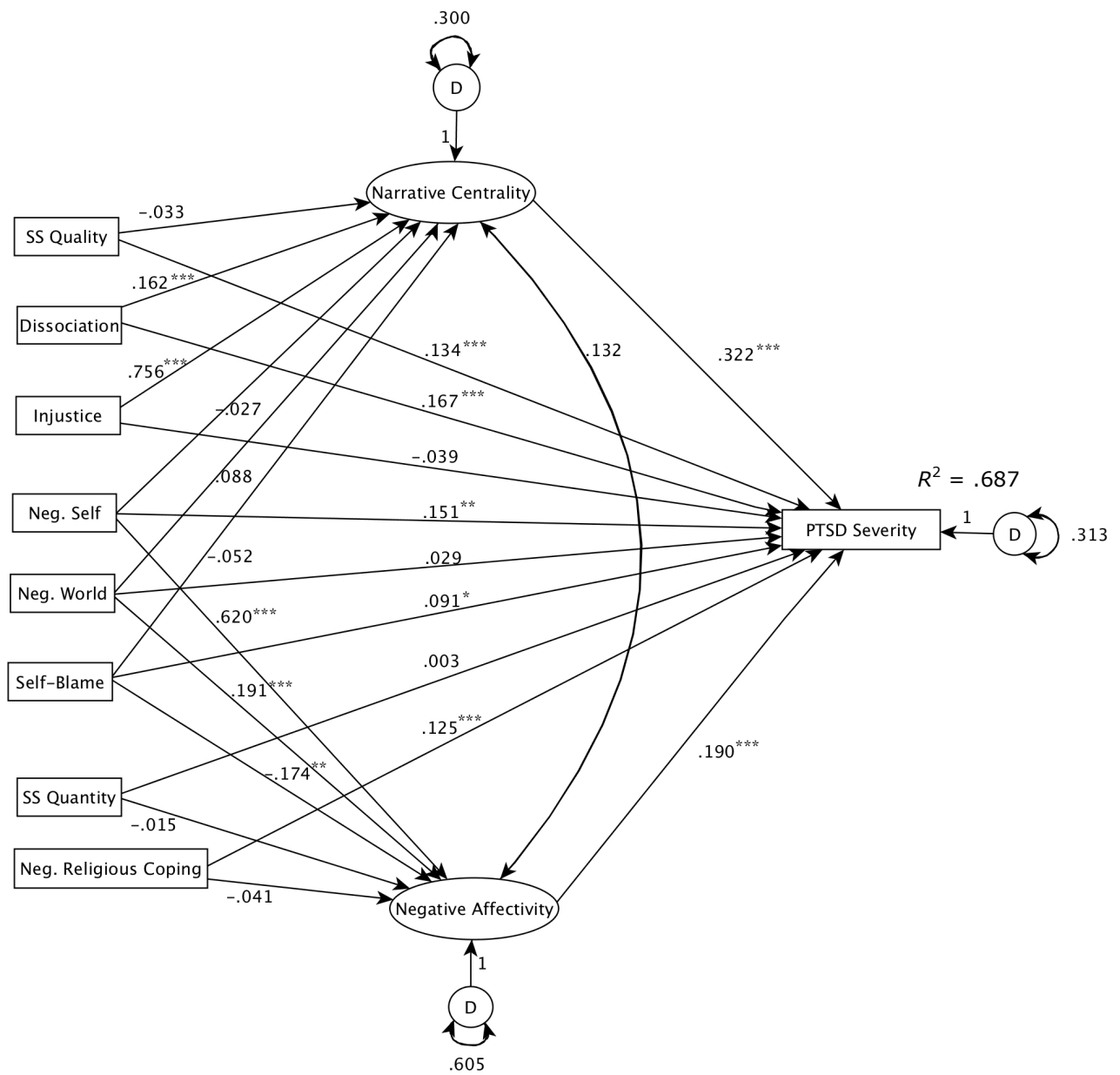


Figure 5. Full structural regression model (prior to modification) with standardized parameter estimates. Though statistical significance is not generally reported for standardized parameter estimates (Kline, 2011), here asterisks are included to identify parameter estimates for which the corresponding unstandardized parameter estimate was statistically significant.

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

Further, like perceived injustice, the direct path from negative cognitions about the world to PTSD severity was near zero, suggesting potential full mediation through negative affectivity.

Also of note is the observation that all three negative cognition types performed similarly in their alignment with negative affectivity and their non-alignment with narrative centrality.

Contrary to my hypotheses, social support quality had a near-zero path coefficient to narrative centrality but did have a statistically significant direct path to PTSD severity. The same was true for negative religious coping; there was no evidence for mediation through negative affectivity, but the direct path to PTSD symptom severity was statistically significant. Lastly, social support quantity did not have strong path coefficients to PTSD symptom severity or to negative affectivity, both of which were contrary to my hypothesis. This is inconsistent with previous literature identifying social support as a strong correlate of PTSD severity. To ensure no errors occurred in the data collection or scoring, I once again examined MSPSS scores. Internal consistency reliability was well within acceptable range and scores on the measure were all within the expected range, so I concluded that errors in data handling did not account for this departure from expectations.

CHAPTER 4

DISCUSSION

Project Summary

The purpose of the current study was to extend the work of Rubin, Boals, and Hoyle (2014) to further develop a proposed framework for understanding relationships among known correlates of PTSD symptom severity; this framework centers around the influence of narrative centrality and negative affectivity. In this project, I extended the work of Rubin and colleagues by: a) utilizing structural equation modeling techniques to simultaneously examine relationships among variables, b) testing the model's utility with a carefully-selected list of PTSD correlate variables, c) extending the model by including PTSD symptom severity, and d) examining both direct and indirect effects to assess the roles of narrative centrality and negative affectivity as they relate to known PTSD correlates and PTSD symptom severity. In the hypothesized model, the following PTSD correlates were expected to align with the narrative centrality factor: perceived quality of social support as measured by scores on the Unsupportive Social Interactions Inventory, peritraumatic dissociation, perceived injustice, and negative posttraumatic cognitions (negative thoughts about self, negative thoughts about the world, and self-blame). The following PTSD correlates were expected to align with the negative affectivity factor: perceived quantity of social support as measured by scores on the Multidimensional Scale of Perceived Social Support, negative religious coping, and negative posttraumatic cognitions (negative thoughts about self, negative thoughts about the world, and self-blame). Note that all three types of negative posttraumatic cognitions were expected to align with both the narrative centrality and the negative affectivity factors.

Primary Findings

Hypotheses were partially supported in that peritraumatic dissociation and perceived injustice aligned with narrative centrality as expected (with perceived injustice having a fully indirect relationship with PTSD severity), and negative posttraumatic cognitions aligned with negative affectivity as expected (with negative cognitions about the world having a fully indirect relationship with PTSD severity). However, the three types of negative posttraumatic cognitions did not also align with narrative centrality as predicted. Also contrary to expectations, negative religious coping had only a direct relationship with PTSD severity (no indirect relationship through negative affectivity), and social support quality had only a direct relationship with PTSD severity (no indirect relationship through narrative centrality). Unexpectedly, social support quantity, as measured by the Multidimensional Scale of Perceived Social Support, had neither a direct nor an indirect relationship with PTSD severity.

The proportion of variance in PTSD severity accounted for by all variables in the model (roughly 70%, $R^2 = .687$) is noteworthy, especially considering that the PTSD correlates selected for this study are a subset of all known PTSD correlates. For comparison, in Rubin and colleagues' (2014) Study 3, they found that factor scores on the latent factors narrative centrality and negative affectivity, along with their interaction term, accounted for 32% of the variance in PTSD severity in a multiple regression analysis. One contributing factor in the increased amount of variance accounted for is likely the inclusion of direct relationships with PTSD severity alongside indirect relationships (via narrative centrality and negative affectivity).

A pattern that is evident among these relationships is that variables more proximal to the individual's experience and cognitive construal of a very stressful experience (e.g., perceived injustice, negative posttraumatic cognitions, peritraumatic dissociation) had indirect relationships

with PTSD severity via narrative centrality or negative affectivity—some variables having a fully indirect relationship, whereas other variables (social support quality and negative religious coping) had only direct relationships with PTSD severity. Although social support and coping are certainly key factors in shaping long-term outcomes after trauma, they arguably are more distal to the trauma experience and not critical to the cognitive construal process. Thus, it appears that Rubin and colleagues' (2014) model may have some utility in distinguishing between PTSD correlates that are more and less critical to the cognitive perception and construal of a potentially traumatic experience.

This pattern echoes Ozer and colleagues' (2003) distinction between variables that are proximally and distally related to the trauma experience and construal process, and their emphasis on the relative predictive strength of PTSD correlates that are more proximal to the event experience. The narrative centrality/negative affectivity model may be useful in further exploring this distinction. As Rubin and colleagues (2014) stated, an important aspect of work examining the utility of their model is identifying variables that both confirm and challenge it. Social support seems to be one such variable that tests the limits of the model and helps to clarify this proximal-distal distinction among PTSD correlates.

Limitations and Implications for Future Research

Though the parameter estimates for the structural regression model provided partial support for the study's hypotheses and some interesting patterns emerged, they must be interpreted with some caution because the model fit to the data, though adequate, was not perfect. Further, the measurement model for narrative centrality required modification by omitting posttraumatic growth as an indicator of narrative centrality. This necessary change was

unanticipated. Also unanticipated was the lack of any statistically significant associations with social support quantity (as measured by the Multidimensional Scale of Perceived Social Support), which has been a common operationalization in previous research on the association between social support and trauma responses.

Regarding the performance of posttraumatic growth in the measurement model, comparison with correlation patterns in two other studies recently completed with MTurk samples by my research team revealed a similar pattern of attenuated relationships between scores on the PTGI and scores on the PCL-5 and the CES. One possible contributing factor is participant attention in MTurk samples. The items on the PTGI are particularly cognitively dense in that they require a respondent to reflect on a set of experiences, thoughts, feelings, and appraisals over a potentially lengthy period of time (as opposed to reporting a single symptom over the past seven days, for example), and to make comparisons between current functioning and past, pre-trauma functioning. Some MTurk workers complete surveys rather quickly, which introduces doubt about careful consideration in responses. However, this is precisely the reason for including careless responding indicators among the survey items, and only cases that passed all careless responding checks were included in the final dataset for this study.

It is difficult to determine if the less-than-perfect fit of the proposed structural regression model is a function of the narrative centrality/negative affectivity model itself, a function of the selected measures for testing the model's utility in terms of potential mediation, or a function of the study sample. It is possible that all three issues contribute in combination. One limitation of the current study that makes it difficult to tease this out is that, though this study was conceptualized as a next step following Rubin and colleagues' (2014) work, the study is actually multiple steps removed in that the sample is different (MTurk worker sample vs. university

students) and measures of PTSD symptom severity and trauma exposure in this study reflect a newer conception of PTSD according to the *DSM-5*. Rubin and colleagues utilized measures of PTSD symptom severity and trauma exposure consistent with the *DSM-IV* conception of PTSD. I chose to employ *DSM-5* consistent measures in my study to be in alignment with contemporary trauma research, but currently there is still very little psychometric information available about the new *DSM-5*-consistent measures. It could be informative to replicate the current study with the *DSM-IV*-consistent measures employed by Rubin and colleagues and to do so with a participant sample of university students to see if there are differences in the patterns observed in this study (e.g., the model's apparent distinction between PTSD correlates more and less germane to the trauma cognitive construal process). This may also potentially help to tease out the utility of the framework for organizing and more deeply understanding relationships among known PTSD correlates by further clarifying to which populations the model may best generalize and by clarifying which conceptualization of PTSD (*DSM-IV* or *DSM-5*) it best fits.

Another limitation of the current study is an issue common among studies employing SEM analyses: the data are cross-sectional in nature and therefore it is inappropriate to draw conclusions about causation, including conclusions about mediation. This study was planned as an initial next step in exploring the utility of narrative centrality and negative affectivity as a framework for more deeply exploring and understanding relationships among PTSD correlates. Therefore, examining cross-sectional data was an appropriate methodological choice with regard to considerations such as expenditure of resources at this early stage of inquiry. With some evidence that the model does show promise in further elucidating the proximal-distal distinction among PTSD correlates proposed by Ozer and colleagues (2003), an appropriate step for future studies (in addition to those just discussed) could be to collect data at multiple time points, pre-

and post-trauma, and to employ cross-lagged or other prospective analytic strategies to further delineate the potential predictive utility of Rubin and colleagues' model.

Conclusion

The purpose of the current study was to further the field's understanding of relationships among various PTSD correlates and their relative usefulness in explaining individual differences in trauma outcomes. To do so, I examined the utility of a model recently proposed by Rubin, Boals, and Hoyle (2014) that centers on the influence of narrative centrality and negative affectivity in explaining variance in PTSD severity. Previous meta-analytic research on PTSD correlates (e.g., Ozer, Best, Lipsey, & Weiss, 2003) has suggested that factors more closely related to an individual's perception and psychological response to a traumatic experience (e.g., posttraumatic cognitions, peritraumatic dissociation, perceived injustice) may have greater efficacy in predicting PTSD severity and explaining individual variation in trauma responses than factors that are more distally related to the experience construal process (e.g., coping strategies, social support). In the current study, there was some evidence that the model may be effective in highlighting this distinction between variables more and less germane to the individual's construal of a traumatic experience. These results further underscore the potential value of focusing on narrative centrality and negative affectivity both in research to further elucidate factors that determine individual trauma outcomes, and in developing effective prevention and intervention efforts.

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